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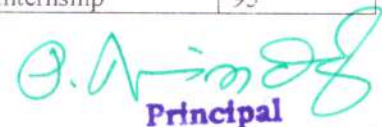
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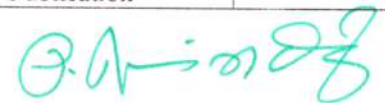
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# COVID-19 Time Series Forecasting of Daily Cases, Deaths Caused and Recovered Cases using Long Short Term Memory Networks

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**Abstract**— Novel Coronavirus (COVID-19) outbreak that emerged originally in Wuhan, the Hubei province of China has put the entire human race at risk. This virus was declared as Pandemic on 11<sup>th</sup> March 2020. Considering the massive growth rate in the number of cases and highly contagious nature of the virus, machine learning prediction models and algorithms are essential to predict the number of cases in the coming days. This could help in reducing the stress on health care systems and administrations by helping them plan better. In this paper the datasets used are obtained from the John Hopkins University's publicly available datasets to develop a state-of-the-art forecasting model of COVID-19 outbreak. We have incorporated data-driven estimations and time series analysis to predict the trends in coming days such as the number of cases confirmed positive, number of deaths caused by the virus and number of people recovered from the novel coronavirus. To achieve the estimations, we have used the Deep learning model long-short-term memory network (LSTM).

**Keywords**— Deep learning, Artificial Neural Networks, Long-Short-Term Memory (LSTMs), Pandemic, COVID-19, Coronavirus.

## I. INTRODUCTION

The World has been affected by a highly contagious virus called the Corona virus or SARS-COV-2. This virus originated in the wet markets of Wuhan, Hubei province of China during December 2019. This virus quickly spread to more than 160+ countries within a span of 3 months causing over 400,000 deaths with more than 8.9 million people affected globally [7]. This virus has caused very distressing times across all the countries and significant disruptions in global economies. Several intervening measures have been taken by the affected countries such as quarantining people to stop the spread of the virus.

Coronavirus being a contagious and infectious disease like the flu with certain growth patterns, such patterns are noted to be non-linear and dynamic in nature. Data is Dynamic in nature as the cases might differ based on the seasons, populations etc. [2]. Thus a deep learning model based on long short term memory networks using Pytorch framework can be used to predict the data accurately.

Deep learning power in the field of Artificial Intelligence can be established by recurrent neural networks (RNNs) and

LSTMs. These models are one of the best dynamic models that are used to generate sequences in multiple domains such as recognizing speech and music, emotional tone prediction for a piece of text (sentiment-classification of text), caption generation and machine translations [3]. There are different methods to achieve the task for time-series analysis, Machine learning algorithms like Linear and Logistical Regressions, SVM etc., are at the center of these applications [6]. While these tools are great in examining observations and reaching to conclusions, they come with some serious limitations. In most cases the data is skewed and relativistic. Considering this a robust new method using deep learning models are inevitable to gain time series forecasting results with higher accuracy.

## II. CONCEPTS

### A. Artificial Neural Networks (ANN)

ANNs are programmed to try and simulate a human brain by modelling the neural structure on a smaller scale [3]. ANN consists of interconnected web of nodes joined by edges known as neurons. The main function ANN is to perform progressively complex calculations on a set of inputs, then use the output to solve a problem [2]. ANNs are used for lots of different applications. An ANN typically consists of 3 layers namely input, hidden and output layers. Neural net can be seen as a result of spinning classifiers composed in a layered web; this is because every node in the hidden layer and output layer has their own classifier.

### B. Recurrent Neural Networks (RNN)

Recurrent neural networks (RNN) find their best usage when the patterns in data vary with time. This deep learning model is a simple structured model with a built-in feedback loop that allows it to act as a forecasting-engine [15]. In the feed forward neural network signals have unidirectional movement from input to output one layer at a time, In RNN the layer's output is added to the next input and fed back into the same layer. Contrary to feed-forward neural nets, an RNN can accept a sequence of values as input and produces a sequence of values as output, the capability to operate in sequence unfolds RNN to a wide variety of applications [13]. It is possible to obtain a capable net of more complex outputs by stacking RNNs one on top of another [20].

## Forex exchange using big data analytics

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**Abstract.** Analysis and Prediction of forex has gained immense value in today's economy. The stock price prediction is a difficult process owing to the irregularities in stock prices. Every trader wants to know if the pattern has been repeated in past to know what the possible output of the current situation will be. The primary objective is to propose a methodology that will use a historical dataset and provide a more accurate prediction on stock price. In this paper, we will be using machine learning pattern recognition algorithm on forex tick dataset. The learned model then will produce pattern from the given dataset and on the pattern of increasing or decreasing, the buyer will initiate a buy or sell the stock respectively. We will use python coding to execute the algorithm in jupyter notebook. Matplot library will help us to perform graphing in the process and Numpy will be helpful in doing statistical analysis of data.

### 1. Introduction

Every trader wants to find out the pattern of the forex before he makes any decision of making small or big investment in that forex. These changes in forex market reflect directly to the economy of the area. There is abundance of algorithms that could be found on the Internet that allows the user to predict the next change in forex market. Most of these are just a hoax and a way to manipulate people. We are going to find out patterns by plotting together the lines of those patterns on graph, which are very much similar to on another. Then we will perform back test on these results. A forward test can be performed on the upcoming data that has been produced after the prediction of the data but that data cannot be back tested to give the guarantee that it is indeed a suitable prediction.

We are using python here because it is a single threaded language, it uses single core of CPU, which means one script will use only one CPU (see ref. [8]-[14]).

We have many variables to be accounted for, not just the explicit ones but implicit ones too. Some of the explicit variables are percent change as pattern recognition, start point to current location percent change, fixed pattern length, fixed value/weight of pattern irrespective how old or new the data is.





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*Swecha*

## Certificate of Internship

This is to certify that

**Rodda Harshitha**

from

**Chaitanya Bharathi Institute of Technology**

has successfully completed a 4-week Swecha Internship Program during **October 9th, 2021 to November 6th, 2021** on **Web Development and Data Sciences** with Swecha.



**EXECUTIVE COMMITTEE MEMBER  
SWECHA**

Sy. No. 91, Beside Centre for Good Governance, Greenlands colony, Svm, Jawaharlal, Nehru Outer Ring Rd,  
Madhava Reddy Colony, Gachibowli, Telangana 500032

*Swecha*

## Certificate of Internship

This is to certify that

**Ajitha Gollapudi**

from

**Chaitanya Bharathi Institute of Technology**

has successfully completed a 4-week Swecha Internship Program during **October 9th, 2021 to November 6th, 2021** on **Web Development and Data Sciences** with Swecha.



**EXECUTIVE COMMITTEE MEMBER  
SWECHA**

Sy. No. 91, Beside Centre for Good Governance, Greenlands colony, Svm, Jawaharlal, Nehru Outer Ring Rd,  
Madhava Reddy Colony, Gachibowli, Telangana 500032

*Swecha*

## Certificate of Internship

This is to certify that

**G.Anshumaan**

from

**Chaitanya Bharathi Institute of Technology**

has successfully completed a 4-week Swecha Internship Program during **October 9th, 2021 to November 6th, 2021** on **Web Development and Data Sciences** with Swecha.



**EXECUTIVE COMMITTEE MEMBER  
SWECHA**

Sy. No. 91, Beside Centre for Good Governance, Greenlands colony, Svm, Jawaharlal, Nehru Outer Ring Rd,  
Madhava Reddy Colony, Gachibowli, Telangana 500032



*Swecha*

## Certificate of Internship

This is to certify that

**G.Srikanth Cohort6**

from

**Chaitanya Bharathi Institute of Technology**

has successfully completed a 4-week Swecha Internship Program during **October 9th, 2021 to November 6th, 2021** on **Web Development and Data Sciences** with Swecha.



---

**EXECUTIVE COMMITTEE MEMBER  
SWECHA**

Sy. No. 91, Beside Centre for Good Governance, Greenlands colony, Svm, Jawaharlal, Nehru Outer Ring Rd,  
Madhava Reddy Colony, Gachibowli, Telangana 500032

*Swecha*

## Certificate of Internship

This is to certify that

**O M S S N VANDAN BABU Cohort6**

from

**Chaitanya Bharathi Institute of Technology**

has successfully completed a 4-week Swecha Internship Program during **October 9th, 2021 to November 6th, 2021** on **Web Development and Data Sciences** with Swecha.



**EXECUTIVE COMMITTEE MEMBER  
SWECHA**

Sy. No. 91, Beside Centre for Good Governance, Greenlands colony, Svm, Jawaharlal, Nehru Outer Ring Rd,  
Madhava Reddy Colony, Gachibowli, Telangana 500032

*Swecha*

## Certificate of Internship

This is to certify that

**Nandishwar Ragula**

from

**Chaitanya Bharathi Institute of Technology**

has successfully completed a 4-week Swecha Internship Program during **October 9th, 2021 to November 6th, 2021** on **Web Development and Data Sciences** with Swecha.



**EXECUTIVE COMMITTEE MEMBER  
SWECHA**

Sy. No. 91, Beside Centre for Good Governance, Greenlands colony, Svm, Jawaharlal, Nehru Outer Ring Rd,  
Madhava Reddy Colony, Gachibowli, Telangana 500032

*Swecha*

## Certificate of Internship

This is to certify that

**Koppula Srinija Cohort6**

from

**Chaitanya Bharathi Institute of Technology**

has successfully completed a 4-week Swecha Internship Program during **October 9th, 2021 to November 6th, 2021** on **Web Development and Data Sciences** with Swecha.



**EXECUTIVE COMMITTEE MEMBER  
SWECHA**

Sy. No. 91, Beside Centre for Good Governance, Greenlands colony, Svm, Jawaharlal, Nehru Outer Ring Rd,  
Madhava Reddy Colony, Gachibowli, Telangana 500032

*Swecha*

## Certificate of Internship

This is to certify that

**VISHNU MADUPOJU**

from

**Chaitanya Bharathi Institute of Technology**

has successfully completed a 4-week Swecha Internship Program during **October 9th, 2021 to November 6th, 2021** on **Web Development and Data Sciences** with Swecha.



**EXECUTIVE COMMITTEE MEMBER  
SWECHA**

Sy. No. 91, Beside Centre for Good Governance, Greenlands colony, Svm, Jawaharlal, Nehru Outer Ring Rd,  
Madhava Reddy Colony, Gachibowli, Telangana 500032



*Swecha*

## Certificate of Internship

This is to certify that

**J Vinod Kumar**

from

**Chaitanya Bharathi Institute of Technology**

has successfully completed a 4-week Swecha Internship Program during **October 9th, 2021 to November 6th, 2021** on **Web Development and Data Sciences** with Swecha.



**EXECUTIVE COMMITTEE MEMBER  
SWECHA**

Sy. No. 91, Beside Centre for Good Governance, Greenlands colony, Svm, Jawaharlal, Nehru Outer Ring Rd,  
Madhava Reddy Colony, Gachibowli, Telangana 500032

*Swecha*

## Certificate of Internship

This is to certify that

**Indu Kannedevara**

from

**Chaitanya Bharathi Institute of Technology**

has successfully completed a 4-week Swecha Internship Program during **October 9th, 2021 to November 6th, 2021** on **Web Development and Data Sciences** with Swecha.



**EXECUTIVE COMMITTEE MEMBER  
SWECHA**

Sy. No. 91, Beside Centre for Good Governance, Greenlands colony, Svm, Jawaharlal, Nehru Outer Ring Rd,  
Madhava Reddy Colony, Gachibowli, Telangana 500032

*Swecha*

## Certificate of Internship

This is to certify that

**JADI.MANASA Cohort6**

from

**Chaitanya Bharathi Institute of Technology**

has successfully completed a 4-week Swecha Internship Program during **October 9th, 2021 to November 6th, 2021** on **Web Development and Data Sciences** with Swecha.



**EXECUTIVE COMMITTEE MEMBER  
SWECHA**

Sy. No. 91, Beside Centre for Good Governance, Greenlands colony, Svm, Jawaharlal, Nehru Outer Ring Rd,  
Madhava Reddy Colony, Gachibowli, Telangana 500032

*Swecha*

## Certificate of Internship

This is to certify that

**Yeturi Sai Shanmukha Cohort6**

from

**Chaitanya Bharathi Institute of Technology**

has successfully completed a 4-week Swecha Internship Program during **October 9th, 2021 to November 6th, 2021** on **Web Development and Data Sciences** with Swecha.



**EXECUTIVE COMMITTEE MEMBER  
SWECHA**

Sy. No. 91, Beside Centre for Good Governance, Greenlands colony, Svm, Jawaharlal, Nehru Outer Ring Rd,  
Madhava Reddy Colony, Gachibowli, Telangana 500032

Certificate Number

RHYTMNB1742-2021-7685009

\*RHYTMNB1742-2021-7685009\*



Bharat Sanchar Nigam Limited  
(A Govt. of India Enterprise)

## Regional Telecom Training Centre

Gachibowli, Hyderabad - 500 032  
Phone: 040-23000172 / 233  
Web site: www.rttyhd.bsnl.co.in



### CERTIFICATE

This is to certify

**AMRITHA BHARGAVI UTLA**

has completed successfully the following Course conducted by  
Bharat Sanchar Nigam Limited

Name of the Course : **ONLINE INTERNSHIP TRAINING-ECE-2Weeks**  
Commencing Date : **26-04-21**  
Completion Date : **07-05-21**

( SATYANARAYANA V V V )  
ASSISTANT GENERAL MANAGER

Dated : 07-05-21

Certificate Number

RHYTMNB1742-2021-7732011

\*RHYTMNB1742-2021-7732011\*



**Bharat Sanchar Nigam Limited**

(A Govt. of India Enterprise)

**Regional Telecom Training Centre**

Gachibowli, Hyderabad - 500 032

Phone: 040-23000172 / 233

Web site: www.rttyhd.bsnl.co.in



## CERTIFICATE

**This is to certify**

**CHENNOJU MADHU**

has completed successfully the following course conducted by  
Bharat Sanchar Nigam Limited

**Name of the course** : ONLINE INTERNSHIP TRAINING-ECE-2Week  
**Commencing Date** : 19-07-21  
**Completion Date** : 30-07-21

( SATYANARAYANA V V V )  
**DEPUTY GENERAL MANAGER (DGM)**

Dated : 30-07-21

Certificate Number

RHYTMNB1742-2021-7732013

\*RHYTMNB1742-2021-7732013\*



**Bharat Sanchar Nigam Limited**

(A Govt. of India Enterprise)

**Regional Telecom Training Centre**

Gachibowli, Hyderabad - 500 032

Phone: 040-23000172 / 233

Web site: www.rtchyd.bsnl.co.in



## CERTIFICATE

**This is to certify**

**CHITNENI MANIDEEPAK RAO**

has completed successfully the following course conducted by  
Bharat Sanchar Nigam Limited

**Name of the course** : ONLINE INTERNSHIP TRAINING-ECE-2Week  
**Commencing Date** : 19-07-21  
**Completion Date** : 30-07-21

( SATYANARAYANA V V V )  
**DEPUTY GENERAL MANAGER (DGM)**

Dated : 30-07-21

Certificate Number

RHYTMNB1742-2021-7732002

\*RHYTMNB1742-2021-7732002\*



**Bharat Sanchar Nigam Limited**

(A Govt. of India Enterprise)

**Regional Telecom Training Centre**

Gachibowli, Hyderabad - 500 032

Phone: 040-23000172 / 233

Web site: www.rttyhd.bsnl.co.in



## CERTIFICATE

**This is to certify**

**CHENNAREDDY VAMSI KRISHNA**

has completed successfully the following course conducted by  
Bharat Sanchar Nigam Limited

**Name of the course** : ONLINE INTERNSHIP TRAINING-ECE-2Week  
**Commencing Date** : 19-07-21  
**Completion Date** : 30-07-21

( SATYANARAYANA V V V )  
**DEPUTY GENERAL MANAGER (DGM)**

Dated : 30-07-21



Certificate Number

RHYTMNB1742-2021-7732021

\*RHYTMNB1742-2021-7732021\*



**Bharat Sanchar Nigam Limited**

(A Govt. of India Enterprise)

**Regional Telecom Training Centre**

Gachibowli, Hyderabad - 500 032

Phone: 040-23000172 / 233

Web site: www.rtchyd.bsnl.co.in



## CERTIFICATE

**This is to certify**

**S SAI PRADEEP**

has completed successfully the following course conducted by  
Bharat Sanchar Nigam Limited

**Name of the course** : ONLINE INTERNSHIP TRAINING-ECE-2Week

**Commencing Date** : 19-07-21

**Completion Date** : 30-07-21

( SATYANARAYANA V V V )  
**DEPUTY GENERAL MANAGER (DGM)**

Dated : 30-07-21

Certificate Number

RHYTMNB1742-2021-7732010

\*RHYTMNB1742-2021-7732010\*



**Bharat Sanchar Nigam Limited**

(A Govt. of India Enterprise)

**Regional Telecom Training Centre**

Gachibowli, Hyderabad - 500 032

Phone: 040-23000172 / 233

Web site: www.rttyhd.bsnl.co.in



## CERTIFICATE

**This is to certify**

**MEDAVARAPU CHIDRUPI**

has completed successfully the following course conducted by  
Bharat Sanchar Nigam Limited

**Name of the course** : ONLINE INTERNSHIP TRAINING-ECE-2Week  
**Commencing Date** : 19-07-21  
**Completion Date** : 30-07-21

( SATYANARAYANA V V V )  
**DEPUTY GENERAL MANAGER (DGM)**

Dated : 30-07-21

Certificate Number

RHYTMNB1742-2021-7732015

\*RHYTMNB1742-2021-7732015\*



**Bharat Sanchar Nigam Limited**

(A Govt. of India Enterprise)

**Regional Telecom Training Centre**

Gachibowli, Hyderabad - 500 032

Phone: 040-23000172 / 233

Web site: www.rtchyd.bsnl.co.in



## CERTIFICATE

**This is to certify**

**AKSHITHA SANGARSU**

has completed successfully the following course conducted by  
Bharat Sanchar Nigam Limited

**Name of the course** : ONLINE INTERNSHIP TRAINING-ECE-2Week  
**Commencing Date** : 19-07-21  
**Completion Date** : 30-07-21

( SATYANARAYANA V V V )  
**DEPUTY GENERAL MANAGER (DGM)**

Dated : 30-07-21

Certificate Number

RHYTMNB1742-2021-7732019

\*RHYTMNB1742-2021-7732019\*



**Bharat Sanchar Nigam Limited**

(A Govt. of India Enterprise)

**Regional Telecom Training Centre**

Gachibowli, Hyderabad - 500 032

Phone: 040-23000172 / 233

Web site: www.rttyhd.bsnl.co.in



## CERTIFICATE

**This is to certify**

**LASYA GUDURU**

has completed successfully the following course conducted by  
Bharat Sanchar Nigam Limited

**Name of the course** : ONLINE INTERNSHIP TRAINING-ECE-2Week  
**Commencing Date** : 19-07-21  
**Completion Date** : 30-07-21

( SATYANARAYANA V V V )  
**DEPUTY GENERAL MANAGER (DGM)**

Dated : 30-07-21

Certificate Number

RHYTMNB1742-2021-7732017

\*RHYTMNB1742-2021-7732017\*



**Bharat Sanchar Nigam Limited**

(A Govt. of India Enterprise)

**Regional Telecom Training Centre**

Gachibowli, Hyderabad - 500 032

Phone: 040-23000172 / 233

Web site: www.rttyhd.bsnl.co.in



## CERTIFICATE

**This is to certify**

**GURRAM BOOSHAN RAJ**

has completed successfully the following course conducted by  
Bharat Sanchar Nigam Limited

**Name of the course** : ONLINE INTERNSHIP TRAINING-ECE-2Week  
**Commencing Date** : 19-07-21  
**Completion Date** : 30-07-21

( SATYANARAYANA V V V )  
**DEPUTY GENERAL MANAGER (DGM)**

Dated : 30-07-21

Certificate Number

RHYTMNB1742-2021-7732003

\*RHYTMNB1742-2021-7732003\*



**Bharat Sanchar Nigam Limited**

(A Govt. of India Enterprise)

**Regional Telecom Training Centre**

Gachibowli, Hyderabad - 500 032

Phone: 040-23000172 / 233

Web site: www.rttyhd.bsnl.co.in



## CERTIFICATE

**This is to certify**

**DURGAM PRASHANTH**

has completed successfully the following course conducted by  
Bharat Sanchar Nigam Limited

**Name of the course** : ONLINE INTERNSHIP TRAINING-ECE-2Week  
**Commencing Date** : 19-07-21  
**Completion Date** : 30-07-21

( SATYANARAYANA V V V )  
**DEPUTY GENERAL MANAGER (DGM)**

Dated : 30-07-21

Certificate Number

RHYTMNB1742-2021-7732016

\*RHYTMNB1742-2021-7732016\*



**Bharat Sanchar Nigam Limited**

(A Govt. of India Enterprise)

**Regional Telecom Training Centre**

Gachibowli, Hyderabad - 500 032

Phone: 040-23000172 / 233

Web site: www.rtchyd.bsnl.co.in



## CERTIFICATE

**This is to certify**

**G.SATYA SAI EESHWAR GANESH**

has completed successfully the following course conducted by  
Bharat Sanchar Nigam Limited

**Name of the course** : ONLINE INTERNSHIP TRAINING-ECE-2Week  
**Commencing Date** : 19-07-21  
**Completion Date** : 30-07-21

( SATYANARAYANA V V V )  
**DEPUTY GENERAL MANAGER (DGM)**

Dated : 30-07-21

Certificate Number

RHYTMNB1745-2021-7728012

\*RHYTMNB1745-2021-7728012\*



**Bharat Sanchar Nigam Limited**

(A Govt. of India Enterprise)

**Regional Telecom Training Centre**

Gachibowli, Hyderabad - 500 032

Phone: 040-23000172 / 233

Web site: www.rtchyd.bsnl.co.in



## CERTIFICATE

**This is to certify**

**PODDUTURI SHAILIKA**

has completed successfully the following course conducted by  
Bharat Sanchar Nigam Limited

**Name of the course** : ONLINE INTERNSHIP TRAINING WITH PROJECT-CSE-4Weeks  
**Commencing Date** : 12-07-21  
**Completion Date** : 06-08-21

( SATYANARAYANA V V V )  
**DEPUTY GENERAL MANAGER (DGM)**

Dated : 06-08-21



Certificate Number

RHYTMNB1745-2021-7749007

\*RHYTMNB1745-2021-7749007\*



**Bharat Sanchar Nigam Limited**

(A Govt. of India Enterprise)

**Regional Telecom Training Centre**

Gachibowli, Hyderabad - 500 032

Phone: 040-23000172 / 233

Web site: www.rtchyd.bsnl.co.in



## CERTIFICATE

**This is to certify**

**RAMISETTI SRI HARSHITHA**

has completed successfully the following course conducted by  
Bharat Sanchar Nigam Limited

**Name of the course** : ONLINE INTERNSHIP TRAINING WITH PROJECT-CSE-4Weeks  
**Commencing Date** : 19-07-21  
**Completion Date** : 13-08-21

( SATYANARAYANA V V V )  
**DEPUTY GENERAL MANAGER (DGM)**

Dated : 13-08-21

Certificate Number

RHYTMNB1745-2021-7749006

\*RHYTMNB1745-2021-7749006\*



**Bharat Sanchar Nigam Limited**

(A Govt. of India Enterprise)

**Regional Telecom Training Centre**

Gachibowli, Hyderabad - 500 032

Phone: 040-23000172 / 233

Web site: www.rtchyd.bsnl.co.in



## CERTIFICATE

**This is to certify**

**KOYALA NANDINI**

has completed successfully the following course conducted by  
Bharat Sanchar Nigam Limited

**Name of the course** : ONLINE INTERNSHIP TRAINING WITH PROJECT-CSE-4Weeks  
**Commencing Date** : 19-07-21  
**Completion Date** : 13-08-21

( SATYANARAYANA V V V )  
**DEPUTY GENERAL MANAGER (DGM)**

Dated : 13-08-21

Certificate Number

RHYTMNB1745-2021-7749008

\*RHYTMNB1745-2021-7749008\*



**Bharat Sanchar Nigam Limited**

(A Govt. of India Enterprise)

**Regional Telecom Training Centre**

Gachibowli, Hyderabad - 500 032

Phone: 040-23000172 / 233

Web site: www.rtchyd.bsnl.co.in



## CERTIFICATE

**This is to certify**

**KALYANAM NANDINI**

has completed successfully the following course conducted by  
Bharat Sanchar Nigam Limited

**Name of the course** : ONLINE INTERNSHIP TRAINING WITH PROJECT-CSE-4Weeks  
**Commencing Date** : 19-07-21  
**Completion Date** : 13-08-21

( SATYANARAYANA V V V )  
**DEPUTY GENERAL MANAGER (DGM)**

Dated : 13-08-21



BOLT

Date: 10/08/2021

## INTERNSHIP COMPLETION CERTIFICATE

To Whom-so-ever- It May Concern

This is to certify that Nakka Naga Geetha Krishna has successfully completed a Remote Internship at Inventrom Private Limited - Bolt IoT for the duration of six weeks. During this duration, Nakka worked as Web App Developer Intern on the project Movie Finder under the guidance of Senior Software Developer and Mentor Mr. Rahul Kumar Singh.

We take this opportunity to thank Nakka and wish them all the best for their future.

For Inventrom Private Limited,

Joyner Fernandes  
Human Resources Manager



# Certificate of Completion

This is to certify that Mr./Ms. Harika Dasa,  
a student                      of Chaitanya Bharathi Institute of Technology,  
has scored 58% and successfully completed the 2 Month training on Internet of  
Things and Machine Learning.

22nd Nov 2021

Date

A handwritten signature in black ink, appearing to read "Pranav Kundaikar".

Pranav Kundaikar

CTO, Bolt IoT

A handwritten signature in black ink, appearing to read "Pranav Pai Vernekar".

Pranav Pai Vernekar

CEO, Bolt IoT



To verify this certificate, please email [support@bolliot.com](mailto:support@bolliot.com) with the code below

7C34B3FB8BAD44D24A45D1F44ECA84



# Certificate of Completion

This is to certify that Mr./Ms. Himaja Karveda,  
a student \_\_\_\_\_ of CBIT, Hyderabad,  
has scored 68% and successfully completed the 1 Month training on Internet of  
Things and Machine Learning.

30th Dec 2021

Date

Handwritten signature of Pranav Kundaikar in black ink.

**Pranav Kundaikar**

CTO, Bolt IoT

Handwritten signature of Pranav Pai Vernekar in black ink.

**Pranav Pai Vernekar**

CEO, Bolt IoT



To verify this certificate, please email [support@boltiot.com](mailto:support@boltiot.com) with the code below

8C4C4847EBD323EF85DB8E0174CD64



# Certificate of Completion

This is to certify that Mr./Ms. Muthyam Mithila, a student of Chaitanya Bharathi Institute of Technology has scored 39 marks out of 50 and successfully completed the 2 Months training on Web Development.

05/06/2021

Date

Handwritten signature of Rahul Singh in black ink.

Rahul Singh  
Mentor, Bolt IoT

Handwritten signature of Pranav Pai Vernekar in black ink.

Pranav Pai Vernekar  
CEO, Bolt IoT



To verify this certificate, please e-mail to [support@boltiot.com](mailto:support@boltiot.com) with the code below:

D75DC94802926E378EFECB27FF8697

# CERTIFICATE *Of* INTERNSHIP

This certificate is proudly presented to  
**Chakilam Supriya**

in appreciation for your successful Internship in  
**THE IICLUB** on Internet Of Things  
between June 1,2021 and Sep 1 ,2021

Date: Sep 2 ,2021

  
**THE IICLUB**  
— Innovate Invent —  
Managing Director



# CERTIFICATE OF PROJECT COMPLETION



THIS CERTIFICATE IS PROUDLY PRESENTED TO

## Alakuntla Vishnu

has successfully undergone Industrial Program on Machine Learning  
from Beat The Virus from 15th Jun, 2021 to 15th Aug, 2021 and  
successfully completed the projects on

- Gmail Spam Detection
- Diabetes Detection
- IRIS classification

Under the guidance of the mentor and company representative

17-Aug-2021

DATE



A handwritten signature in black ink that reads 'Daman' with a double underline.

PROJECT HEAD

FT-2108000080

# CERTIFICATE OF PROJECT COMPLETION



THIS CERTIFICATE IS PROUDLY PRESENTED TO

## Roshitha Perumalla

has successfully undergone Industrial Program on Machine Learning  
from Beat The Virus from 15th Jun, 2021 to 15th Aug, 2021 and  
successfully completed the projects on

- Gmail Spam Detection
- Diabetes Detection
- IRIS classification

Under the guidance of the mentor and company representative

23-Aug-2021

BTV-2108000051

DATE



*Daman*

PROJECT HEAD

# CERTIFICATE OF PROJECT COMPLETION



THIS CERTIFICATE IS PROUDLY PRESENTED TO

**Sarvepalli Venkatadri Babu**

has successfully undergone Industrial Program on Machine Learning  
from Beat The Virus from 15th Jun, 2021 to 15th Aug, 2021 and  
successfully completed the projects on

- Gmail Spam Detection
- Diabetes Detection
- IRIS classification

Under the guidance of the mentor and company representative

11-Sep-2021

BTV-2109000406

DATE



A handwritten signature in black ink that reads 'Daman' with a double underline.

PROJECT HEAD



# INTERNSHIP CERTIFICATE

THIS IS TO CERTIFY THAT

**Pilla Vijay Kumar**

has successfully completed internship program in **Artificial Intelligence** from 05th Sep, 2021 to 05th Nov, 2021. During the internship, the student was found to be dedicated, hardworking and diligent.

Jahnvi Narindi



Director Signature



# INTERNSHIP CERTIFICATE

THIS IS TO CERTIFY THAT

**Dubasi Yashassu**

has successfully completed internship program in **Artificial Intelligence** from 05th Sep, 2021 to 05th Nov, 2021. During the internship, the student was found to be dedicated, hardworking and diligent.

Jahnvi Narindi



Director Signature

# Exposys Data Labs



## Certificate of Internship

### TO WHOM IT MAY CONCERN

This is to certify that **Ms. PABBATHI PALLAVI** has completed internship programme on “**IOT Developer**” from 11.05.2021 to 11.06.2021.

She took keen interest in the work assigned and successfully completed it. During the period of internship we found her to be punctual, hardworking and inquisitive.

We wish her luck and success in all her future endeavours.

**Y Vishnuvardhan**

Chief Director



hr@exposysdata.com  
www.exposysdata.com

# Exposys Data Labs



## Certificate of Internship

### TO WHOM IT MAY CONCERN

This is to certify that **Mr. SRIRAM SAI KRISHNAM RAJU SAGIRAJU** has completed internship programme on “**Data Science**” from 02.07.2021 to 01.08.2021.

He took keen interest in the work assigned and successfully completed it. During the period of internship we found him to be punctual, hardworking and inquisitive.

We wish him luck and success in all his future endeavours.

**Y Vishnuvardhan**

Chief Director



hr@exposysdata.com  
www.exposysdata.com

# Exposys Data Labs



## Certificate of Internship

### TO WHOM IT MAY CONCERN

This is to certify that **Mr. IPPILI HEMANTH SAI MANIKANTA** has completed internship programme on “**IOT Developer**” from 20.07.2021 to 19.08.2021.

He took keen interest in the work assigned and successfully completed it. During the period of internship we found him to be punctual, hardworking and inquisitive.

We wish him luck and success in all his future endeavours.

**Y Vishnuvardhan**

Chief Director



hr@exposysdata.com  
www.exposysdata.com



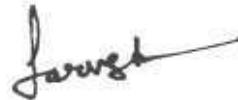
# Certificate of Training

## Samyuktha Gundla

from CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY has successfully completed a 6-week online training on **Blockchain**. The training consisted of Introduction to Blockchain, Key Concepts of Blockchain, Forming your own Blockchain Solution & Top Blockchain Solutions, Hyperledger Fabric, Hyperledger Composer, Capstone Project, and Training Project modules.

Samyuktha scored 100% marks in the final assessment and is a top performer in the training.

We wish Samyuktha all the best for future endeavours.



Sarvesh Agarwal

FOUNDER & CEO, INTERNSHALA

Date of certification: 2021-09-24

Certificate no. : 7E3FE282-FA0C-68D2-43E3-D5FEEEACBD4A

For certificate authentication, please visit [https://trainings.internshala.com/verify\\_certificate](https://trainings.internshala.com/verify_certificate)

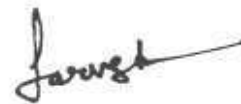
# Certificate of Training

## Goverarram Soumya

from CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY, has successfully completed a 6-week online training on **Blockchain**. The training consisted of Introduction to Blockchain, Key Concepts of Blockchain, Forming your own Blockchain Solution & Top Blockchain Solutions, Hyperledger Fabric, Hyperledger Composer, Capstone Project and Training Project modules.

Goverarram scored 100% marks in the final assessment and is a top performer in the training.

We wish Goverarram all the best for the future endeavours.



Sarvesh Agarwal

FOUNDER & CEO, INTERNSHALA

Date of certification: 2021-09-12

Certificate no. : 02FF361F-691A-761C-E01E-50631F88D917

For certificate authentication, please visit [https://trainings.internshala.com/verify\\_certificate](https://trainings.internshala.com/verify_certificate)

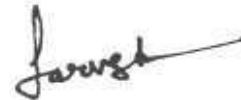
# Certificate of Training

## Manoj Kumar Bodula

from Chaitanya Bharathi Institute of Technology, has successfully completed a 6-week online training on **Blockchain**. The training consisted of Introduction to Blockchain, Key Concepts of Blockchain, Forming your own Blockchain Solution & Top Blockchain Solutions, Hyperledger Fabric, Hyperledger Composer, Capstone Project and Training Project modules.

Manoj Kumar scored 100% marks in the final assessment and is a top performer in the training.

We wish Manoj Kumar all the best for the future endeavours.



Sarvesh Agarwal

FOUNDER & CEO, INTERNSHALA

Date of certification: 2021-09-18

Certificate no. : 5E07DFED-8561-5114-CB7E-1FB630AA98F7

For certificate authentication, please visit [https://trainings.internshala.com/verify\\_certificate](https://trainings.internshala.com/verify_certificate)

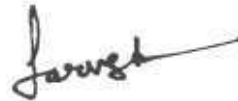
# Certificate of Training

**Sai Kiran**

from Chaitanya bhārathi Institute of technology, has successfully completed a 6-week online training on **Blockchain**. The training consisted of Introduction to Blockchain, Key Concepts of Blockchain, Forming your own Blockchain Solution & Top Blockchain Solutions, Hyperledger Fabric, Hyperledger Composer, Capstone Project and Training Project modules.

Sai scored 96% marks in the final assessment and is a top performer in the training.

We wish Sai all the best for the future endeavours.



**Sarvesh Agarwal**

FOUNDER & CEO, INTERNSHALA

Date of certification: 2021-09-18

Certificate no. : 750F4ED6-D76D-CCAC-12F0-CAE3C457F222

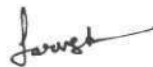
For certificate authentication, please visit [https://trainings.internshala.com/verify\\_certificate](https://trainings.internshala.com/verify_certificate)

# Certificate of Training

**Sanjana Rao Puligilla**

from Chaitanya Bharathi Institute of Technology, has successfully completed a 6-week online training on **Blockchain**. The training consisted of Introduction to Blockchain, Key Concepts of Blockchain, Forming your own Blockchain Solution & Top Blockchain Solutions, Hyperledger Fabric, Hyperledger Composer, Capstone Project and Training Project modules.

Sanjana Rao scored 100% marks in the final assessment and is a top performer in the training.  
We wish Sanjana Rao all the best for the future endeavours.



**Sarvesh Agarwal**  
FOUNDER & CEO, INTERNSHALA

Date of certification: 2021-09-17

Certificate no. : CF6F8B55-02E6-7D0E-141E-E7DA815F7794

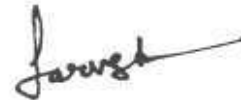
For certificate authentication, please visit [https://trainings.internshala.com/verify\\_certificate](https://trainings.internshala.com/verify_certificate)

# Certificate of Training

**Bhavana Mudimadugula**

from Chaitanya Bharathi Institute of Technology has successfully completed an 8-week online training on **Programming with C and C++**. The training consisted of Getting Started With Programming in C, Diving Into C Programming, Fundamentals of Object Oriented Programming Using CPP, Diving into CPP Programming, and Building Cricket Game Application modules.

We wish Bhavana all the best for future endeavours.



Sarvesh Agarwal

FOUNDER & CEO, INTERNSHALA

Date of certification: 2021-10-03

Certificate no. : C796E90C-72D6-D03B-D0BC-1493304B657F

For certificate authentication, please visit [https://trainings.internshala.com/verify\\_certificate](https://trainings.internshala.com/verify_certificate)



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**TECHNICAL SERVICES CENTRE**

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E.C.I.L X Road, Kushaiguda, Hyderabad - 500062, Telangana, India.



क्रमांक / S.No. 180766

दिनांक / Date: 02/08/2021

**E – CERTIFICATE**

प्रमाणित किया जाता है कि श्री / सुश्री / This is to certify that Mr. / Ms. Billa Bhanu

सुपुत्र / सुपुत्री श्री / Son/Daughter of Mr. Billa Srinivas


ने सफलतापूर्वक पाठ्यक्रम प्रशिक्षण पूरा किया है / has successfully completed training in the course of  
Industrial Training In Artificial Intelligence & Machine Learning Using Python

दिनांक से / from 19/07/2021 तक / to 02/08/2021 and secured A1


और निष्पादन मूल्यांकन के दौरान श्रेणी प्राप्त किया / grade during performance evaluation.

उपरोक्त समयावधि के दौरान प्रशिक्षार्थी का व्यवहार अच्छा पाया गया।

During the above period, the trainee's conduct was found Good

  
प्रशिक्षण प्रमुख  
Head of Training



  
केन्द्र प्रमुख  
Head of Centre



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E.C.I.L X Road, Kushaiguda, Hyderabad - 500062, Telangana, India.



क्रमांक / S.No. 180763

दिनांक / Date: 02/08/2021

**E - CERTIFICATE**

प्रमाणित किया जाता है कि श्री / सुश्री / This is to certify that Mr. / Ms. Gaddam Likhitheshwar

सुपुत्र / सुपुत्री श्री / Son/Daughter of Mr. Gaddam Ramulu


ने सफलतापूर्वक पाठ्यक्रम प्रशिक्षण पूरा किया है / has successfully completed training in the course of  
Industrial Training In Artificial Intelligence & Machine Learning Using Python

दिनांक से / from 19/07/2021 तक / to 02/08/2021 and secured A1


और निष्पादन मूल्यांकन के दौरान श्रेणी प्राप्त किया / grade during performance evaluation.

उपरोक्त समयावधि के दौरान प्रशिक्षार्थी का व्यवहार अच्छा पाया गया।

During the above period, the trainee's conduct was found Good

  
प्रशिक्षण प्रमुख  
Head of Training



  
केन्द्र प्रमुख  
Head of Centre





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(भारत सरकार का उद्यम / A Government of India Enterprises)  
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E.C.I.L X Road, Kushaiguda, Hyderabad - 500062, Telangana, India.



क्रमांक / S.No. 180765

दिनांक / Date: 02/08/2021

**E - CERTIFICATE**

प्रमाणित किया जाता है कि श्री / सुश्री / This is to certify that Mr. / Ms. Dade Karthik

सुपुत्र / सुपुत्री श्री / Son/Daughter of Mr. Dade Krishna


ने सफलतापूर्वक पाठ्यक्रम प्रशिक्षण पूरा किया है / has successfully completed training in the course of  
Industrial Training In Artificial Intelligence & Machine Learning Using Python

दिनांक से / from 19/07/2021 तक / to 02/08/2021 and secured A1


और निष्पादन मूल्यांकन के दौरान श्रेणी प्राप्त किया / grade during performance evaluation.

उपरोक्त समयावधि के दौरान प्रशिक्षार्थी का व्यवहार अच्छा पाया गया।

During the above period, the trainee's conduct was found Good

  
प्रशिक्षण प्रमुख  
Head of Training



  
केन्द्र प्रमुख  
Head of Centre



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E.C.I.L X Road, Kushaiguda, Hyderabad - 500062, Telangana, India.



क्रमांक / S.No. 180757

दिनांक / Date: 02/08/2021

**E - CERTIFICATE**

प्रमाणित किया जाता है कि श्री / सुश्री / This is to certify that Mr. / Ms. Kukkadapu Latha Sri

सुपुत्र / सुपुत्री श्री / Son/Daughter of Mr. Kukkadapu Vijaya Krishna


ने सफलतापूर्वक पाठ्यक्रम प्रशिक्षण पूरा किया है / has successfully completed training in the course of  
Industrial Training In Artificial Intelligence & Machine Learning Using Python

दिनांक से / from 19/07/2021 तक / to 02/08/2021 and secured A1


और निष्पादन मूल्यांकन के दौरान श्रेणी प्राप्त किया / grade during performance evaluation.

उपरोक्त समयावधि के दौरान प्रशिक्षार्थी का व्यवहार अच्छा पाया गया।

During the above period, the trainee's conduct was found Good

  
प्रशिक्षण प्रमुख  
Head of Training



  
केन्द्र प्रमुख  
Head of Centre



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TECHNICAL SERVICES CENTRE

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E.C.I.L X Road, Kushaiguda, Hyderabad - 500062, Telangana, India.



क्रमांक / S.No. 180775

दिनांक / Date: 02/08/2021

E - CERTIFICATE

प्रमाणित किया जाता है कि श्री / सुश्री / This is to certify that Mr. / Ms. M V Sharanya

सुपुत्र / सुपुत्री श्री / Son/Daughter of Mr. M G Vishweshwer Rao


ने सफलतापूर्वक पाठ्यक्रम प्रशिक्षण पूरा किया है / has successfully completed training in the course of  
Industrial Training In Artificial Intelligence & Machine Learning Using Python

दिनांक से / from 19/07/2021 तक / to 02/08/2021 and secured A1


और निष्पादन मूल्यांकन के दौरान श्रेणी प्राप्त किया / grade during performance evaluation.

उपरोक्त समयावधि के दौरान प्रशिक्षार्थी का व्यवहार अच्छा पाया गया।

During the above period, the trainee's conduct was found Good.

  
प्रशिक्षण प्रमुख  
Head of Training



  
केन्द्र प्रमुख  
Head of Centre



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E.C.I.L X Road, Kushaiguda, Hyderabad - 500062, Telangana, India.



क्रमांक / S.No. 181011

दिनांक / Date: 26/08/2021

**E - CERTIFICATE**

प्रमाणित किया जाता है कि श्री / सुश्री / This is to certify that Mr. / Ms. Shaik Ruksana

सुपुत्र / सुपुत्री श्री / Son/Daughter of Mr. Shaik Tara Abdul Davood


ने सफलतापूर्वक पाठ्यक्रम प्रशिक्षण पूरा किया है / has successfully completed training in the course of  
Internship Program- Android App Development

दिनांक से / from 09/08/2021 तक / to 23/08/2021 and secured A1


और निष्पादन मूल्यांकन के दौरान श्रेणी प्राप्त किया / grade during performance evaluation.

उपरोक्त समयावधि के दौरान प्रशिक्षार्थी का व्यवहार अच्छा पाया गया।

During the above period, the trainee's conduct was found Good

  
प्रशिक्षण प्रमुख  
Head of Training



  
केन्द्र प्रमुख  
Head of Centre



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TECHNICAL SERVICES CENTRE

(भारत सरकार का उद्यम / A Government of India Enterprises)  
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E.C.I.L X Road, Kushaiguda, Hyderabad - 500062, Telangana, India.



क्रमांक / S.No. 181012

दिनांक / Date: 26/08/2021

E - CERTIFICATE

प्रमाणित किया जाता है कि श्री / सुश्री / This is to certify that Mr. / Ms. Jhakkani Bhargavi

सुपुत्र / सुपुत्री श्री / Son/Daughter of Mr. Jhakkani Jagdish


ने सफलतापूर्वक पाठ्यक्रम प्रशिक्षण पूरा किया है / has successfully completed training in the course of  
Internship Program- Android App Development

दिनांक से / from 09/08/2021 तक / to 23/08/2021 and secured A1


और निष्पादन मूल्यांकन के दौरान श्रेणी प्राप्त किया / grade during performance evaluation.

उपरोक्त समयावधि के दौरान प्रशिक्षार्थी का व्यवहार अच्छा पाया गया।

During the above period, the trainee's conduct was found Good

  
प्रशिक्षण प्रमुख  
Head of Training



  
केन्द्र प्रमुख  
Head of Centre



## Certificate of Completion

*This is to certify that **Sathvika Gummadvally**  
of **Chaitanya Bharathi Institute Of Technology***

*has successfully completed 4 Weeks Instructor Led Live Online Training  
On **Machine Learning with Artificial Intelligence & IOT Using AWS**  
held during 12<sup>th</sup> July - 06<sup>th</sup> August 2021*

***Organized by**  
**Finland Labs (A Unit of Revert Technology Pvt. Ltd.)***

For Revert Technology Pvt. Ltd.  
*Director*  
  
Revert Technology Pvt. Ltd.  
Director



## Certificate of Completion

*This is to certify that **VARSHA PICHIKA***

*of **CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY***

*has successfully completed 4 Weeks Instructor Led Live Online Training  
On **Machine Learning with Artificial Intelligence & IOT Using AWS**  
held during 26<sup>th</sup> July - 20<sup>th</sup> August 2021*

**Organized by**

***Finland Labs (A Unit of Revert Technology Pvt. Ltd.)***

For Revert Technology Pvt. Ltd.  
*Director*  
  
Revert Technology Pvt. Ltd.  
Director



## Certificate of Completion

*This is to certify that **MANUPATI VIJAY KUMAR***

*of **Chaithanya Bharathi Institute Of Technology***

*has successfully completed 4 Weeks Instructor Led Live Online Training  
On **Machine Learning with Artificial Intelligence & IOT Using AWS**  
held during 26<sup>th</sup> July - 20<sup>th</sup> August 2021*

**Organized by**

**Finland Labs (A Unit of Revert Technology Pvt. Ltd.)**

For Revert Technology Pvt. Ltd.  
*Director*  
  
Revert Technology Pvt. Ltd.  
Director





## Certificate of Completion

*This is to certify that **MANUPATI VIJAY KUMAR***

*of **Chaithanya Bharathi Institute Of Technology***

*has successfully completed 4 Weeks Instructor Led Live Online Training  
On **Machine Learning with Artificial Intelligence & IOT Using AWS**  
held during 26<sup>th</sup> July - 20<sup>th</sup> August 2021*

**Organized by**

**Finland Labs (A Unit of Revert Technology Pvt. Ltd.)**

For Revert Technology Pvt. Ltd.  
*Director*  
  
Revert Technology Pvt. Ltd.  
Director



# *Certificate of Internship*

*awarded to*

***SAI BHARADWAJ V S MUNJULURU***

*for the successful completion of the 4-week Internship in Artificial Intelligence, Machine Learning  
& Industrial Internet of Things, jointly organized by National Instruments (NI) and Cognibot.  
The internship included training and projects in the above domains.*

A handwritten signature in black ink, appearing to read 'Ajay Kumar'.

*Ajay Kumar, Cognibot*

*20<sup>th</sup> June 2020*

*Date*



# *Certificate of Internship*

*awarded to*

***PADIGE KALYAN KUMAR***

*for the successful completion of the 4-week Internship in Artificial Intelligence, Machine Learning & Industrial Internet of Things, jointly organized by National Instruments (NI) and Cognibot.  
The internship included training and projects in the above domains.*

A handwritten signature in black ink, appearing to read 'Ajay Kumar'.

*Ajay Kumar, Cognibot*

*20<sup>th</sup> June 2020*

*Date*

# CERTIFICATE

THE SWASTIKA

*This certificate is proudly awarded to*

ANUHYA LINGA

*for being an Outstanding Android App Developer and Designer  
for the months of July - October 2021.*



---

Anisha Sharma

*Founder & CEO, The  
Swastika*

# CERTIFICATE

THE SWASTIKA

*This certificate is proudly awarded to*

AKSHAYA ENJAMOORI

*for being an Outstanding Android App Developer and Designer  
for the months of July - October 2021.*



---

Anisha Sharma

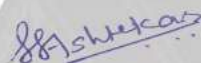
*Founder & CEO, The  
Swastika*

# SUMMER INTERNSHIP 2021

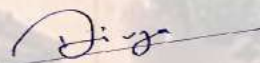
## *Certificate of Participation*

This is to certify that **Shravani Koduru**  
has successfully completed the Summer Internship 2021 on  
**Exploring Data Science with Python and MySQL.**

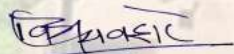
This summer internship was organized by the Department of Electronics Engineering, Ramrao Adik Institute of Technology, Nerul, Navi Mumbai, IEEE RAIT Student Chapter and technically sponsored by IEEE Bombay Section during 15th June to 31st July 2021.



**Ms. Shweta Ashtekar**  
Coordinator,  
Summer Internship 2021



**Ms. Divya Shah**  
Coordinator,  
Summer Internship 2021



**Dr Vishwesh A. Vyawahare**  
Head, Electronics Engg, RAIT



**Dr Mukesh D. Patil**  
Principal, RAIT

# CERTIFICATE OF COMPLETION



THIS IS PRESENTED TO

**SHAMITHA REDDY REGENTI**

TO CERTIFY THAT SHE HAS SUCCESSFULLY  
COMPLETED HER INTERNSHIP AS A

**Team leader for design and analysis of  
algorithms.**

**From May 7th to July 7th 2021**

ACCOMPLISHMENTS: DESIGNED 3 ALGORITHMS FOR PHONE NUMBER  
SEPARATION ON THE BASIS OF DIFFERENT FEATURES OF PHONE  
NUMBERS.

**WE WISH HER ALL THE BEST FOR FUTURE  
ENDEAVORS**

Certificate Date: 27/07/21

Certificate number:X1PEFU98BB2KE9ZFESI34T9ZW3VN37

A handwritten signature in black ink, appearing to read 'Mukul Goel', is positioned above the printed name.

**MUKUL GOEL**

FOUNDER & CEO





# Certificate of COMPLETION

## NITK - STEP

THIS IS TO CERTIFY THAT  
**MOUNIKA PASHAM**

ELECTRONICS AND COMMUNICATION ENGINEERING  
CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY

HAS COMPLETED THE ONE MONTH INDUSTRIAL INTERNSHIP PROGRAM ON

**IOT WITH MACHINE LEARNING USING PYTHON**

ORGANIZED BY NITK -STEP, NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA  
AND IEEE STUDENT BRANCH IN ASSOCIATION WITH PANTECH E LEARNING.

12<sup>TH</sup> JULY 2021

TO

6<sup>TH</sup> AUGUST 2021

CERTIFICATE NO: NITK-07-132

SRINIVASAN N

DIRECTOR - PANTECH E LEARNING



Dr.P.VENKATESA PERUMAL

PROFESSOR - INCHARGE - NITK - STEP





**NITK - STEP**

# Certificate of COMPLETION

THIS IS TO CERTIFY THAT

**MOVVA LAXMI SHIVANI**

ELECTRONICS AND COMMUNICATION ENGINEERING

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY

HAS COMPLETED THE ONE MONTH INDUSTRIAL INTERNSHIP PROGRAM ON

**IOT WITH MACHINE LEARNING USING PYTHON**

ORGANIZED BY NITK -STEP, NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA  
AND IEEE STUDENT BRANCH IN ASSOCIATION WITH PANTECH E LEARNING.

12<sup>TH</sup> JULY 2021

TO

6<sup>TH</sup> AUGUST 2021

CERTIFICATE NO: NITK-07-133

SRINIVASAN N

DIRECTOR - PANTECH E LEARNING



Dr.P.VENKATESA PERUMAL

PROFESSOR - INCHARGE - NITK - STEP



**NITK - STEP**

# Certificate of COMPLETION

THIS IS TO CERTIFY THAT

**SRAVYA KARYAMPUDI**

ELECTRONICS AND COMMUNICATION ENGINEERING

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY

HAS COMPLETED THE ONE MONTH INDUSTRIAL INTERNSHIP PROGRAM ON

**IOT WITH MACHINE LEARNING USING PYTHON**

ORGANIZED BY NITK -STEP, NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA  
AND IEEE STUDENT BRANCH IN ASSOCIATION WITH PANTECH E LEARNING.

12<sup>TH</sup> JULY 2021

TO

6<sup>TH</sup> AUGUST 2021

CERTIFICATE NO: NITK-07-169

SRINIVASAN N

DIRECTOR - PANTECH E LEARNING



Dr.P.VENKATESA PERUMAL

PROFESSOR - INCHARGE - NITK - STEP



**NITK - STEP**

# Certificate of COMPLETION

THIS IS TO CERTIFY THAT

**RACHEL SHANTHI**

ELECTRONICS AND COMMUNICATION ENGINEERING

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY

HAS COMPLETED THE ONE MONTH INDUSTRIAL INTERNSHIP PROGRAM ON

**IOT WITH MACHINE LEARNING USING PYTHON**

ORGANIZED BY NITK -STEP, NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA  
AND IEEE STUDENT BRANCH IN ASSOCIATION WITH PANTECH E LEARNING.

12<sup>TH</sup> JULY 2021

TO

6<sup>TH</sup> AUGUST 2021

CERTIFICATE NO: NITK-07-153

SRINIVASAN N

DIRECTOR - PANTECH E LEARNING



Dr.P.VENKATESA PERUMAL

PROFESSOR - INCHARGE - NITK - STEP



# *Certificate of Internship*

*awarded to*

***Gundluri lokesh***

*for the successful completion of the 4-week Internship in Artificial Intelligence, Machine Learning  
& Industrial Internet of Things, jointly organized by National Instruments (NI) and Cognibot.  
The internship included training and projects in the above domains.*

A handwritten signature in black ink, appearing to read 'Ajay Kumar'.

*Ajay Kumar, Cognibot*

*20<sup>th</sup> June 2020*

*Date*



# *Certificate of Internship*

*awarded to*

***Sai adithya Tirukkolluru***

*for the successful completion of the 4-week Internship in Artificial Intelligence, Machine Learning  
& Industrial Internet of Things, jointly organized by National Instruments (NI) and Cognibot.  
The internship included training and projects in the above domains.*

A handwritten signature in black ink, appearing to read 'Ajay Kumar'.

*Ajay Kumar, Cognibot*

*20<sup>th</sup> June 2020*

*Date*



# *Certificate of Internship*

*awarded to*

***Shashi Kiran***

*for the successful completion of the 4-week Internship in Artificial Intelligence, Machine Learning  
& Industrial Internet of Things, jointly organized by National Instruments (NI) and Cognibot.  
The internship included training and projects in the above domains.*

A handwritten signature in black ink, appearing to read 'Ajay Kumar'.

*Ajay Kumar, Cognibot*

*20<sup>th</sup> June 2020*

*Date*



# *Certificate of Internship*

*awarded to*

***Emmadi Srinivas Jahnavi***

*for the successful completion of the 4-week Internship in Artificial Intelligence, Machine Learning & Industrial Internet of Things, jointly organized by National Instruments (NI) and Cognibot.  
The internship included training and projects in the above domains.*

A handwritten signature in black ink, appearing to read 'Ajay Kumar'.

*Ajay Kumar, Cognibot*

*20<sup>th</sup> June 2020*

*Date*



# *Certificate of Internship*

*awarded to*

***Janvi Veeramreddy***

*for the successful completion of the 4-week Internship in Artificial Intelligence, Machine Learning & Industrial Internet of Things, jointly organized by National Instruments (NI) and Cognibot.  
The internship included training and projects in the above domains.*

A handwritten signature in black ink, appearing to read 'Ajay Kumar'.

*Ajay Kumar, Cognibot*

*20<sup>th</sup> June 2020*

*Date*





# T-WORKS FOUNDATION

A Government of Telangana Initiative



Date: 10-08-2021

## TO WHOMSOEVER IT MAY CONCERN

**Name: Vanteru Rithvik Reddy,**  
**Hyderabad.**

### **Regarding: Internship Completion**

We are pleased to confirm that Rithvik Reddy has completed an internship with T-Works foundation. During the course of the internship, he worked on the project – Jungle Maker Payload Project.

### Details of Internship:

**Type of Assignment: Full Time**

**Start Date of the Internship: 05/07/21**

**End Date of Internship: 30/07/21**

**Brief of the Project / Assignment:** Rithvik worked on electronics testing and assembly of seed dropping mechanism for a drone. He supported UAV team to assemble VTOL components. During the internship, Rithvik was dedicated, diligent, and performed at a satisfactory standard, and we believe Rithvik made a valuable contribution to the team.

We wish Rithvik all the best in his future endeavors.

For T-Works Foundation:

Sanjay Kumar Gajjala

Director - Operations



T-Works Foundation is a registered company u/s B. Companies Act 2013

+91-40-48590752

[www.tworks.telangana.gov.in](http://www.tworks.telangana.gov.in)

CIN: U74999TG2017NPL120864

[tworks@telangana.gov.in](mailto:tworks@telangana.gov.in)



Registered Office:  
3rd Floor, D-Bloc,  
Telangana Secretariat,  
NTR Marg, Hyderabad -  
500022

Corporate Office:  
7th floor, Splendid  
Towers, Begumpet,  
Hyderabad -500016

# Certificate of Excellence

This certificate is proudly presented to

*Pavani*

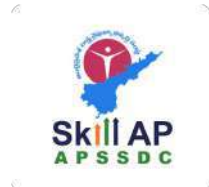
for successfully completing the Unschool Community Program  
on October 31, 2020 as a **Social Media Marketing Intern** for 2 weeks,  
an online internship initiative by



Unschool wishes you the best for your future endeavors.

A handwritten signature in black ink, appearing to read 'Rahul Varma'.

**Rahul Varma**  
Chief Executive Officer





# THE SPARKS FOUNDATION

INSPIRE, INNOVATE, INTEGRATE

## CERTIFICATE OF COMPLETION

*This Certificate is presented to*

*Madiha Sadaf*

*for an outstanding contribution during the session (May 2021 - Jun 2021) of  
Graduate Rotational Internship Program at The Sparks Foundation on 03-Jul-2021.*



Certificate Number: RZDHNU7FUZ

Verification at:

<https://truecertificates.com/verification/>

PRANAV DUBEY

MANAGING DIRECTOR



# THE SPARKS FOUNDATION

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THIS IS PRESENTED TO

**MADIHA SADAF**

---

**PRANAV DUBEY**

DIRECTOR

**26-APR-2021**

---

**DATE**

for successful selection as an intern at The Sparks  
Foundation for function Data Science & Business  
Analytics.



**CODE : SMMWRCTJYS**

Verify at:

<https://truecertificates.com/verification>



**ServiceNow**  
www.servicenow.com

**ServiceNow Software Development India Pvt. Ltd.**

Parcel 3, Knowledge City, 7th Floor & 8th Floor,  
Plot #2, Phase - 1, Survey #83/1, Raidurg  
Village, Serilingampally Mandal, Rangareddy  
Dist. Hyderabad-500081, Telangana, India

**Tel** +91 (40) 6629 4700

**CIN** U72900AP2014FTC092162

08 Dec 2021

**TO WHOM IT MAY CONCERN**

This is to certify that **Shravya Kodur (22922)** was employed with us from **19 Jul 2021 to 17 Sep 2021**. **Shravya Kodur's** role at the time of leaving ServiceNow was **Intern - Technical Writer**.

Yours sincerely,

*Ilango A P*

**ILANGO A P**

Director, India HR

For **ServiceNow Software Development India Private Limited**

For queries concerning the above information, please contact  
[globaltalentss.apj@servicenow.com](mailto:globaltalentss.apj@servicenow.com)

# OMSPACE ROCKET AND EXPLORATION PVT LTD

Ahmedabad, Gujarat

ENROLLMENT NO.: OSRE/INT/0921/261



www.omspace.in

## INTERNSHIP CERTIFICATE

This is to certify that **Jayasree K** has been awarded this certificate for completing a One-month internship from **1st September 2021 to 1st October 2021**. She has Successfully Completed the Project on "LITERATURE SURVEY ON GROUND STATION AND TTC ."

Mr. Shyam K Sharma  
DIRECTOR

Ravindra Raj B. M  
Chief Executive Officer

Issue Date : 24/10/2021

CIN: U29100GJ2020PTC114246

Certificate No. DIPP62717

Any Queries : admin@omspace.in

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Recognised by



#startupindia



# Mujahid Shaik

## Technology Consulting Virtual Internship

### Certificate of Completion

August 14th, 2021

Over the period of July 2021 to August 2021, Mujahid Shaik has completed practical task modules in:

Client Discovery  
Design a Business Case  
Considerations For Mobilisation  
Define the project approach  
Conduct a market scan

Further analysis & solution presentation  
Understanding Cloud Computing  
Cloud Feasibility Assessment  
Cloud Readiness Assessment



**Danielle O'Leary**  
Senior Consultant  
National Graduate  
Talent Acquisition  
Team



**Tom Brunskill**  
CEO, Co-Founder of  
Forage



*Letter of Intent to hire*

Date: Feb 16, 2021

Name: Akhil Teja Jampani  
Roll No: 160117735147  
Institute Name: Chaitanya Bharathi Institute of Technology

Subject: Letter of Intent to hire

Dear Akhil

Congratulations! Thank you for exploring career opportunities with Abzooba India Infotech Pvt. Ltd (Abzooba). You have successfully completed our initial selection process and we intend to make you an offer of employment as **Trainee**. Your designation will be aligned as per Practice / Function upon joining Abzooba.

Initially, you will be put in Training for 3 (Three) months starting from March 1, 2021. During the initial training period you will not be eligible for any payment and company-sponsored benefits.

After successful completion of training program and subject to availability of projects with Abzooba, you will be issued a Letter of Appointment by Abzooba with an appropriate date of joining. You may still need to undergo more training even upon joining Abzooba, as may be planned by the company. Your CTC including all benefits will be **INR 5,00,000 Per Annum**. The break-up is presented in **Annexure A**. Your employment will be subject to the Standard Terms and Conditions of employment at Abzooba and will be governed by the policies, rules, regulations, practices, processes, and procedures of Abzooba as applicable to you and the changes therein from time to time.

This letter of intent is valid subject to your being found medically fit, you are completing your academic course with minimum grade of First Class as specified at the time of your selection, meeting the set eligibility criteria at the end of your academic course and successful completion of Abzooba's Training program prior to your joining.

You shall maintain confidentiality with respect to all information relating to the company's technology, processes, and any other activities of the company and its customers/ client and shall not at any time disclose to any third party any Confidential Information. Your obligation to keep such information confidential will survive even after completion of your internship at the company. Your obligation to keep such information confidential will survive even after completion of your internship at the company.

As part of pre-joining formalities, please submit the following documents:

1. Pan Card
2. Aadhaar Card
3. Educational Certificates

This letter of intent will be valid for 1 week from the date of issue. If this is acceptable to you, please let us know your acceptance by signing **Annexure B** of this document and sending a scanned copy to us. If we do not hear back from you within this period, the offer of intent will be deemed to be cancelled.

We take great pleasure in welcoming you to Abzooba and sincerely hope that training period with us will be pleasant and of mutual benefit. Please do not hesitate to e-mail us for any information you may need at [human\\_resources@abzooba.com](mailto:human_resources@abzooba.com)



*Letter of Intent to hire*

**Annexure B**

**Additional Benefits:**

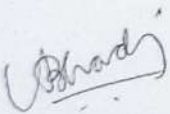
- Health Insurance is provided to the associate and his/her dependents (spouse and 2 children). Benefit amount (INR 6,00,000 for self and family & INR 5,00,000 for single associates).
- There is a provision to include Parents in the medical insurance policy, but the premium will be deducted from Employee's CTC. The exact premium amount for including Parents can be worked out by the Payroll team once the employee joins the organisation.
- Gratuity is paid as per the norms of the Payment of Gratuity Act.
- Annual Training Allowance of 30,000 INR can be claimed against certifications and courses relevant for self-development.

**Note:**

- Shift allowance where applicable is paid as per prevalent policy for applicable projects.
- All taxes arising out of this structure shall be borne by you.
- Flexible Benefits as may be availed from Special Allowance only for tax exemption purposes:
  - Sodexo coupons are optional and can be availed to a maximum extent of INR 26,400 Per Annum from Special Allowance.
  - LTA, as may be availed from Special Allowance, will be governed by tax laws as applicable and will be on claim basis against the appropriate enclosures / bills produced with appropriate forms duly filled. If bills are not produced during a financial year, then the unclaimed part of the reimbursements will be added to taxable salary and will be subject to appropriate deduction of tax along with your salary for the month of March as per tax laws.

Yours sincerely,

For Abzooba India Infotech Pvt. Ltd.



Awantika Bhardwaj  
*Vice President – Employee Success*

**ACCEPTANCE:**

I have read and understood the offer on the terms and conditions and hereby signify my acceptance of the same.

Signature: J. Akhileja

Name: J. Akhileja

Date: 01/3/2021

**Date:** Feb 17, 2021

**To:** Student name: P V Divya Sree  
Address: Jains Four Seasons villa no 20, Kokapet, Hyderabad

**Subject: Internship Offer Letter**

Dear Student Name:

With reference to your application and the subsequent interview you had with us, we would like to congratulate you on being selected as an intern ("Intern") with Blue Yonder India Private Ltd. ("Blue Yonder") under Blue Yonder's Internship Program. Your internship is scheduled to commence on the effective date stated below ("Effective Date"), and for the duration also stated below ("Internship Term"). Upon your signature of the acknowledgement section of this letter, you agree that the terms of this letter shall form the binding agreement of internship between you and Blue Yonder ("Internship Agreement" or "Agreement"). You further acknowledge and agree that you have executed Blue Yonder's Confidentiality, Non-Competition and Inventions Assignment Agreement with the effective date as set out below ("NDA").

**Effective Date:** 15-02-2021

**Internship Term:** Six (6) months from the Effective Date

**Effective Date of NDA:** 15-02-2021

## 1. ROLES AND RESPONSIBILITIES:

- 1.1 As an Intern, your job responsibilities will include but not be limited to assist Blue Yonder in carrying out the following tasks:
- Installation and configuration of Blue Yonder product suite including Reporting, Trouble Shoot and resolve batch and data load issues
  - Perform technical upgrades and handle change requests and other technical enhancements.
  - Follow Incident, Problem and Change Management Process

## 2. TERM

- 2.1 The Internship Term may be extended with the mutual agreement of the parties. The general work hours for the Internship Program is 40 hours a week, 8 hours a day, Mondays to Fridays.

## 3. COMPENSATION AND BENEFITS.

- 3.1 You are entitled for a stipend amount of INR 30000/- per month (Rupees thirty thousand only) during your Internship Term. The monthly stipend will be paid by Blue Yonder on the last working day of each completed month. Taxes will be deducted as per the applicable tax laws.
- 3.2 During the Internship Term, you are eligible for one (1) day leave per each completed month of internship. At the end of the Internship Term, the unused leave entitlement if any will expire.
- 3.3 You acknowledge and agree that apart from the foregoing, no other compensation, payment or benefits shall be provided to you in relation to your internship with Blue Yonder.

## 4. CONFIDENTIALITY

- 4.1 You acknowledge and agree that you may gain access or be provided with Proprietary Information (as defined in the NDA mentioned above), and that you shall use and protect the confidentiality of the Proprietary Information strictly in accordance with the terms of the NDA.

## 5. BLUE YONDER PROPERTY

- 5.1 If any Blue Yonder Proprietary Information or Blue Yonder Equipment is provided by Blue Yonder to you, you agree and will ensure to, comply with the terms of this Section 5 (Blue Yonder Property), and all terms in the Agreement as they apply to Blue Yonder Proprietary Information and Blue Yonder Equipment. You agree that notwithstanding anything to the contrary in this Internship Agreement, Blue Yonder shall not be obliged in any way to provide any Blue Yonder Equipment to you. "Blue Yonder Equipment" means Blue Yonder's appliances, hardware and supplies, and includes, but is not limited to: Blue Yonder's computers, batteries, power adaptors, monitors, headsets, computer accessories, virtual desktops, other virtual environments, telecommunication devices, media, and building entry keys and cards.
- 5.2 When using or accessing any Blue Yonder Proprietary Information or Blue Yonder Equipment, you must ensure to adhere to Blue Yonder's Acceptable Use Policy and any other Blue Yonder policies related to Blue Yonder Equipment, as updated from time to time. You must not allow any person other than a you to use or access any Blue Yonder Proprietary Information or Blue Yonder Equipment.

**Blue Yonder India Private Limited**

(Formerly known as JDA Software Private Limited)

Registered Office: Tower A, Mantri Commercial, Outer Ring Road, Bellandur, Bengaluru - 560103, India  
+91 80 6101 8888 main | +91 80 6101 8500 fax | blueyonder.com | CIN: U72900KA1989PTC032468

## 6. BLUE YONDER POLICIES

- 6.1 During the Internship Term, you agree to comply with all rules and regulations and company policies of Blue Yonder as may be in existence, or formulated or amended from time to time, including without limitation to Code of Conduct, Anti-Bribery and other associated company policy documents of Blue Yonder. You are expected to maintain a high standard of discipline, efficiency and integrity during the Internship Term. You must also ensure that you timely complete any required compliance and security training mandated by Blue Yonder for performance of the Services.

## 7. TERMINATION

- 7.1 During the Internship Term, your internship may be terminated by either party by giving two weeks' prior written notice to the other party. In addition, your internship may also be terminated immediately by Blue Yonder without any notice in the event of any misconduct and/or breach of the terms of this Agreement and/or the NDA by you. Blue Yonder reserves the sole discretion to determine the existence of such misconduct or breach.
- 7.2 You hereby warrant that your application for internship, and all data, information and materials (including certificates) provided by you in connection with this Internship Agreement or generally in relation to your internship (collectively "Materials") are true and accurate. You also agree that in the event of any inaccuracy in the Materials, Blue Yonder shall be entitled to immediately suspend or terminate your internship by written notice, with no remedy, compensation nor liability to you.

## 8. CONSEQUENCES OF TERMINATION

- 8.1 Upon termination or expiry of the Internship Term, as the case may be, you shall return all Proprietary Information, Blue Yonder Property and/or assets entrusted to you by Blue Yonder during the Internship Term.
- 8.2 All Blue Yonder Proprietary Information and Blue Yonder Equipment must be returned by you to Blue Yonder immediately upon Blue Yonder's demand, or within ten (10) calendar days of the termination or expiration of this Agreement, whichever comes first.
- 8.3 In the case of Blue Yonder Equipment, within ten (10) calendar days of the conclusion or termination of the Agreement, you must return all Blue Yonder Equipment, in proper working order, to Blue Yonder. If Blue Yonder does not receive all the Blue Yonder Equipment within the designated period, you remain solely liable to Blue Yonder for the cost of the repair and/or replacement of the Blue Yonder Equipment (or its reasonable equivalent).

Blue Yonder India Private Limited  
(Formerly known as IDA Software Private Limited)

Registered Office: Tower A, Mantri Commercio, Outer Ring Road, Bellandur, Bengaluru - 560103, India  
+91 80 6101 8888 main | +91 80 6101 8500 fax | blueyonder.com | CIN: U72900KA1989PTC032468



**9. OTHER TERMS**

9.1 This Internship Agreement is created and executed to help you to expand your knowledge and skills within Blue Yonder and that the parties explicitly agree that there is no intention to conclude any apprenticeship or any employment contract whether term or permanent as a result of or arising from this Internship Agreement.

Yours sincerely

Jayshankar.M

For Blue Yonder India Private Ltd.

Jayshankar. M  
Director – Associate Success (Talent Acquisition)

**DECLARATION:**

I have gone through the terms and conditions mentioned above. By signing this Agreement, I declare that I have understood, agreed and accepted the terms herein. I acknowledge that my internship starts on the Effective Date.

Place: Hyderabad

Date: Feb 17, 2021

SIGNATURE OF THE CANDIDATE

**nitesh aloney**

---

**From:** Deeksha Pemmaiah A (CW) <Deeksha.PemmaiahA@blueyonder.com>  
**Sent:** Wednesday, February 17, 2021 3:26 PM  
**To:** nitesh aloney  
**Cc:** Radha Rao; Vinay Chandupatla  
**Subject:** Welcome to Blue Yonder (Formerly known as JDA Software)

**Follow Up Flag:** Flag for follow up  
**Flag Status:** Flagged



Dear Nitesh,

## Blue Yonder is happy to have you aboard!

Welcome to Blue Yonder (Formerly known as JDA software)!

I'm Deeksha and I'll be your on-boarding point of contact at Blue Yonder. Your internship start date is on **Monday, 03<sup>rd</sup> May 2021**. As part of your pre-onboarding process, you are required to complete few key actions to ensure that we move forward towards your seamless virtual onboarding.

### **You are required to complete the following steps and they are:**

1. Please click on this link (<https://bit.ly/36n9EGu>) and fill out the required information within 24 hours

2. You are required to send us the following documents as scanned copies

- Aadhaar and PAN copy
- Passport size photograph

**3. As a follow up to this email, you'll receive two additional notifications via Adobe Echo sign for your digital signature action on the following documents:**

- Blue Yonder NDA document
- On boarding/Statutory documents

Should you have any additional questions, then please reach-out to me and we look forward to have you as part of Blue Yonder family soon.

**Important:** Due to COVID 19 Outbreak, we are not doing any in-person onboarding yet, and instead we continue doing only virtual onboarding.

Please stay tuned for more updates.

---

Best Regards,

Deeksha Pemmaiah  
Talent Acquisition | Associate Success



Go BYond. Put us to the test with a [free product trial offer](#)



08-Apr-2021

Akhila Maarka

B.Tech/B.E. Electronics and Communication Engineering  
Chaitanya Bharathi Inst of Technology, Hyderabad

Dear Akhila,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for a **period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion. Actual Internship dates and duration would be based on the business demand aligned skill tracks offered to you and would be shortly communicated to you.

Cognizant Internship being a pre joining skill and capability development program, it would form a critical part of your employment with Cognizant.

You will undergo a learning curriculum as per the learning track assigned to you. The learning path will include in-depth sessions, hands on exercise and project work. There will also be series of webinars, quizzes, SME interactions, mentor connects, code challenges, assessments etc. to accelerate your learning. The performance during Internship would be monitored through formal evaluations.

The Cognizant Internship completion would qualify as the entry criteria to your post joining training program and would be used as basis towards your allocation to projects/roles.

Prior to joining Cognizant, you must successfully complete the prescribed Internship program. In event of non-completion of the Internship, Cognizant may at its sole discretion revoke this offer of employment.

Please also note that:

- The Internship Training will be done from Monday through Friday for 8 hours from 9 am to 6 pm (IST).
- Interns are covered under Cognizant's calendar holidays of the respective location of internship and you would need to adhere with attendance requirements. Pre-approvals are to be sought towards unavoidable leave or break requests from the program.
- There would be zero tolerance to plagiarisms and misconduct during the internship.
- You would be required to ensure timely completion and submission of assignments, project work and preparation required prior to the sessions.
- You may be required, to travel to other locations within India if there is a business need as per your internship plan
- Cognizant reserves clauses regarding IT infra if applicable and access to information and material of Cognizant during the period and could modify or amend the Cognizant GenC program terms and conditions from time to time

At the time of your reporting for the internship, you will be required to sign a Non - Disclosure Agreement with the company. During the course of your Internship and after completion of the same, you are required to maintain strictest confidentiality with respect to company proprietary or products that you access or come into contact with, during your project as an Intern, at all times as per our Policy. Use of company proprietary information or products shall not be made without prior permission from the concerned authority.

You will also be required to submit the following documents at the time of reporting:

- Photocopy of your Passport & Visa



- Photocopy of your Certificates / Mark Sheets in support of your Educational Qualification(s)
- 2 Passport-size photographs
- Pan Card
- Aadhar Card
- Personal individual bank account from a nationalized bank for processing stipend

Please do not hesitate to call us for any information you may need.

We wish you good luck.


Yours sincerely,

For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu  
**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

Signature: 

Date: 20-04-2021



08-Apr-2021

Khundhana M

**B.Tech/B.E. Electronics and Communication Engineering**  
**Chaitanya Bharathi Inst of Technology,Hyderabad**

**Dear Khundhana,**

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for **a period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

Actual Internship dates and duration would be based on the business demand aligned skill tracks offered to you and would be shortly communicated to you.

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- You may be required, to travel to other locations within India if there is a business need as per your internship plan
- Cognizant reserves clauses regarding IT infra if applicable and access to information and material of Cognizant during the period and could modify or amend the Cognizant GenC program terms and conditions from time to time

At the time of your reporting for the internship, you will be required to sign a Non - Disclosure Agreement with the company. During the course of your Internship and after completion of the same, you are required to maintain strictest confidentiality with respect to company proprietary or products that you access or come into contact with, during your project as an Intern, at all times as per our Policy. Use of company proprietary information or products shall not be made without prior permission from the concerned authority.

You will also be required to submit the following documents at the time of reporting;

- Photocopy of your Passport & Visa

- Photocopy of your Certificates / Mark Sheets in support of your Educational Qualification(s)
- 2 Passport-size photographs
- Pan Card
- Aadhar Card
- Personal individual bank account from a nationalized bank for processing stipend

Please do not hesitate to call us for any information you may need.

We wish you good luck.

Yours sincerely,

For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu

**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

**Signature:**

**Date:**



08-Apr-2021

Shivani Jannaikode

B.Tech/B.E. Electronics and Communication Engineering  
Chaitanya Bharathi Inst of Technology, Hyderabad

Dear Shivani,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for a **period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion. Actual Internship dates and duration would be based on the business demand aligned skill tracks offered to you and would be shortly communicated to you.

Cognizant Internship being a pre joining skill and capability development program, it would form a critical part of your employment with Cognizant.

You will undergo a learning curriculum as per the learning track assigned to you. The learning path will include in-depth sessions, hands on exercise and project work. There will also be series of webinars, quizzes, SME interactions, mentor connects, code challenges, assessments etc. to accelerate your learning. The performance during Internship would be monitored through formal evaluations.

The Cognizant Internship completion would qualify as the entry criteria to your post joining training program and would be used as basis towards your allocation to projects/roles.

Prior to joining Cognizant, you must successfully complete the prescribed Internship program. In event of non-completion of the Internship, Cognizant may at its sole discretion revoke this offer of employment.

Please also note that:

- The Internship Training will be done from Monday through Friday for 8 hours from 9 am to 6 pm (IST).
- Interns are covered under Cognizant's calendar holidays of the respective location of internship and you would need to adhere with attendance requirements. Pre-approvals are to be sought towards unavoidable leave or break requests from the program.
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- Personal individual bank account from a nationalized bank for processing stipend

Please do not hesitate to call us for any information you may need.

We wish you good luck.

Yours sincerely,

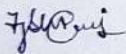
For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu  
**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

**Date:** 20-04-2021

**Signature:** 



08-Apr-2021

Shreya Reddy

B.Tech/B.E. Electronics and Communication Engineering

Chaitanya Bharathi Inst of Technology, Hyderabad

Dear Shreya,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for a **period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

Actual Internship dates and duration would be based on the business demand aligned skill tracks offered to you and would be shortly communicated to you.

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The Cognizant Internship completion would qualify as the entry criteria to your post joining training program and would be used as basis towards your allocation to projects/roles.

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# Cognizant

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We wish you good luck.

Yours sincerely,

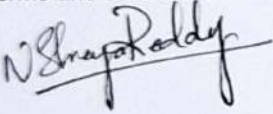
For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu  
Global Head-Talent Acquisition

I accept the terms and conditions of the offer as mentioned above.

Signature:



Date: 17/04/2021





# Cognizant

Dear Shreya Reddy

Congratulations on successfully confirming your offer with Cognizant

Please note:

- a. An email will be sent to you requesting you to upload the documents in onboarding application. Please upload and submit the documents to proceed with filling up the online forms.
- b. It is mandatory to complete the forms in the pre-joining section before your date of joining to ensure a seamless onboarding experience. You may also refer to the sample forms provided in the 'Resource center' to assist you with filling up of pre-joining forms.

We look forward to you joining our organization and we hope you have a great experience working with us!

Thank you.

- Human Resources - Shared Services



08-Apr-2021

Abbidi Harikrishna

B.Tech/B.E. Electronics and Communication Engineering  
Chaitanya Bharathi Inst of Technology,Hyderabad

Dear Abbidi,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for **a period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

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- Personal individual bank account from a nationalized bank for processing stipend

Please do not hesitate to call us for any information you may need.

We wish you good luck.

Yours sincerely,

For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu

**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

**Signature:**

**Date:**



08-Apr-2021

Rohith Reddy S

B.Tech/B.E. Electronics and Communication Engineering  
Chaitanya Bharathi Inst of Technology, Hyderabad

Dear Rohith,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for a **period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

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We wish you good luck.

Yours sincerely,

For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu  
**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

Signature: S. Rolith

Date: 23-04-2021



08-Apr-2021

Sai Gowtham Chittamsetty

B.Tech/B.E. Electronics and Communication Engineering

Chaitanya Bharathi Inst of Technology, Hyderabad

Dear Sai Gowtham,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for a **period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

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Please do not hesitate to call us for any information you may need.

We wish you good luck.


Yours sincerely,

For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu  
**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

Signature: 

Date: 12/04/2021

**Fwd: Intern Offer status update with Cognizant**  
1 message

**Sai Gowtham Chittamsetty** <saigowthamch@gmail.com>  
To: classicinternet1@gmail.com

Mon, Apr 19, 2021 at 12:21 PM

----- Forwarded message -----  
From: <cognizantHR@cognizant.com>  
Date: Mon, 12 Apr, 2021, 3:11 pm  
Subject: Intern Offer status update with Cognizant  
To: <saigowthamch@gmail.com>

Dear Sai Gowtham Chittamsetty

**Congratulations** on successfully confirming your offer with Cognizant

Please note:

- a. An email will be sent to you requesting you to upload the documents in onboarding application. Please upload and submit the documents to proceed with filling up the online forms.
- b. It is mandatory to complete the forms in the pre-joining section before your date of joining to ensure a seamless onboarding experience. You may also refer to the sample forms provided in the 'Resource center' to assist you with filling up of pre-joining forms.

We look forward to you joining our organization and we hope you have a great experience working with us!

Thank you.  
- Human Resources - Shared Services

This e-mail and any files transmitted with it are for the sole use of the intended recipient(s) and may contain confidential and privileged information. If you are not the intended recipient(s), please reply to the sender and destroy all copies of the original message. Any unauthorized review, use, disclosure, dissemination, forwarding, printing or copying of this email, and/or any action taken in reliance on the contents of this e-mail is strictly prohibited and may be unlawful. Where permitted by applicable law, this e-mail and other e-mail communications sent to and from Cognizant e-mail addresses may be monitored.

**3 attachments**

Cognizant	ATT00001 5K
Cognizant	ATT00002 4K
Cognizant	ATT00001 5K





08-Apr-2021

Salprathap Reddy Vadicherla

B.Tech/B.E. Electronics and Communication Engineering

Chaitanya Bharathi Inst of Technology, Hyderabad

Dear Salprathap Reddy,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for a period of 3 to 6 months, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

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Please do not hesitate to call us for any information you may need.

We wish you good luck.

Yours sincerely,

For **Cognizant Technology Solutions India Pvt. Ltd.,**



Suresh Bethavandu

**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

Signature: *J. Sai Prathap Reddy*

Date: 12/04/2021



08-Apr-2021

**Shashivardhan Reddy Kaveli**

**B.Tech/B.E. Electronics and Communication Engineering**

**Chaitanya Bharathi Inst of Technology,Hyderabad**

**Dear Shashivardhan Reddy,**

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for a **period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

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Yours sincerely,


For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu

**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

Signature: 

Date: 12/01/2021



08-Apr-2021

Tharun Thota

B.Tech/B.E. Electronics and Communication Engineering  
Chaitanya Bharathi Inst of Technology, Hyderabad

Dear Tharun,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for a **period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

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Please do not hesitate to call us for any information you may need.

We wish you good luck.

Yours sincerely,

For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu

**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

Signature: T. Tharun

Date: 20-04-2021.



08-Apr-2021

Satish Kumar Kolla

B.Tech/B.E. Electronics and Communication Engineering

Chaitanya Bharathi Inst of Technology, Hyderabad

Dear Satish Kumar,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for a **period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

Actual Internship dates and duration would be based on the business demand aligned skill tracks offered to you and would be shortly communicated to you.

Cognizant Internship being a pre joining skill and capability development program, it would form a critical part of your employment with Cognizant.

You will undergo a learning curriculum as per the learning track assigned to you. The learning path will include in-depth sessions, hands on exercise and project work. There will also be series of webinars, quizzes, SME interactions, mentor connects, code challenges, assessments etc. to accelerate your learning. The performance during Internship would be monitored through formal evaluations.

The Cognizant Internship completion would qualify as the entry criteria to your post joining training program and would be used as basis towards your allocation to projects/roles.

Prior to joining Cognizant, you must successfully complete the prescribed Internship program. In event of non-completion of the Internship, Cognizant may at its sole discretion revoke this offer of employment.

Please also note that:

- The Internship Training will be done from Monday through Friday for 8 hours from 9 am to 6 pm (IST).
- Interns are covered under Cognizant's calendar holidays of the respective location of internship and you would need to adhere with attendance requirements. Pre-approvals are to be sought towards unavoidable leave or break requests from the program.
- There would be zero tolerance to plagiarisms and misconduct during the internship.
- You would be required to ensure timely completion and submission of assignments, project work and preparation required prior to the sessions.
- You may be required, to travel to other locations within India if there is a business need as per your internship plan
- Cognizant reserves clauses regarding IT infra if applicable and access to information and material of Cognizant during the period and could modify or amend the Cognizant GenC program terms and conditions from time to time

At the time of your reporting for the internship, you will be required to sign a Non - Disclosure Agreement with the company. During the course of your Internship and after completion of the same, you are required to maintain strictest confidentiality with respect to company proprietary or products that you access or come into contact with, during your project as an Intern, at all times as per our Policy. Use of company proprietary information or products shall not be made without prior permission from the concerned authority.

You will also be required to submit the following documents at the time of reporting;

- Photocopy of your Passport & Visa

## Cognizant

- Photocopy of your Certificates / Mark Sheets in support of your Educational Qualification(s)
- 2 Passport-size photographs
- Pan Card
- Aadhar Card
- Personal individual bank account from a nationalized bank for processing stipend

Please do not hesitate to call us for any information you may need.

We wish you good luck.

Yours sincerely,

For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu

**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

Signature: *K. Satish Kumar*

Date: 20-04-2021



**Fwd: Intern Offer status update with Cognizant**

1 message

Satish Kumar Kolla <kollasatish100@gmail.com>  
To: "nakshatraweb123@gmail.com" <nakshatraweb123@gmail.com>

20 April 2021 at 14:01

----- Forwarded message -----  
From: <cognizantHR@cognizant.com>  
Date: Tue, Apr 13, 2021, 2:02 PM  
Subject: Intern Offer status update with Cognizant  
To: <kollasatish100@gmail.com>



Dear Satish Kumar Kolla

**Congratulations** on successfully confirming your offer with Cognizant

Please note:

- a. An email will be sent to you requesting you to upload the documents in onboarding application. Please upload and submit the documents to proceed with filling up the online forms.
- b. It is mandatory to complete the forms in the pre-joining section before your date of joining to ensure a seamless onboarding experience. You may also refer to the sample forms provided in the 'Resource center' to assist you with filling up of pre-joining forms.

We look forward to you joining our organization and we hope you have a great experience working with us!

Thank you.  
- Human Resources - Shared Services



This e-mail and any files transmitted with it are for the sole use of the intended recipient(s) and may contain confidential and privileged information. If you are not the intended recipient(s), please reply to the sender and destroy all copies of the original message. Any unauthorized review, use, disclosure, dissemination, forwarding, printing or copying of this email, and/or any action taken in reliance on the contents of this e-mail is strictly prohibited and may be unlawful. Where permitted by applicable law, this e-mail and other e-mail communications sent to and from Cognizant e-mail addresses may be monitored.

**3 attachments**

-  ATT00001  
5K
-  ATT00002  
4K
-  ATT00001  
5K



08-Apr-2021

Sai Kiran Reddy Govindhugari

B.Tech/B.E. Electronics and Communication Engineering  
Chaitanya Bharathi Inst of Technology, Hyderabad

Dear Sai Kiran Reddy,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for a **period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

Actual Internship dates and duration would be based on the business demand aligned skill tracks offered to you and would be shortly communicated to you.

Cognizant Internship being a pre joining skill and capability development program, it would form a critical part of your employment with Cognizant.

You will undergo a learning curriculum as per the learning track assigned to you. The learning path will include in-depth sessions, hands on exercise and project work. There will also be series of webinars, quizzes, SME interactions, mentor connects, code challenges, assessments etc. to accelerate your learning. The performance during Internship would be monitored through formal evaluations.

The Cognizant Internship completion would qualify as the entry criteria to your post joining training program and would be used as basis towards your allocation to projects/roles.

Prior to joining Cognizant, you must successfully complete the prescribed Internship program. In event of non-completion of the Internship, Cognizant may at its sole discretion revoke this offer of employment.

Please also note that:

- The Internship Training will be done from Monday through Friday for 8 hours from 9 am to 6 pm (IST).
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- There would be zero tolerance to plagiarisms and misconduct during the internship.
- You would be required to ensure timely completion and submission of assignments, project work and preparation required prior to the sessions.
- You may be required, to travel to other locations within India if there is a business need as per your internship plan
- Cognizant reserves clauses regarding IT infra if applicable and access to information and material of Cognizant during the period and could modify or amend the Cognizant GenC program terms and conditions from time to time

At the time of your reporting for the internship, you will be required to sign a Non - Disclosure Agreement with the company. During the course of your Internship and after completion of the same, you are required to maintain strictest confidentiality with respect to company proprietary or products that you access or come into contact with, during your project as an Intern, at all times as per our Policy. Use of company proprietary information or products shall not be made without prior permission from the concerned authority.

You will also be required to submit the following documents at the time of reporting;

- Photocopy of your Passport & Visa

## Cognizant

- Photocopy of your Certificates / Mark Sheets in support of your Educational Qualification(s)
- 2 Passport-size photographs
- Pan Card
- Aadhar Card
- Personal individual bank account from a nationalized bank for processing stipend

Please do not hesitate to call us for any information you may need.

We wish you good luck.

Yours sincerely,

For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu  
**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

Signature: G Sai Kiran Reddy

Date: 20-04-2021

**INTERNSHIP OFFER LETTER**

EMP ID : ST#2103

10-March-2021  
CH MVN SAI TEJA PRASHANTH  
Chaitanya Bharathi Institute of Technology,  
Gandipet, Hyderabad, Telangana - 500075.

Dear Prashanth,

Congratulations!

We are delighted to invite you to an offer for "Advanced Bug Bounty Internship" at Supraja Technologies, if you accept this offer, you will begin your Internship with our company on and will be expected to work 40 hours per week. As we discussed, your Internship will begin on **March 18<sup>th</sup>, 2021** and will end on or around **May 31<sup>st</sup>, 2021**.

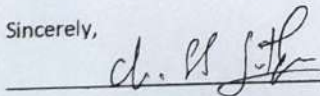
During your internship, you may have access to trade secrets and confidential business information belonging to the Company. By accepting this offer of internship, you acknowledge that you must keep all of this information strictly confidential, and refrain from using it for your own purposes or from disclosing it to anyone outside the Company. In addition, you agree that, upon conclusion of your employment, you will immediately return to the Company all of its property, equipment, and documents, including electronically stored information.

We reserve the right to withdraw this invitation before its expiry, or to change the Commencement Date or period for internship based on any business exigencies. Please note that this letter constitutes neither an offer of employment nor commitment to offer of employment with our company to you in the future.

We are very excited about the prospect of you joining our team and staff as an intern at Supraja Technologies. We look forward to helping you continue your education outside the classroom. To learn more about Supraja Technologies, please visit our website at [www.suprajatechnologies.com](http://www.suprajatechnologies.com)

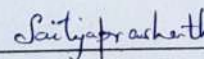
Look forward to your acceptance.

Sincerely,

  
\_\_\_\_\_  
Founder & CEO of Supraja Technologies



Your signature below indicates the acceptance of the offer as outlines above.

CH MVN SAI TEJA PRASHANTH		17-03-2021	ST#2103
Name	Signature	Date	EMP ID

**SUPRAJA TECHNOLOGIES**

(a unit of CHSMRLSS Technologies Pvt. Ltd.)

An ISO 9001:2015 Certified Company

Regd. & Head Office : Door No. 11-9-18, 1<sup>st</sup> Floor, Majjivari Street, Kothapeta, Vijayawada – 520001.  
contact@suprajatechnologies.com | www.suprajatechnologies.com | +91 - 9550055338

**INTERNSHIP OFFER LETTER**

EMP ID : ST#2104

10-March-2021  
VAMSHI KRISHNA MOTRU  
Chaitanya Bharathi Institute of Technology,  
Gandipet, Hyderabad, Telangana - 500075.

Dear Vamshi,

Congratulations!

We are delighted to invite you to an offer for "Advanced Bug Bounty Internship" at Supraja Technologies, if you accept this offer, you will begin your Internship with our company on and will be expected to work 40 hours per week. As we discussed, your Internship will begin on **March 18<sup>th</sup>, 2021** and will end on or around **May 31<sup>st</sup>, 2021**.

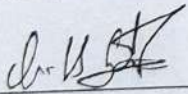
During your internship, you may have access to trade secrets and confidential business information belonging to the Company. By accepting this offer of internship, you acknowledge that you must keep all of this information strictly confidential, and refrain from using it for your own purposes or from disclosing it to anyone outside the Company. In addition, you agree that, upon conclusion of your employment, you will immediately return to the Company all of its property, equipment, and documents, including electronically stored information.

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We are very excited about the prospect of you joining our team and staff as an intern at Supraja Technologies. We look forward to helping you continue your education outside the classroom. To learn more about Supraja Technologies, please visit our website at [www.suprajatechnologies.com](http://www.suprajatechnologies.com)

Look forward to your acceptance.

Sincerely,



Founder & CEO of Supraja Technologies



Your signature below indicates the acceptance of the offer as outlines above.

MOTRU VAMSHI KRISHNA	M. Vamshi	17-03-2021	ST#2104
Name	Signature	Date	EMP ID

**SUPRAJA TECHNOLOGIES**

(a unit of CHSMRLSS Technologies Pvt. Ltd.)  
An ISO 9001:2015 Certified Company

Regd. & Head Office : Door No. 11-9-18, 1<sup>st</sup> Floor, Majjivari Street, Kothapeta, Vijayawada - 520001.  
contact@suprajatechnologies.com | www.suprajatechnologies.com | +91-9550055338



08-Apr-2021

Anusha Bamar

B.Tech/B.E. Electronics and Communication Engineering  
Chaitanya Bharathi Inst of Technology, Hyderabad

Dear Anusha,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for a period of **3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

Actual Internship dates and duration would be based on the business demand aligned skill tracks offered to you and would be shortly communicated to you.

Cognizant Internship being a pre joining skill and capability development program, it would form a critical part of your employment with Cognizant.

You will undergo a learning curriculum as per the learning track assigned to you. The learning path will include in-depth sessions, hands on exercise and project work. There will also be series of webinars, quizzes, SME interactions, mentor connects, code challenges, assessments etc. to accelerate your learning. The performance during Internship would be monitored through formal evaluations.

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Please also note that:

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- Photocopy of your Passport & Visa

- Photocopy of your Certificates / Mark Sheets in support of your Educational Qualification(s)
- 2 Passport-size photographs
- Pan Card
- Aadhar Card
- Personal individual bank account from a nationalized bank for processing stipend

Please do not hesitate to call us for any information you may need.

We wish you good luck.

Yours sincerely,

For Cognizant Technology Solutions India Pvt. Ltd.,



Suresh Bethavandu  
Global Head-Talent Acquisition

I accept the terms and conditions of the offer as mentioned above.

Signature: Anusha

Date: 23/4/2021



08-Apr-2021

**Madasu Kavya**

**B.Tech/B.E. Electronics and Communication Engineering  
Chaitanya Bharathi Inst of Technology,Hyderabad**

**Dear Madasu,**

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for a **period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

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Please do not hesitate to call us for any information you may need.

We wish you good luck.

Yours sincerely,

For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu  
**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

Signature: *m. kavja.*

Date: *30/04/2021*



08-Apr-2021

Likhitha Ande

B.Tech/B.E. Electronics and Communication Engineering  
Chaitanya Bharathi Inst of Technology, Hyderabad

Dear Likhitha,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for a period of **3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

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## Cognizant

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We wish you good luck.


Yours sincerely,

For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu  
Global Head-Talent Acquisition

I accept the terms and conditions of the offer as mentioned above.

Signature: 

Date: 22/04/2021



08-Apr-2021

Abhinav Kalloormana

B.Tech/B.E. Electronics and Communication Engineering

Chaitanya Bharathi Inst of Technology, Hyderabad

Dear Abhinav,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for a **period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

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Please do not hesitate to call us for any information you may need.

We wish you good luck.

Yours sincerely,


For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu

**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

Signature: 

Date: 23-04-2021



08-Apr-2021

Rupesh Chandra Sayam

B.Tech/B.E. Electronics and Communication Engineering

Chaitanya Bharathi Inst of Technology,Hyderabad

Dear Rupesh Chandra,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for **a period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

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Please do not hesitate to call us for any information you may need.

We wish you good luck.

Yours sincerely,

For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu

**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

**Signature:**

**Date:**



08-Apr-2021

Pochampally Vinay Reddy

B.Tech/B.E. Electronics and Communication Engineering

Chaitanya Bharathi Inst of Technology,Hyderabad

Dear Pochampally,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for **a period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

Actual Internship dates and duration would be based on the business demand aligned skill tracks offered to you and would be shortly communicated to you.

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You will also be required to submit the following documents at the time of reporting;

- Photocopy of your Passport & Visa



- Photocopy of your Certificates / Mark Sheets in support of your Educational Qualification(s)
- 2 Passport-size photographs
- Pan Card
- Aadhar Card
- Personal individual bank account from a nationalized bank for processing stipend

Please do not hesitate to call us for any information you may need.

We wish you good luck.

Yours sincerely,

For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu

**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

**Signature:**

**Date:**



08-Apr-2021

Sumanth Banswada

B.Tech/B.E. Electronics and Communication Engineering

Chaitanya Bharathi Inst of Technology,Hyderabad

Dear Sumanth,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for **a period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

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Yours sincerely,

For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu

**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

**Signature:**

**Date:**



08-Apr-2021

**Akhilesh Thammishetty**

**B.Tech/B.E. Electronics and Communication Engineering**

**Chaitanya Bharathi Inst of Technology,Hyderabad**

**Dear Akhilesh,**

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for **a period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

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We wish you good luck.

Yours sincerely,

For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu

**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

**Signature:**

**Date:**



08-Apr-2021

Shravani Jalli

B.Tech/B.E. Electronics and Communication Engineering  
Chaitanya Bharathi Inst of Technology, Hyderabad

Dear Shravani,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for a **period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

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We wish you good luck.

Yours sincerely,

For **Cognizant Technology Solutions India Pvt. Ltd.,**



Suresh Bethavandu  
**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

Signature: 

Date: 24-04-2021



08-Apr-2021

Srisai Merugu

B.Tech/B.E. Electronics and Communication Engineering  
Chaitanya Bharathi Inst of Technology, Hyderabad

Dear Srisai,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for a **period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

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We wish you good luck.

Yours sincerely,

For Cognizant Technology Solutions India Pvt. Ltd.,



Suresh Bethavandu  
Global Head-Talent Acquisition

I accept the terms and conditions of the offer as mentioned above.

Signature: 

Date: 23/4/2021



08-Apr-2021

Vinoothna Sree Nayakanti

B.Tech/B.E. Electronics and Communication Engineering  
Chaitanya Bharathi Inst of Technology, Hyderabad

Dear Vinoothna Sree,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for a period of **3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion. Actual Internship dates and duration would be based on the business demand aligned skill tracks offered to you and would be shortly communicated to you.

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We wish you good luck.

Yours sincerely,

For Cognizant Technology Solutions India Pvt. Ltd.,



Suresh Bethavandu  
Global Head-Talent Acquisition

I accept the terms and conditions of the offer as mentioned above.

Signature: 

Date: 24/04/2021



08-Apr-2021

Bob Bathula

**B.Tech/B.E. Electronics and Communication Engineering**  
**Chaitanya Bharathi Inst of Technology,Hyderabad**

**Dear Bob,**

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for **a period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

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Suresh Bethavandu  
**Global Head-Talent Acquisition**

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**Signature:** 

**Date:** 23-04-2021



08-Apr-2021

**Bhagath Singh Khare**

**B.Tech/B.E. Electronics and Communication Engineering**

**Chaitanya Bharathi Inst of Technology,Hyderabad**

**Dear Bhagath Singh,**

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Suresh Bethavandu

**Global Head-Talent Acquisition**

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**Signature:**

**Date:**



08-Apr-2021

**Nithish Chilukuri**

**B.Tech/B.E. Electronics and Communication Engineering  
Chaitanya Bharathi Inst of Technology,Hyderabad**

**Dear Nithish,**

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For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu

**Global Head-Talent Acquisition**

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**Signature:**

**Date:**



08-Apr-2021

Pranav K

B.Tech/B.E. Electronics and Communication Engineering  
Chaitanya Bharathi Inst of Technology, Hyderabad

Dear Pranav,

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- Cognizant reserves clauses regarding IT infra if applicable and access to information and material of Cognizant during the period and could modify or amend the Cognizant GenC program terms and conditions from time to time

At the time of your reporting for the internship, you will be required to sign a Non - Disclosure Agreement with the company. During the course of your Internship and after completion of the same, you are required to maintain strictest confidentiality with respect to company proprietary or products that you access or come into contact with, during your project as an Intern, at all times as per our Policy. Use of company proprietary information or products shall not be made without prior permission from the concerned authority.

You will also be required to submit the following documents at the time of reporting,

- Photocopy of your Passport & Visa

- Photocopy of your Certificates / Mark Sheets in support of your Educational Qualification(s)
- 2 Passport-size photographs
- Pan Card
- Aadhar Card
- Personal individual bank account from a nationalized bank for processing stipend

Please do not hesitate to call us for any information you may need.

We wish you good luck.

Yours sincerely,

For Cognizant Technology Solutions India Pvt. Ltd.,



Suresh Bethavandu  
Global Head-Talent Acquisition

I accept the terms and conditions of the offer as mentioned above.

Signature: 

Date: 24-04-2021



17-Feb-2021

Saiteja Reddy Pidugu

B.Tech/B.E. Electronics and Communication Engineering

Chaitanya Bharathi Ins of Tech - Hyderabad

Dear Saiteja Reddy,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for a period of **3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion. Actual Internship dates and duration would be based on the business demand aligned skill tracks offered to you and would be shortly communicated to you.

Cognizant Internship being a pre joining skill and capability development program, it would form a critical part of your employment with Cognizant.

You will undergo a learning curriculum as per the learning track assigned to you. The learning path will include in-depth sessions, hands on exercise and project work. There will also be series of webinars, quizzes, SME interactions, mentor connects, code challenges, assessments etc. to accelerate your learning. The performance during Internship would be monitored through formal evaluations.

The Cognizant Internship completion would qualify as the entry criteria to your post joining training program and would be used as basis towards your allocation to projects/roles.

Prior to joining Cognizant, you must successfully complete the prescribed Internship program. In event of non-completion of the Internship, Cognizant may at its sole discretion revoke this offer of employment.

Please also note that:

- The Internship Training will be done from Monday through Friday for 8 hours from 9 am to 6 pm (IST).
- Interns are covered under Cognizant's calendar holidays of the respective location of internship and you would need to adhere with attendance requirements. Pre-approvals are to be sought towards unavoidable leave or break requests from the program.
- There would be zero tolerance to plagiarisms and misconduct during the internship.
- You would be required to ensure timely completion and submission of assignments, project work and preparation required prior to the sessions.
- You may be required, to travel to other locations within India if there is a business need as per your internship plan
- Cognizant reserves clauses regarding IT infra if applicable and access to information and material of Cognizant during the period and could modify or amend the Cognizant GenC program terms and conditions from time to time

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- 2 Passport-size photographs
- Pan Card
- Aadhar Card
- Personal individual bank account from a nationalized bank for processing stipend

Please do not hesitate to call us for any information you may need.

We wish you good luck.

Yours sincerely,

For **Cognizant Technology Solutions India Pvt. Ltd.,**



Suresh Bethavandu

**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

**Signature:**

**Date:**



08-Apr-2021

Shiva Kumar Reddy Nareddy

B.Tech/B.E. Electronics and Communication Engineering  
Chaitanya Bharathi Inst of Technology, Hyderabad

Dear Shiva Kumar Reddy,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for a **period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

Actual Internship dates and duration would be based on the business demand aligned skill tracks offered to you and would be shortly communicated to you.

Cognizant Internship being a pre joining skill and capability development program, it would form a critical part of your employment with Cognizant.

You will undergo a learning curriculum as per the learning track assigned to you. The learning path will include in-depth sessions, hands on exercise and project work. There will also be series of webinars, quizzes, SME interactions, mentor connects, code challenges, assessments etc. to accelerate your learning. The performance during Internship would be monitored through formal evaluations.

The Cognizant Internship completion would qualify as the entry criteria to your post joining training program and would be used as basis towards your allocation to projects/roles.

Prior to joining Cognizant, you must successfully complete the prescribed Internship program. In event of non-completion of the Internship, Cognizant may at its sole discretion revoke this offer of employment.

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- Interns are covered under Cognizant's calendar holidays of the respective location of internship and you would need to adhere with attendance requirements. Pre-approvals are to be sought towards unavoidable leave or break requests from the program.
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At the time of your reporting for the internship, you will be required to sign a Non - Disclosure Agreement with the company. During the course of your Internship and after completion of the same, you are required to maintain strictest confidentiality with respect to company proprietary or products that you access or come into contact with, during your project as an Intern, at all times as per our Policy. Use of company proprietary information or products shall not be made without prior permission from the concerned authority.

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- 2 Passport-size photographs
- Pan Card
- Aadhar Card
- Personal individual bank account from a nationalized bank for processing stipend

Please do not hesitate to call us for any information you may need.

We wish you good luck.

Yours sincerely,

For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu

**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

**Signature:**

**Date:**



08-Apr-2021

**Srinivasa Bharadwaj Chakilam**

**B.Tech/B.E. Electronics and Communication Engineering**

**Chaitanya Bharathi Inst of Technology,Hyderabad**

**Dear Srinivasa Bharadwaj,**

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for **a period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

Actual Internship dates and duration would be based on the business demand aligned skill tracks offered to you and would be shortly communicated to you.

Cognizant Internship being a pre joining skill and capability development program, it would form a critical part of your employment with Cognizant.

You will undergo a learning curriculum as per the learning track assigned to you. The learning path will include in-depth sessions, hands on exercise and project work. There will also be series of webinars, quizzes, SME interactions, mentor connects, code challenges, assessments etc. to accelerate your learning. The performance during Internship would be monitored through formal evaluations.

The Cognizant Internship completion would qualify as the entry criteria to your post joining training program and would be used as basis towards your allocation to projects/roles.

Prior to joining Cognizant, you must successfully complete the prescribed Internship program. In event of non-completion of the Internship, Cognizant may at its sole discretion revoke this offer of employment.

Please also note that:

- The Internship Training will be done from Monday through Friday for 8 hours from 9 am to 6 pm (IST).
- Interns are covered under Cognizant's calendar holidays of the respective location of internship and you would need to adhere with attendance requirements. Pre-approvals are to be sought towards unavoidable leave or break requests from the program.
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- 2 Passport-size photographs
- Pan Card
- Aadhar Card
- Personal individual bank account from a nationalized bank for processing stipend

Please do not hesitate to call us for any information you may need.

We wish you good luck.

Yours sincerely,

For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu

**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

**Signature:**

**Date:**



08-Apr-2021

Nakka Sai Siddartha

B.Tech/B.E. Electronics and Communication Engineering  
Chaitanya Bharathi Inst of Technology,Hyderabad

Dear Nakka,

Further to our offer for the position of Programmer Analyst Trainee and in response to your confirmation into the Internship opportunity we had extended, we are pleased to offer you an **Internship** with us for a **period of 3 to 6 months**, during which you will be offered a stipend Amount of **INR 12000/-** per month based on the Internship performance and completion.

Actual Internship dates and duration would be based on the business demand aligned skill tracks offered to you and would be shortly communicated to you.

Cognizant Internship being a pre joining skill and capability development program, it would form a critical part of your employment with Cognizant.

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Prior to joining Cognizant, you must successfully complete the prescribed Internship program. In event of non-completion of the Internship, Cognizant may at its sole discretion revoke this offer of employment.

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At the time of your reporting for the internship, you will be required to sign a Non - Disclosure Agreement with the company. During the course of your Internship and after completion of the same, you are required to maintain strictest confidentiality with respect to company proprietary or products that you access or come into contact with, during your project as an Intern, at all times as per our Policy. Use of company proprietary information or products shall not be made without prior permission from the concerned authority.

You will also be required to submit the following documents at the time of reporting;

- Photocopy of your Passport & Visa

RI'qd. Office: 115/535, Old Mahabalipuram Road, Okkiam Thoraipakkam, Chennai - 600 097

- Photocopy of your Certificates / Mark Sheets in support of your Educational Qualification(s)
- 2 Passport-size photographs
- Pan Card
- Aadhar Card
- Personal individual bank account from a nationalized bank for processing stipend

Please do not hesitate to call us for any information you may need.

We wish you good luck.

Yours sincerely,

For **Cognizant Technology Solutions India Pvt. Ltd.**,



Suresh Bethavandu  
**Global Head-Talent Acquisition**

I accept the terms and conditions of the offer as mentioned above.

**Signature:**

**Date:**



**LETTER OF OFFER**

Offer Date: **February 01, 2021**

**Karthik Mathka**  
**1-7-221/D/2/1, Madugunagar Colony,**  
**Mahabubnagar, Telangana. Pin:509327.**

Dear Karthik,

Pursuant to our recent discussions, it is my pleasure to offer you internship and employment opportunities at Colruyt IT Consultancy India Pvt. Ltd ("Colruyt" or "the Company")

The internship engagement shall be for a period of **eight (08) weeks** starting from **February 08, 2021**. The duration of this engagement may be further extended at the sole discretion of the Company.

The Internship Engagement may be terminated either by the Company or by you by giving a prior written notice of at least 15 days.

If the Company finds your conduct, learning and performance during the tenure of Internship satisfactory, you will be offered Employment opportunities in the Company.

As an employee, you will join the Company as **Intern**. A separate Appointment letter containing detailed terms and conditions of employment will be issued to you at the time of joining the Company as an employee.

As you are yet to obtain your final degree certification BE, this is a conditional offer of employment with the Company and the final employment contract will be subject to your clearing the degree examination and producing the degree certificate to the Company on or before **November 30, 2021**.

At the end of the Internship period, the Company shall pay you a lump sum amount of Rs. 20,000/- as a token of appreciation for your learning efforts.

During the term of the Internship, you will not receive any of the employee benefits that the regular employees of the Company receive.

As an Intern, you will undergo trainings/on the job learnings and perform duties as may be assigned to you in the course of conduct of business of the Company. You will report to the designated Team Manager in the Company. You will obey the Company rules as may be applicable to you.

Upon your employment with the Company, Your Salary (**Total Cost to the Company**) would be in the range of **Rs.3,60,000 - 5,00,000 per annum**. The final salary will be based on your assessment during the Internship and will be mentioned in your Appointment Letter. . In addition to this, you will also be entitled to additional benefits as are generally accorded to the employees of Colruyt IT Consultancy India Pvt Ltd., as per the Company policy. The salary review will be on a yearly basis as per the Company policy.

In this position, you will be reporting to the designated **Delivery Head** of Colruyt and you will be under probation period for the period of three-months from the date of joining as an employee. . The probation period is extendable at the sole discretion of the Company. You may have to work on shifts, weekends and on public holidays on need basis as per the requirement and you will compensated appropriately as per the applicable Company policy..

*Hd. Alamy.*

Upon your employment with the Company, you will be required to sign a Trainee Service Agreement as per the Company policy. HR will provide a copy of the Trainee Service Agreement along with the final employment offer for joining the Company.

You are requested to present to the HR department on the first day of joining the Company, a copy of the following documents along with the originals for verification:

1. Copies of educational certificates, starting from school leaving certificate.
2. Copies of prior internship, if any.
3. Copy of Passport.
4. Four Passport size photographs
5. Copy of PAN (Permanent Account Number)

Please send us your written notification of acceptance of this offer, over mail within two business days i.e before **February 03, 2021** else the offer shall stand withdrawn automatically.

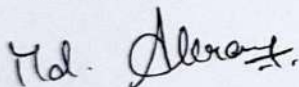
This offer shall be liable for cancellation if the information given by you at the time of interview or in your application for the internship/job is found to be incorrect.

In the event of unforeseen adverse circumstances beyond the reasonable control of the Company, the offer of employment may be revoked by the Company before you join as an employee, by giving a prior written notice of at least 15 days.

Please feel free to contact me in the interim if you have any questions.

We look forward to having you on board and being part of the Colruyt team for a long and mutually beneficial association.

Yours sincerely,



**Akram Mohammad**  
Deputy Head - Human Resources  
Colruyt IT Consultancy India Pvt. Ltd.

**Internship letters for Aman and Abhinay**

1 message

Sachin Chaudhari <sachin.c@iiit.ac.in>

Sat, Feb 20, 2021 at 1:13 PM

To: "placements@cbit.ac.in" <placements@cbit.ac.in>

Cc: aman ahmed <aman31hyd@gmail.com>, "suryaabhinay34@gmail.com" <suryaabhinay34@gmail.com>

Dear Sir/Madam,

This is to inform you that students from your college Aman Ahmad and Surya Abhinay have been selected for the internship at SPCRC, IIITH. They will be working with me on the project 'IoT enabled smart cities' on the vertical Air Pollution Monitoring around water bodies. I have attached detailed internship letters for them with this email. Please let me know if you need any more information.

Thanks and Regards  
Sachin

**2 attachments**



**IIIT internship letter\_1.jpg**  
200K



**IIIT internship letter\_2.jpg**  
221K



International Institute of Information Technology, Hyderabad  
A Research University

18 February 2021

To,

Surya Abhinay  
Chaitanya Bharathi Institute of Technology  
Hyderabad

**Sub: Offer Letter for internship at Signal Processing and Communication Research Centre (SPCRC)**

I am happy to inform you that you have been selected for the internship at SPCRC, IIITH. You will be working under me on the project 'IoT enabled smart cities' on the vertical Air Pollution Monitoring around water bodies.

You can come to the IIIT campus and work from the lab by maintaining all the Covid related protocols. There will be catch-ups scheduled to discuss work progress and overall internship experience at regular intervals in-person. All the work that you will produce at or with IIITH will be the intellectual property of IIITH. You cannot sell, publish, and distribute it to a third party under any circumstances apart from a report submission at CBIT towards your final year project requirement. I anticipate that the appointment will continue at least through May 2021 contingent upon your project progress, program needs and satisfactory performance.

Please confirm that if you accept this internship offer with the suggested terms and conditions. Reply with a signed copy of this letter as confirmation.

Thank you.

Dr. Sachin Chaudhari  
Assistant professor  
SPCRC, IIIT





International Institute of Information Technology, Hyderabad  
A Research University

18 February 2021

To,

Aman Ahmed  
Chaitanya Bharathi Institute of Technology  
Hyderabad

**Sub: Offer Letter for internship at Signal Processing and Communication Research Centre (SPCRC)**

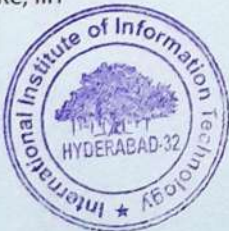
I am happy to inform you that you have been selected for the internship at SPCRC, IIITH. You will be working under me on the project 'IoT enabled smart cities' on the vertical Air Pollution Monitoring around water bodies.

You can come to the IIIT campus and work from the lab by maintaining all the Covid related protocols. There will be catch-ups scheduled to discuss work progress and overall internship experience at regular intervals in-person. All the work that you will produce at or with IIITH will be the intellectual property of IIITH. You cannot sell, publish, and distribute it to a third party under any circumstances apart from a report submission at CBIT towards your final year project requirement. I anticipate that the appointment will continue at least through May 2021 contingent upon your project progress, program needs and satisfactory performance.

Please confirm that if you accept this internship offer with the suggested terms and conditions. Reply with a signed copy of this letter as confirmation.

Thank you.

Dr. Sachin Chaudhari  
Assistant professor  
SPCRC, IIIT





## JPMORGAN CHASE & Co.

---

Message from Jamie Dimon, Chairman and CEO

Welcome to JPMorgan Chase. We are pleased that you will be starting your career at an exceptional company – one of the world's oldest, largest and best-known financial institutions.

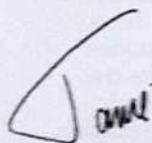
Across our businesses, we continue to deliver record results, innovative products and services for our customers, and great experiences for our employees. Named #1 in *Fortune's* Change the World list, we are focused on helping communities large and small grow around the world. It's an exciting time to join JPMorgan Chase, and now – with your skills, experience and creative ideas – you'll help us continue to drive change.

During your time here, you will have opportunities to learn and grow in a supportive, respectful and inclusive environment. Do your best to contribute and excel in everything you do. By building strong relationships and doing the right thing – at all times – we have made this a company of which we can all be proud. It's how we do business. And, it is what has made us a top employer and a great business partner.

As you begin your career with JPMorgan Chase, I offer you an essential piece of advice: do your job well, and earn the trust and respect of the people around you. Throughout your employment, you will hear advice like this from our senior leaders – and we encourage you to put it into practice every day.

I hope you enjoy working here as much as I do, and I look forward to meeting many of you.

Best of luck in what I am sure will be a rewarding experience.

A handwritten signature in black ink, appearing to read "JD" or "Dimon", is located in the lower-left quadrant of the page.

J.P.Morgan

05-Jan-2021

Gudeti Pragathi  
Plot no. 40 & 41, Venkateswara Gardens, Subhash Nagar, Trunulgherry, Secunderabad  
500015  
HYDERABAD  
Telangana  
INDIA

Dear Gudeti,

**Your Internship by J.P. Morgan**

Congratulations on joining the J.P. Morgan family. We are pleased to confirm your internship with J.P. Morgan Services India Private Limited (the "Company").

You will find your personal internship terms outlined in Appendix A with general internship terms and conditions in Appendix B. Please note these terms and conditions supersede any verbal discussions you may have previously had with any J.P.Morgan Chase employee with regards to your internship arrangements.

A number of important policies will apply to your internship with the Company, including the Personal Account Dealing Policy and the Code of Conduct. We provide more information about these policies in Appendix C and it is essential that you carefully read and understand their requirements. By signing this letter, you confirm that you have read, understood and agree to be bound by these policies. In addition, you will be required to abide by all other Company policies and regulations (including J.P.Morgan Chase group of companies (the "Group") policies) and with applicable law.

Should you have queries in relation to your employment terms, your benefits or Company policies, please contact our HR Answers hotline at 000 800 440 5210 (local toll free) or +1 212-552-5100 (international).

Please be reminded your internship terms should be treated with the strictest confidence. To accept this offer of internship, please click on the 'Accept' button at the bottom of this page on or before 08-Jan-2021.

We are excited to welcome you to our Company and take this opportunity to wish you every success in taking this next step of your career with us.

\*This is a computer generated communication and does not have a signature.

Appendix A - PERSONAL

Appendix B - PERSONAL

You will join us as an intern and will carry out your role in India

Internship - Confidential

## Appendix A – PERSONAL INTERNSHIP TERMS AND CONDITIONS

### A1. Title/Category

You will join us as an intern in the Software Engineer Program at JPMorgan Chase & Co., and will carry out your role while physically present in the J.P. Morgan offices in Hyderabad, India.

### A2. Internship Commencement Date

Your internship shall begin on 15-Feb-2021 ("Start Date") and shall continue, subject to the remaining terms of this agreement, until it terminates on 11-Jun-2021 ("End Date") without the need for notice, unless previously terminated by either party pursuant to paragraph 4 of Appendix B.

In addition to the conditions set out in paragraph 1 of Appendix B, your offer is subject to you successfully meeting the educational criteria that has already been communicated to you in writing.

### A3. Working Hours

Your manager will assign you specific working hours, often during the Company's normal office hours. Depending on the needs of your department, however, you may be required to work outside the official hours to fulfill your duties.

### A4. Stipend

Your stipend will be INR50,000/- per month.

### A5. Probationary Period

Your internship will be subject to a probation period as outlined in paragraph 4.3 of Appendix B.

### A6. Leave Entitlement

#### A6.1 Annual Leave

You are entitled to 20 working days of annual leave with full pay in every calendar year, pro-rated according to the duration of your employment in accordance with the Company's Human Resources Policies and applicable law. If you work part-time hours, your annual leave entitlement will be pro-rated to reflect your part-time hours worked.

#### A6.2 Other Leave

You can find further details of other leave entitlements in paragraph 5 of Appendix B.

### A7. Benefits

You will not be entitled to join the Company's benefits programs, given the short length of

your fixed-term contract.

**A8. Retirement Scheme**

You are not eligible for retirement benefits.

**A9. Notice Period**

During your probationary period, starting the day you join the Company, either you or the Company may terminate your employment with at least 15 days' written notice or payment of wages in lieu of such notice period.

After the probationary period, either party can terminate the employment by giving the other party 30 Days written notice ("Notice Period") or by the Company making a payment in lieu of Notice Period.

## APPENDIX B – GENERAL INTERNSHIP TERMS AND CONDITIONS

**B1. Internship**

**B1.1** Your internship is subject to:

- a) you being able to carry out your role in India while being able to be physically present in an JPMC office in Hyderabad, India and obtaining and maintaining throughout your entire period of internship a valid work permit and such other permission, license or registration as may from time to time be necessary to enable you to carry out your duties and continue your internship.
- b) the completion of all pre-employment screening processes to the satisfaction of the Company, including obtaining education verification, background references and checks as sought and the execution of any other forms necessary for internship, etc.; and
- c) you being legally able to work with the Company. You undertake to disclose any internship or contractual post-internship restraints to which you are subject and which may, and will continue to, affect your internship with us and represent and warrant that:
  - ix. by entering into internship with the Company and performing the duties set out in this letter, you will not be in breach of any express or implied term of any internship or other agreement or arrangement to which you are party;
  - i. you have not taken or otherwise misappropriated and you do not have in your possession or control any confidential and proprietary information belonging to any of your prior employers, or any third party providing services to your prior employer, or connected with or derived from your services to prior employers and you have returned to all prior employers any and all such confidential or proprietary information; and
  - ii. you are not subject to any other internship, including being subject to garden leave or any contractual post-internship restraints.

You shall indemnify and hold harmless the Company from any and all claims arising

from any breach of the warranties in this paragraph B1.

- B1.2 Whilst you and/or the Company may have agreed a tentative date of commencement of internship with the Company, you will not, unless the Company decides otherwise, be able to commence internship with the Company without our receipt of completed and satisfactory results from our pre-employment screening process.
- B1.3 You may be required to provide services for other members of the Group throughout your internship. When providing these services, you may from time to time be required to travel and work in different locations within and outside your hiring location.
- B1.4 You will not undertake outside employment or activities with or without remuneration, unless you have the prior written approval of senior management of the Company or its delegate. Outside activities may include (but are not limited to) activities as a director, officer, partner, sole proprietor, consultant or controlling stockholder of any business. If your request to undertake outside activity is not approved by management and you decide to engage in the activity, your internship may be terminated without any notice or compensation.

## **B2. Remuneration**

- B2.1 We will deposit your stipend (paragraph 4 of Appendix A) on or around the 30th of each month.
- B2.2 You will be responsible for all tax liabilities world-wide arising out of payments pursuant to your internship with the Company.
- B2.3 Any payment of salary or bonus by, or other sum due to you from the Company shall be subject to any and all withholding or deduction (for, including but not limited to, any taxes, contributions, repayments or other sums which you have agreed that the Company may withhold/deduct or which the Company is obliged or entitled to withhold/deduct from time to time under any applicable law), and the Company shall in such case be entitled to withhold, deduct or retain the amount of such tax, withholding or deduction from any sum payable to you.

## **B3. Incentive Compensation**

For this position, you won't be eligible for incentive awards under the JPMorgan Chase Performance-Based Incentive Compensation Plan or any other non-annual incentive compensation plan.

## **B4. Termination**

- B4.1 Your internship may be terminated as follows:
  - a) By either party giving to the other prior written notice of at least the period specified, as applicable, in paragraph 9 in Appendix A (the "Notice Period"), or by the Company making a payment in lieu of notice for all or part of such Notice Period of an amount equal to basic salary you would have been entitled to receive during the Notice period or part of the Notice Period.
  - b) By the Company at any time without notice or compensation if you:

- i) are guilty of fraud, dishonesty or misconduct which is inconsistent with the Code of Conduct and faithful discharge of your duties;
- ii) seriously breach the Code of Conduct and any other Company policies;
- iii) disobey the Company's lawful and reasonable instructions/requirements;
- iv) habitually neglect your duties; or
- v) otherwise commit a material or repeated breach of your internship terms or any of the Company's or Group's policies.

B4.2 During any Notice Period, the Company may put you on "garden leave" and may, amongst other things, do any or a combination of the following:

- (a) suspend you from the performance of any duties or assign you alternative duties;
- (b) exclude you from any premises of the Company or any of the Group companies and/or require you to work from another location;
- (c) require that you have no or limited contact or communication, other than purely social contact, with any employees, officers, directors, agents or consultants of the Company or any other member of the Group;
- (d) require that you have no or limited contact or communication with any customer or client of the Company or any other member of the Group;
- (e) remove your access to the Company premises and computer systems;
- (f) require that you return any property belonging to the Company under paragraph 7 in this Appendix
- (g) require you not to do any act or thing, or make or cause to be made, any statement reasonably likely to damage the business or reputation of the Company or the Group.

B4.3 If paragraph 5 of Appendix A states that your employment is subject to probation, your probation period will be the first 3 months of employment, which you agree is reasonable, and fair, in light of the responsibilities of the role.

B4.4 At its sole discretion, the Company may notify you of an extension to your probationary period.

B4.5 All your duties (whether express or implied) under your internship and this letter, including without limitation your duty of fidelity, good faith, exclusive service and duties in relation to the Group's confidential information shall continue throughout the Notice Period including any period that you are on garden leave.

B4.6 During any Notice Period:

(a) you will provide such handover of your duties or any of the Group

(b) you shall make your assistance, be available

B5.

- (a) you will provide such assistance as the Company may require to effect an orderly handover of your duties and responsibilities to any individual appointed by the Company or any of the Group Companies to take over your role or responsibilities; and
- (b) you shall make yourself available to deal with requests for information, provide assistance, be available for meetings and to advise on matters relating to work.

**B5. Leave**

**B5.1 Annual Leave**

- (a) You will be entitled to annual leave with full pay in every calendar year – please see paragraph 6 of Appendix A, pro-rated according to the duration of your employment. The Company will be entitled to determine when annual leave is taken, although as far as possible, arrangements will be made to suit your convenience. Annual leave entitlement for each calendar year must be taken in that calendar year and only in exceptional circumstances can annual leave (other than unused statutory entitlement, if any) be carried forward into the following calendar year. All annual leave days taken will be deducted first from the statutory entitlement accumulation.
- (b) After a notice of termination has been given pursuant to paragraph B4.1 of this Appendix, you will not be entitled to take any annual leave without the express consent of the Company provided after notice of termination has been given.
- (c) You must comply with the Company's 'consecutive days leave' policies.

**B5.2 Sick Leave**

Any sick leave entitlement will be subject to relevant legislation and J.P.Morgan internal policies that are in force and amended from time to time. More details are set out in the [me@jpmc](mailto:me@jpmc) website, which will be accessible to you upon commencement of your employment.

**B5.3 Suspension Leave**

The Company has the right to suspend you from your work duties with full pay when it considers it necessary to investigate any allegation of misconduct or impropriety on your part. The Company can exercise this right at its sole discretion, acting in good faith.

**B6. Confidentiality**

You acknowledge that a vast amount of privileged and confidential information will be disclosed to you in course of your internship with the Company and during your internship with the Company and thereafter, you shall keep secret and shall not at any time (whether during or after the period of your internship) use for your own or another's advantage, or reveal to any person, firm or company, any of the trade secrets, business methods and plans, financial matters, client lists, investments, marketing plans, personnel matters or other information which you knew or reasonably ought to have known to be confidential concerning the business or affairs of the Company or any other member of the Group or any of their related companies, clients or suppliers.

You agree to abide by the specific provisions on the use of confidential information in the Company's policies and Group code of conduct.

The restriction contained in this paragraph shall not apply to any disclosure or use authorized by the Company or required by law.

**B7. Return of Company Property**

You acknowledge that any privileged or confidential information disclosed to you in the course of your internship with the Company remains the exclusive property of the Company and whenever requested by the Company and/or Group and in any event upon the termination of your internship, you will promptly deliver to the Company and/or Group all documents and other materials (whether originals or copies or in hard copy or electronic form) concerning the Company and/or Group or their respective clients and suppliers, which may have been prepared by you or have come into your possession, custody or control in the course of your internship with the Company. This includes, without limitation, any confidential information, lists of clients or suppliers, correspondence, electronic equipment, computer software or hardware, staff identity cards and other property used in connection with the operations of the Company and/or Group. You will not be entitled to, and will not retain, any copies, title and copyright in such correspondence and other documents, papers, records and property are vested in the Company and/or Group.

**B8. Post Internship Restrictions**

**B8.1** For a period of three months commencing on the Relevant Date, you shall not directly or indirectly (whether on your own account, for or with any other person, firm or company) solicit or endeavor to entice away from the Company or any other Group Company any Critical Person.

**B8.2** For a period of three months commencing on the Relevant Date, you shall not directly or indirectly (whether on your own account, for or with any other person, firm or company) solicit or endeavor to entice away from the Company or any other Group Company the business or custom of any Restricted Client.

**B8.3** The duration of the restrictions will be reduced by any period of notice that you work out or any period of garden leave as provided in this offer letter.

**B8.4** In this paragraph B8:

a) "Critical Person" means any person who was an employee or director of the Company or any other Group Company at any time within one year prior to the Relevant Date who had access to trade secrets or confidential information of the Company or any other Group Company. This includes knowledge of, involvement with or influence over suppliers or clients of the Company or any other Group Company with whom you worked at any time during that period.

b) "Group Company" means the Company, its ultimate holding company, any subsidiary of the Company and any holding company from time to time. "Subsidiary" and "holding company" shall have the same meaning as in the relevant companies' legislation.

c) "Restricted Client" means any person:



- i. who in the one year before the Relevant Date was a client of, or has dealt with, the Company or any other Group Company; and
  - ii. with whose custom or business you, or persons reporting to you, were personally involved with during the period of one year prior to the Relevant Date
  - iii. but does not include publicly known institutional clients which you serve subsequent to your internship with the Company without the use of confidential or proprietary information of the Company and the Group.
- d) "Relevant Date" means the date your internship with the Company or the Group terminates for whatever reason.

B8.5 You acknowledge and agree:

- a) that each of the foregoing paragraphs constitutes an entirely separate and independent restriction on you;
- b) that the duration, extent and application of each restrictions, obligations and undertakings are reasonable and necessary to protect legitimate interests of the Company and the Group, considering, among other things, that the Company has commercial dealings with business partners throughout the world and that you will regularly be dealing with such partners as part of your duties and you understand that it does not by any means prevent you from earning a living in a satisfactory way;
- c) that, if any such restriction (or parts of a restriction) shall be adjudged by any court of competent jurisdiction to be void or unenforceable, the validity or enforceability of the remaining restrictions (or parts of a restriction) shall remain in full force and effect as if the unenforceable parts had been deleted. Damages may be an inadequate compensation for breach of any of the restrictions in this paragraph and, subject to a court's discretion, in the event of any actual or threatened breach of any provision of this paragraph, you agree that the Company shall be entitled to (on behalf of itself and on behalf of any other Group Company) restrain, by injunction, equitable relief or similar remedy, any conduct or threatened conduct by you. You expressly submit to the jurisdiction of any court of competent jurisdiction for this purpose, and in the event you receive from any person an offer of employment (whether oral or in writing and whether accepted or not), either during your internship or the continuation in force of all or any of the restrictions applicable to you, whether pursuant to this letter or the Code of Conduct, you shall provide to the person making such an offer of employment a full and accurate copy of the then current restrictions applicable to you.
- d) that any benefit given or deemed to be given by you to the Group under the terms of this paragraph is received and held on trust by the Company for the relevant Group Company. You will enter into appropriate restrictive covenants directly with other Group Companies if asked to do so by the Company.
- e) that your internship with the Company and the compensation paid and/or payable to you by the Company shall be sufficient consideration for the purposes of this clause. You further agree and acknowledge that the limitations as to time and the character or nature placed in this clause are reasonable and fair and will not preclude you from earning a livelihood, nor will they unreasonably impose limitations on your ability to earn a living.

f) that this offer letter constitutes a valid, legally binding and enforceable obligation and this document is not in violation of any applicable law.

g) that any breach or threat of breach on your part of any one of such obligations and/or undertakings would cause serious harm to the Company or the Group which may then institute any legal recourse against you that is deemed appropriate and/or recourse in damages, without further notice or delay.

h) that you shall not assign this offer letter or the rights and/or obligations hereunder. The Company may assign its rights and obligations herein in all circumstances without your consent, including in connection with any sale, transfer or disposition of all or substantially all of its business and operations and its assets, in which case the Company's rights and obligations shall vest to the successor.

i) in addition, you agree and acknowledge that the potential harm to the Company of the non-enforcement of this clause outweighs any potential harm to you and that you have given careful consideration to the restraints imposed upon you by this clause and that you are in full agreement as to their necessity for the reasonable and proper protection of the Company's interests. You expressly acknowledge and agree that each and every restraint imposed by this clause is reasonable with respect to subject matter, time period and geographical area.

#### **B9. Code of Conduct and Staff Regulations and Affirmation**

B9.1 It is a condition of your continuing internship and it is your obligation that you comply with:

(a) the Code of Conduct (as amended from time to time or superseded). At the time of acceptance of the offer of internship and on a periodic basis, you will be required to sign an affirmation (or reaffirmation) confirming your understanding and compliance with the provisions of the Code of Conduct; and

(b) the Company's other internal policies and procedures and all relevant policies and procedures for the line of business in which you are to undertake work.

B9.2 The Company shall be entitled at any time to amend the Company's internal policies and procedures (including but not limited to the Code of Conduct), the benefits set out in the Appendices and other staff regulations, as well as to put in place new policies as the Company sees fit. Any such amendments shall be notified in writing to each employee and shall on provision of such notice, become legally binding.

B9.3 The Company's Human Resources work policies are set out in the me@jpmc website, as amended from time to time. Please take time to familiarise yourself with these policies when you begin your internship.

B9.4 To the extent that the contents of policies or procedures refer to obligations on the Company, you agree that they are guides only and are not contractual terms, conditions or representations on which you rely.

#### **B10. Working Hours**

B10.1 Your total working hours (including break(s)) is 40 hours per working week during the tenure

of your intern  
hours may b

B11.

Retirement E

You are not eli

of your internship and you should attend office 5 days every working week. Your working hours may be revised at the discretion of the Company.

**B11. Retirement Benefits**

You are not eligible for retirement benefits.

**B12. Contract Execution**

B12.1 You acknowledge and agree that:

- (a) This letter may be delivered in a digital or physical format. Subject to any applicable law, where the letter is provided in a digital format, you acknowledge and agree that it is being executed electronically and that it is enforceable.
- (b) You have read and understood the terms of this letter and have been provided with an opportunity to review and discuss the terms of it with advisors, if you so desire.
- (c) Should any further assurances be required or sought by the Company, you shall in good faith perform such further actions (including executing a physical copy of this letter)

**B13. Governing Law and Jurisdiction**

This letter and any dispute or claim arising out of or in connection with it or its subject matter or formation (including non-contractual disputes or claims) shall be governed by and construed in accordance with the laws of India. You and the Company submit to the non-exclusive jurisdiction of the Mumbai, Maharashtra courts in relation to any dispute arising in connection with your internship and this letter.

**APPENDIX C - SYSTEMS MONITORING ACTIVITIES AND CROSS-BORDER TRANSFERS, PERSONAL ACCOUNT DEALING POLICY, AND CODE OF CONDUCT**

**Appendix: Systems Monitoring Activities and Cross-Border Transfers:**

The following provides a summary of how JPMorgan Chase & Co., its affiliates and its subsidiaries and the entity that employs you, or for which you provide services (collectively, "JPMC"), conducts Systems monitoring. JPMC may conduct monitoring to the extent permitted by applicable law.

JPMC conducts monitoring of JPMC's physical facilities and its equipment and systems (collectively, the "Systems"). System monitoring applies to your JPMC equipment, your personal equipment when accessing the Systems, and the communications, information, and materials conveyed or accessed using the Systems. Monitoring activities may include the monitoring and logging of traffic and usage data of all electronic communications; monitoring of telephone calls to or from JPMC work telephones as permitted by applicable laws and subject to any required notices; monitoring of the contents of electronic communications, files, databases, applications, and internet usage; and logging hours worked and physical presence at JPMC's facilities if applicable. JPMC may at all times monitor, access, retrieve, record and review information obtained from the monitoring activities for various purposes, such as preventing and investigating activities that may violate JPMC's policies and ensuring compliance with legal or regulatory obligations. While conducting monitoring activities, JPMC may obtain and process personal information about you and others that may reside on the Systems.

JPMorgan Chase  
time period that y  
comply with the fo  
1. For the r  
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The monitoring activities (including JPMC's collection and processing of personal or other information) are required for purposes of your employment or work assignment to promote adherence to applicable policies and regulations. Subject to applicable laws and regulations, if you object to this processing, JPMC may prohibit you from using the Systems; terminate offers of employment or work assignment; and, for employees, take disciplinary action against you, up to and including termination of your employment with JPMC.

JPMC may disclose the information it obtains in connection with monitoring activities to JPMC affiliates and to third parties, service providers, regulators, supervisory bodies, law enforcement and other government agencies. Information obtained from the monitoring activities may be used as the basis to take disciplinary actions, up to and including termination or other legal action, for violations of JPMC's policies or applicable laws.

In addition to the monitoring activities discussed above, JPMC may obtain and store other information related to your employment or other working relationship, such as your compensation information, performance information, benefits information and other workplace-related data. JPMC may transfer such information, and the information it obtains in connection with monitoring activities, to countries other than the country in which the information originally was collected, including to the United States.

#### **Understanding Obligations under the Firm's Personal Account Dealing Policy (PAD):**

The Personal Account Dealing Policy (Policy) of JPMorgan Chase & Co. (firm or JPMC) is designed to help prevent and detect violations of securities laws and industry conduct standards and to minimize actual or perceived conflicts of interest that could arise due to personal investing activities.

PAD Compliance will notify you if the position you are being offered is considered to be subject to the Policy. You will remain subject for the duration of your time working in a subject group, unless notified otherwise of a change in subject status. Unless otherwise notified, you will continue to be subject to the provisions of the Policy even during leaves of absence from the firm, including, but not limited to, garden leave or medical leave.

You as well as your Connected Persons are subject to the provisions of this Policy and will need to be familiar with the obligations set forth in this policy. Connected Persons includes your spouse, domestic partner or minor children (even if financially independent) as well as anyone to whom you provide significant financial support or for which you, or anyone listed above, has or shares the power, directly or indirectly, to make investment decisions.

Once subject to the Policy, you must disclose and certify your Covered Accounts (which include accounts of your Connected Persons). You will be required to maintain your self-directed Covered Accounts with one of the firm's Approved Brokers and preclear all purchases, sales, pledges and gifts (received and given) of publicly traded and privately held financial instruments, unless listed as specifically exempt. Pre-approval confirmations must be received prior to executing the trade or investment. The firm may impose periodic restrictions on personal trading in certain financial securities. These restrictions can apply to all firm subject Workforce Members and their Connected Persons or may be limited to certain groups. Subject Workforce Members and their Connected Persons are not permitted to recommend or transact in the financial instruments of an issuer while in the possession of material non-public information (MNPI) regarding that issuer.

If you are a seasonal or short term employee the following requirements will apply:

personal or other  
employment to promote  
laws and regulations,  
securities, terminate offers of  
any action against you, up to and

JPMorgan Chase requires that seasonal workers refrain from trading in Covered Accounts for the period that you are employed in a short term training program. Please verify that you will comply with the following personal trading requirements:

1. For the duration of the short term program I am joining I will not trade in any of my Covered Accounts
2. I understand that the Firm has the right to request account information for any of my Covered Accounts
3. If there is an extenuating circumstance that would compel me to place a trade in my Covered Accounts, I will obtain pre-approval of the trade by the Personal Account Dealing Group and I would be responsible for supplying all confirmations and statements to the Personal Account Dealing Group for that trade

\*The term Covered Accounts refers to any securities accounts no matter where they are located and includes, but is not limited to, those accounts that are established, maintained or controlled (either directly or indirectly) by you, your spouse, domestic partner or minor children (even if financially independent), anyone to whom you provide significant financial support, and in which the employee has a direct or indirect financial interest.

**Global Personal Trading Policy:**

The Personal Account Dealing of JPMorgan Chase & Co. is designed to help prevent and detect violations of securities laws and industry conduct standards and to minimize actual or perceived conflicts of interest that could arise due to personal investing activities. This Policy includes requirements for disclosing Covered Accounts, maintaining certain accounts at one of the firm's Approved Brokers, preclearing trades, and restrictions and prohibitions on certain types of trading activity. This Policy is subject to any applicable local laws and rules and should be read in conjunction with Supplements (regional/LOB) as well as the firm's Code of Conduct.

**Acceptance and Code Affirmation:**

Upon signing this letter I accept the terms and conditions described above. I hereby affirm that I have read and understood the JPMorgan Chase Code of Conduct (the "Code of Conduct"). I agree, as a condition of my employment, to comply with the Code of Conduct, as amended and in effect from time to time.

By signing this offer letter, you confirm that your employment by the firm does not violate the hiring of relatives and employees in personal relationships policy and you agree that you will act in compliance with that policy.

I understand that I have access to the Code of Conduct either by [clicking here](#) or via the internet at <https://www.jpmorganchase.com> > About Us > Governance > Code of Conduct and Ethics prior to joining the firm, and through the firm's intranet once I begin employment.

I acknowledge that:

- The Code of Conduct requires that certain outside activities be approved in writing after I begin employment, and I agree that, if any such required approval is denied, I will cease the relevant activity immediately;
- The Code of Conduct imposes certain responsibilities that continue after my employment with JPMorgan Chase terminates, including but not limited to, the return of property, the

protection of confidential information, and assisting with investigations or litigation related to my role at JPMC;

- The Code of Conduct also requires that I safeguard confidential information, including anything that I created while working for my previous employer(s); and I understand that I am not allowed to bring any of this with me to use at JPMorgan Chase or disclose any confidential information from a prior employer unless it has already been made public through no action of my own;
- My offer of employment is contingent upon a determination by JPMorgan Chase that neither the offer nor my employment would violate, or create the appearance of violating, the firm's Code of Conduct, Anti-Corruption Policy, or Human Resources policies and practices, or any applicable laws or regulations;
- I understand and agree that if I am an MD/SVP, ED or VP at the time of my termination I have certain additional responsibilities and restrictions that continue after my employment with the firm terminates, including a prohibition from soliciting or hiring JPMorgan Chase employees and soliciting customers; and
- It is my responsibility to be familiar with all of my post-employment obligations, and I agree to abide by those responsibilities after my employment terminates.

**Independent Auditor Tax Services to Employees of JPMorgan Chase and its Affiliates:**

To be in compliance with the Public Company Accounting Oversight Board (PCAOB) Rule 3523, it is JPMorgan Chase's (JPMC) policy that PricewaterhouseCoopers (PwC) cannot provide any tax services to employees of JPMC or any of its controlled entities (hereafter referred to as JPMC employee). This restriction is regardless of whether the individual is in a financial reporting oversight role or not, and whether PwC is engaged by the individual or by JPMC. PwC is also prohibited from providing any tax services to a spouse of a JPMC employee if the work is related to a joint tax return. Exceptions to this policy will be reviewed on a case-by-case basis and will require the approval of the JPMC Controller.

J.P. Morgan Services India Private Limited  
Corporate Identity Number : U72900MH2000PTC124073

Registered Office: Prism Towers, Level Nos. 9 to 11, Link Road, Mindspace Goregaon (West),  
Mumbai - 400 104, India  
Telephone: +91-22-6157 3000 Facsimile : +91 22 6125 0000



Ref.No:- MA/2020/INT/ 700171

Date: - 2<sup>nd</sup> March 2021

Naveen Y  
ChaitanyaBharathi Institute of Technology  
Phone no.-6300274182  
Email:naveenyembadi143@gmail.com

Dear Naveen,

I am delighted & excited to welcome you to Mercury Associates. As a Business Development InternAt Mercury Associates, we believe that our team is our biggest strength and we take pride in hiring only the best and the brightest. We are confident that you would play a significant role in the overall success of the project and wish you the most enjoyable, learning packed and truly meaningful internship experience with Mercury Associates.

Your expected **date of joining is 6<sup>th</sup> March 2021** and the duration of the internship would be 2 months

Please do not hesitate to call us for any information you may need. Also, please email us your acceptance.

Congratulations!

Regards

A handwritten signature in black ink, appearing to read 'Pradhyun Kodarapu', written in a cursive style.

Pradhyun Kodarapu  
Regional Head  
Mercury Associates



## Offer of Internship

**Private and Confidential**

Date: January 25, 2021

Reference: Your application for student internship at Meridian Data Labs, dated December 24, 2020

To: Nikitha Kotharamula

Dear Nikitha,

We are pleased to offer you student internship to work on projects at Meridian Data Labs (MDL), by way of this internship letter.

### **Appointment:**

Your project location would be Hyderabad, for a period of four months starting February 01, 2021. Any changes to the start and / or end date will be as agreed between MDL and you, and any extension of the internship will be based on mutual agreement. Upon joining, you will be assigned a mentor who will brief you about the project. Your mentor will be guiding, reviewing and assessing the assigned projects.

During your temporary employment with MDL, you may have access to confidential or proprietary business information belonging to MDL. By accepting this offer, you acknowledge that this information must remain confidential and agree to refrain from using it for your own purposes or disclosing it to anyone outside of MDL. Also, you agree that upon completion of your internship, you will promptly return any company information and documents belonging to the company.

MDL expects you to perform your duties with sincerity, honesty, diligence with proper conduct.

### **Stipend:**

During the period of internship, you will be paid a consolidated stipend of INR 10000.00 (Rupees ten thousand only) per month. You will not be entitled to other employee allowances or benefits during the internship period. Please be advised that you need to take care of any applicable tax related responsibilities by yourself.

### **Termination:**

During internship, you or MDL may terminate this internship by giving 10 calendar days' notice in writing or MDL by making payment in lieu thereof.

This offer letter represents the internship offer and supersedes any prior conversations about the position. If you have any questions about this offer please contact the undersigned. Please review this letter in full, and sign and return it to confirm your acceptance of the position. We look forward to having you begin your career at MDL and wish you a successful internship. Welcome to our team!

Sincerely

Diwekar

CEO | +91 9000 999 208

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[www.meridiandatalabs.com](http://www.meridiandatalabs.com)

#302, DSL Abacus IT Park, Uppal, Hyderabad - 500039

CIN: U72200TG2020PTC146569



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District Centre, Saket,  
New Delhi - 110 017  
Phone: 91-11- 46509000  
Fax: 91-11-40574722  
CIN: U74899DL1993PTC051764

## Private & Confidential

Reference: Oracle India/Project Trainee/CEGBU-Hyderabad  
Dated: 17 December 2020

Sahiti Arigela

Dear Sahiti,

It is our pleasure to offer you student internship to work on a project with Oracle India Private Limited, IDC (the **Company**) by way of this internship letter.

### Appointment

Your project location would be Hyderabad.

The duration of your internship will be from 13 January 2021 to 30 June 2021. Any changes to the start and/or end date will be as agreed between the Company and you, and any extension of the internship will be based on mutual agreement.

Upon joining, you will be assigned a mentor from the Company who will brief you about the project and you will be required to carry out the project work under the guidance of a mentor.

### Stipend

Under this internship, you will be paid a stipend of INR 30,000.00 per month, subject to applicable tax deduction. You will however, not be entitled to any other allowances or benefits given to the regular employees of the Company, other than what is set out in this letter.

You will arrange to take care of your tax related responsibilities as may be applicable to the afore said stipend payments or any other tax related matters in connection with your internship and the Company will not be liable for the same.

### Termination

During your internship, you or the Company may terminate this internship by giving 10 calendar days' notice in writing or by Company making payment in lieu thereof.

The Company shall be entitled to terminate this internship with immediate effect (but without prejudice to the rights and remedies of the Company for any breach of this offer letter and to your continuing obligations under this offer letter) if you are guilty of dishonesty, serious or persistent misconduct, or without reasonable cause of neglect, or refusal to attend to your duties, or failure to perform any of your obligations, hereunder, or fail to observe the Company's disciplinary rules or any other applicable regulations of the Company.

You will be responsible for the safe return of all properties of the Company, including any drawings, software, employee data, notebooks, manuals, documents, computerization of technical data, customer lists, specifications, files, memoranda, or other records of any nature belonging to the Company, or any reproduction thereof which may have been provided to you during the course of your internship with the Company, or which may be in your use, custody, care, or charge. For the loss of any property of the Company in your possession, the Company

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India Development Center  
Oracle Technology Park  
3, Bannerghatta Road  
Bangalore - 560 029, India  
Phone +91 80 4107 6000  
Fax +91 80 2552 6124

Registered office address:  
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Salcon Ravvillas Plot no. D-1,  
District Centre, Saket,  
New Delhi - 110 017  
Phone: 91 11 46509000  
Fax: 91-11-40574722  
CIN: U74899DL1993PTC051764

will have a right to assess the value of the loss on its own basis and recover the damages as it deems proper in the event of your failure to account for such material or property to its satisfaction.

On expiry or earlier termination of this internship, you shall immediately hand over all papers, documents, and other properties of the Company and the group companies as may be in your possession, custody, control, or power, including but not limited to any computers, computing equipment, computing devices, etc. as provided by the Company.

We are aware that as part of your education curriculum, you have to work on a project report and submit it to your college. We wish to inform you that the projects done at the Company would be the sole property of the Company. Consequently, all rights to such projects will remain solely the property of the Company. You will be required to prepare a project report under the guidance and review of the mentor; a copy of which will be retained by the Company for our records and the other copy can be submitted to your college.

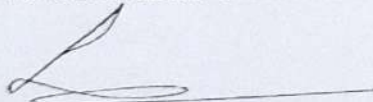
You must also ensure that you have submitted the request/recommendation letter from your college for your internship at the Company with our Campus Team before you can commence on your internship.

On your successful completion of the internship, you will be provided with an internship certificate by the Company.

This internship letter shall be governed by and construed in accordance with the laws of India.

This internship letter is subject to the acceptance of the enclosed guidelines which are applicable during your project period.

Yours Sincerely,  
For and on behalf of Oracle India Private Limited, IDC



Srihari Beldona  
Vice President - Human Resources, India

**Acknowledgement:**

I hereby accept the internship agreement on the terms and conditions set out in the foregoing internship letter.

Name: Sahiti Arigela

Signature: A Sahiti

Date: \_\_\_\_\_

Oracle India Private Limited  
India Development Center  
Oracle Technology Park  
3, Bannerghatta Road  
Bangalore - 560 029, India  
Phone +91 80 4107 6000  
Fax +91 80 2552 6124

Registered office address:  
F-01/02, First Floor,  
Salcon Rasvillas Plot no. D-1,  
District Centre, Saket,  
New Delhi - 110 017  
Phone: 91-11- 46509000  
Fax: 91-11-40574722  
CIN: U74899DL1993PTC051764

## Private & Confidential

Reference: Oracle India/Project Trainee/UGBU-Hyderabad  
Dated: 17 December 2020

Hrithik Roshan Palampatla

Dear Hrithik Roshan,

It is our pleasure to offer you student internship to work on a project with Oracle India Private Limited, IDC (the **Company**) by way of this internship letter.

### Appointment

Your project location would be Hyderabad.

The duration of your internship will be from 13 January 2021 to 30 June 2021. Any changes to the start and/or end date will be as agreed between the Company and you, and any extension of the internship will be based on mutual agreement.

Upon joining, you will be assigned a mentor from the Company who will brief you about the project and you will be required to carry out the project work under the guidance of a mentor.

### Stipend

Under this internship, you will be paid a stipend of INR 30,000.00 per month, subject to applicable tax deduction. You will however, not be entitled to any other allowances or benefits given to the regular employees of the Company, other than what is set out in this letter.

You will arrange to take care of your tax related responsibilities as may be applicable to the afore said stipend payments or any other tax related matters in connection with your internship and the Company will not be liable for the same.

### Termination

During your internship, you or the Company may terminate this internship by giving 10 calendar days' notice in writing or by Company making payment in lieu thereof.

The Company shall be entitled to terminate this internship with immediate effect (but without prejudice to the rights and remedies of the Company for any breach of this offer letter and to your continuing obligations under this offer letter) if you are guilty of dishonesty, serious or persistent misconduct, or without reasonable cause of neglect, or refusal to attend to your duties, or failure to perform any of your obligations, hereunder, or fail to observe the Company's disciplinary rules or any other applicable regulations of the Company.

You will be responsible for the safe return of all properties of the Company, including any drawings, software, employee data, notebooks, manuals, documents, computerization of technical data, customer lists, specifications, files, memoranda, or other records of any nature belonging to the Company, or any reproduction thereof which may have been provided to you during the course of your internship with the Company, or which may be in your use, custody, care, or charge. For the loss of any property of the Company in your possession, the Company

Oracle India Private Limited  
India Development Center  
Oracle Technology Park  
3, Bannerghatta Road  
Bangalore - 560 029, India  
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District Centre, Saket,  
New Delhi - 110 017  
Phone: 91-11- 46509000  
Fax: 91-11-40574722  
CIN: U74899DL1993PTC051764

### Guidelines For Interns

- To enable us to equip you with some of the skills that you may require in your future professional career, you would be required to be available for eight hours each working day at the Company, excluding breaks, during the course of your internship. Your mentor will communicate to you the specific timings that you need to maintain at the Company.
- You will be eligible to take leave of up to 2.25 days per month subject to prior notification and approval from your mentor, and you will be governed by the public/Government holidays as applicable to the Company's location where you are interning.
- You will have to sign our standard "Internship Non-Disclosure Agreement".
- You will be required to comply with the Company's background check process as applicable to interns prior to commencement of the internship. As part of your background check, as well as during the course of your internship, the Company may collect personal information, including but not limited to, your bank details, credit history, medical records and history, and such other personal data or information, as it may deem necessary, from time to time, as necessary for the purpose of your internship. You hereby acknowledge and grant your consent to the Company collecting, using, processing, storing, disposing off, and transferring, whether to any other group company, or to third party service providers, within or outside India, any such personal information relating to you.
- Access card for entry into Oracle office will be provided for the duration of the project, after which, you are required to return the access card.
- Any project carried out at the Company will remain the property of the Company and you will not be allowed to keep with you in any format or mode & any part thereof without the Company's express consent. All rights to such project will remain solely with the Company.
- You need to abide by all relevant company policies, including the policies concerning physical security, information security, discipline, confidentiality, conduct & ethics at workplace, etc.
- You shall be required to prepare a project report and a copy of the report shall be retained by the Company.
- If the project requires generation of source code, the same shall not be included in the project report, nor can you remove a copy of the source code from the office in any format or mode.
- In any work output/product resulting from this internship shall be disclosed by you that you were doing internship assignment for and on the Company's behalf and that the Company owns copyright of the reports/output you created.
- You shall not acquire the status of an employee nor a right to claim employment with the Company by virtue of your participation in this project/internship.

ORACLE

Oracle Solution Services  
(India) Private Limited

Registered office address:  
Prestige Technology Park  
Venus Block 2C,  
Level 6-8, #29  
Sarjapur Marthahalli Ring Road  
Kadabeesanahalli  
Bangalore 560 103, Karnataka

Phone +91 80 4029 6000  
Fax +91 80 4029 6475  
CIN: U72900KA1995PTC018327

### Private & Confidential

Reference: Oracle India/Project Trainee/ UGBU Consul- Hyderabad

Dated: 20 December 2020

Mahidhara Reddy Kankara

Dear Mahidhara Reddy,

It is our pleasure to offer you student internship to work on a project with Oracle Solution Services (India) Private Limited (the **Company**) by way of this internship letter.

### Appointment

Your project location would be Hyderabad.

The duration of your internship will be from 13 January 2021 to 30 June 2021. Any changes to the start and/or end date will be as agreed between the Company and you, and any extension of the internship will be based on mutual agreement.

Upon joining, you will be assigned a mentor from the Company who will brief you about the project and you will be required to carry out the project work under the guidance of a mentor.

### Stipend

Under this internship, you will be paid a stipend of INR 30,000.00 per month, subject to applicable tax deduction. You will however, not be entitled to any other allowances or benefits given to the regular employees of the Company, other than what is set out in this letter.

You will arrange to take care of your tax related responsibilities as may be applicable to the aforesaid stipend payments or any other tax related matters in connection with your internship and the Company will not be liable for the same.

### Termination

During your internship, you or the Company may terminate this internship by giving 10 calendar days' notice in writing or by Company making payment in lieu thereof.

The Company shall be entitled to terminate this internship with immediate effect (but without prejudice to the rights and remedies of the Company for any breach of this offer letter and to your continuing obligations under this offer letter) if you are guilty of dishonesty, serious or persistent misconduct, or without reasonable cause of neglect, or refusal to attend to your duties, or failure to perform any of your obligations, hereunder, or fail to observe the Company's disciplinary rules or any other applicable regulations of the Company.

You will be responsible for the safe return of all properties of the Company, including any drawings, software, employee data, notebooks, manuals, documents, computerization of technical data, customer lists, specifications, files, memoranda, or other records of any nature belonging to the Company, or any reproduction thereof which may have been provided to you during the course of your internship with the Company, or which may be in your use, custody, care, or charge. For the loss of any property of the Company in your possession, the Company will have a right to assess the value of the loss on its own basis and recover the damages as

ORACLE

Oracle Solution Services  
(India) Private Limited

Registered office address:  
Prestige Technology Park  
Venus Block 2C,  
Level 6-8, #29  
Sarjapur Marthahalli Ring Road  
Kadabeesanahalli  
Bangalore 560 103, Karnataka

Phone +91 80 4029 6000  
Fax +91 80 4029 6475  
CIN: U72900KA1995PTC018327

it deems proper in the event of your failure to account for such material or property to its satisfaction.

On expiry or earlier termination of this internship, you shall immediately hand over all papers, documents, and other properties of the Company and the group companies as may be in your possession, custody, control, or power, including but not limited to any computers, computing equipment, computing devices, etc. as provided by the Company.

We are aware that as part of your education curriculum, you have to work on a project report and submit it to your college. We wish to inform you that the projects done at the Company would be the sole property of the Company. Consequently, all rights to such projects will remain solely the property of the Company. You will be required to prepare a project report under the guidance and review of the mentor; a copy of which will be retained by the Company for our records and the other copy can be submitted to your college.

You must also ensure that you have submitted the request/recommendation letter from your college for your internship at the Company with our Campus Team before you can commence on your internship.

On your successful completion of the internship, you will be provided with an internship certificate by the Company.

This internship letter shall be governed by and construed in accordance with the laws of India.

This internship letter is subject to the acceptance of the enclosed guidelines which are applicable during your project period.

Yours Sincerely,

For and on behalf of Oracle Solution Services (India) Private Limited



Srihari Beldona  
Vice President - Human Resources, India

**Acknowledgement:**

I hereby accept the internship agreement on the terms and conditions set out in the foregoing internship letter.

Name: K. Mahidhara Reddy

Signature: 

Date: 20-12-2020

ORACLE

Oracle Solution Services  
(India) Private Limited

Registered office address:  
Prestige Technology Park  
Venus Block 2C,  
Level 6-8, #29  
Sarjapur Marthahalli Ring Road  
Kadabeesanahalli  
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Phone +91 80 4029 6000  
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CIN: U72900KA1995PTC018327

### Guidelines For Interns

- To enable us to equip you with some of the skills that you may require in your future professional career, you would be required to be available for eight hours each working day at the Company, excluding breaks, during the course of your internship. Your mentor will communicate to you the specific timings that you need to maintain at the Company.
- You will be eligible to take leave of up to 2.25 days per month subject to prior notification and approval from your mentor, and you will be governed by the public/Government holidays as applicable to the Company's location where you are interning.
- You will have to sign our standard "Internship Non-Disclosure Agreement".
- You will be required to comply with the Company's background check process as applicable to interns prior to commencement of the internship. As part of your background check, as well as during the course of your internship, the Company may collect personal information, including but not limited to, your bank details, credit history, medical records and history, and such other personal data or information, as it may deem necessary, from time to time, as necessary for the purpose of your internship. You hereby acknowledge and grant your consent to the Company collecting, using, processing, storing, disposing off, and transferring, whether to any other group company, or to third party service providers, within or outside India, any such personal information relating to you.
- Access card for entry into Oracle office will be provided for the duration of the project, after which, you are required to return the access card.
- Any project carried out at the Company will remain the property of the Company and you will not be allowed to keep with you in any format or mode & any part thereof without the Company's express consent. All rights to such project will remain solely with the Company.
- You need to abide by all relevant company policies, including the policies concerning physical security, information security, discipline, confidentiality, conduct & ethics at workplace, etc.
- You shall be required to prepare a project report and a copy of the report shall be retained by the Company.
- If the project requires generation of source code, the same shall not be included in the project report, nor can you remove a copy of the source code from the office in any format or mode.
- In any work output/product resulting from this internship shall be disclosed by you that you were doing internship assignment for and on the Company's behalf and that the Company owns copyright of the reports/output you created.
- You shall not acquire the status of an employee nor a right to claim employment with the Company by virtue of your participation in this project/internship.



February 13 2021

Dear Akshith Aluguri

On behalf of Possibillion Software Technologies Pvt Ltd the "Company" or "Possibillion", I am pleased to offer employment to you. The purpose of this letter is to outline the terms for your employment subject to the terms of Company policies and other agreements.

**Position:** Your initial position with the Company will be Intern – Embedded Software Engineer.

**Start Date:** February 15 2021

**Anticipated End Date:** August 13, 2021

**Workdays:** Monday to Friday (5 days a week).

**Stipend:** The Company will employ you at a monthly stipend of Rs. 12,000.00.

**Other Terms:**

- Your employment with the Company shall be on an at-will basis. In other words, you or the Company may terminate employment for any reason and at anytime.
- The terms of employment outlined in this letter are subject to change at anytime.
- You and the Company agree that you intend that this letter agreement will be superseded by Possibillion's standard employee agreement.

We are excited about the opportunity to work with you. Please confirm your acceptance of this offer of employment by signing below.

Very truly yours,

Ayyappa Nagubandi  
Co-Founder and CEO  
Possibillion Software Technologies Pvt Ltd

Accepted:  
Date:

---

**Possibillion Software Technologies Pvt Ltd**  
1-20-248, 1<sup>st</sup> Floor, Rasoolpura, Secunderabad, Hyderabad 500034 Telangana, India  
contact@possibilliontech.com, www.possibilliontech.com





possibillion

February 26 2021

Dear Vashista Basava

On behalf of Possibillion Software Technologies Pvt Ltd the "Company" or "Possibillion"), I am pleased to offer employment to you. The purpose of this letter is to outline the terms for your employment subject to the terms of Company policies and other agreements.

**Position:** Your initial position with the Company will be Intern – Embedded Software Engineer.

**Start Date:** March 01 2021

**Anticipated End Date:** August 31, 2021

**Workdays:** Monday to Friday (6 days a week).

**Stipend:** The Company will employ you at a monthly stipend of Rs. 12,000.00.

**Other Terms:**

- Your employment with the Company shall be on an at-will basis. In other words, you or the Company may terminate employment for any reason and at anytime.
- The terms of employment outlined in this letter are subject to change at anytime.
- You and the Company agree that you intend that this letter agreement will be superseded by Possibillion's standard employee agreement.

We are excited about the opportunity to work with you. Please confirm your acceptance of this offer of employment by signing below.

Very truly yours,

Ayyappa Nagubandi  
Co-Founder and CEO  
Possibillion Software Technologies Pvt Ltd

Accepted:

Date:

---

Possibillion Software Technologies Pvt Ltd  
1-20-248, 1<sup>st</sup> Floor, Rasoolpura, Secunderabad, Hyderabad 500034 Telangana, India  
contact@possibilliontech.com, www.possibilliontech.com

December 4, 2020

**Chandana S**

Chaitanya Bharathi Institute of Technology  
India

Dear **Chandana**,

**Internship Offer Letter**

It is my pleasure to offer you the position of **Software Development Intern** with ServiceNow Software Development India Private Limited (the "**Company**"), on the conditions set out below.

You will be based at Parcel 3, Knowledge City, 7th Floor & 8th Floor, Plot #2, Phase - 1, Survey # 83/1, Raidurg Village, Serilingampally Mandal, Rangareddy Dist, Hyderabad – 500081 Telangana, India. Your manager and place of work may change from time to time depending on the needs of the organization and its ability to adapt to market conditions.

This letter summarizes some of the headline points, but the full details of your engagement are documented in the separate contract (the "**Letter of Engagement- Internship**") which is enclosed for your information. Your start date has been tentatively scheduled for **January 4, 2021** and your contract shall be for a period of **21 Weeks** ending on **May 28, 2021**. This internship offer letter should be read in conjunction with the Internship Contract.

Your stipend will be **INR 45,000** paid in monthly instalments into your bank in arrears on the last working day of each month or on such other date within such month as may otherwise be notified by the Company. The Company shall make such deductions from your stipend as shall be required by law.

You will be in your training period till the complete duration of your internship which in this case is **21 Weeks** from the date of your joining.

You will not be eligible for the company benefits over and above the stipend as long as you are an intern with the company.

You will be eligible for-

- Provision of a company laptop.
- In addition, you will be entitled to gazetted public holidays as per Andhra Pradesh Shops & establishment Act 1988. You will not be eligible for any leave benefits during the internship period.

This offer is conditional on the following:

- A copy of your picture page in your passport and the page with the permanent address;
- A copy of the Permanent Account Number (PAN) Card, issued by the Income Tax Authorities in India;
- A copy of all the testimonials and certificates;
- You are signing and returning to us, a copy of this internship offer letter together with the Internship Contract before you begin your engagement with the Company.
- The Company receiving two references from former employers/university (one of which

DocuSigned by:  
S. Chandana  
DA0C57ED72B54C3

- must be from your current employer/university) which it considers satisfactory.
- You complete and pass a standard background check, via a third-party background checking agency, which will be provided with your CV and contact details, on acceptance of this offer.

This internship offer may be withdrawn, if any, of the above conditions are not satisfied.

By accepting this internship offer, you confirm that you are able to accept this job and carry out the work that it would involve without breaching any legal restrictions on your activities. Once you begin your engagement with the Company, you agree to adhere to all its policies, procedures, guidelines and work instructions.


I very much hope that you will accept this offer of internship. If you wish to do so, please sign copies of this letter and the enclosed contract of internship and return to **Ramesh Mudhigiri** by email at [ramesh.mudhigiri@servicenow.com](mailto:ramesh.mudhigiri@servicenow.com). This internship offer is open for you to accept until **December 21, 2020**, at which time it will be deemed to be withdrawn.

We greatly look forward to you joining the ServiceNow team and feel confident you can look forward to a rewarding career with the Company!

Yours sincerely,

For ServiceNow Software Development India Pvt. Ltd

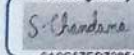
DocuSigned by:

  
3C5C4E97BF6A4C5

Ilango A P  
Director, India HR

I, **Chandana S**, accept this position as offered and agree to all the terms and conditions described herein.

DocuSigned by:

  
6WCA7E072861C3

Signature

December 8, 2020 | 06:50:11 PST

Date:

December 4, 2020

Chandana S  
Chaitanya Bharathi Institute of Technology  
India

Dear Chandana,

**Letter of Engagement - Internship**

We, ServiceNow Software Development India Private Limited bearing Corporate Identification Number (CIN) U72900TG2014FTC092163 (the "Company"), are pleased to offer you engagement as, **Software Development Intern** with the Company upon the following terms and conditions (the "Agreement"). This Agreement together with our Internship Offer Letter **December 4, 2020** (the "Offer Letter") constitutes the terms of your engagement. In the event of any conflict with the Offer Letter this Agreement shall prevail.

1. Appointment

- 1.1 This Agreement will commence with effect from **January 4, 2021** and your contract shall be for a period of **21 Weeks**, ending on **May 28, 2021**, unless otherwise terminated in accordance with the terms and conditions herein.
- 1.2 The Company shall have the right, at its sole discretion, to assign you to other tasks, to change the location of the place of work and to modify your reporting and organizational structure as may be reasonably necessary to respond to changing business needs. You will perform all acts, duties and obligations, and will comply with such orders as may be assigned by the Company which are reasonably consistent with your position. The Company may, from time to time, require you to perform duties normally undertaken by other employees or contractors, including different or additional duties, but not duties which you cannot reasonably perform.
- 1.3 The Company may require you (as part of your duties) to perform duties or services not only for Company but also for any Group Company where such duties or services are of a similar status to or consistent with your position with the Company. The Company may at its sole discretion assign your engagement to any Group Company on the same terms and conditions as set out, or referred to, in this Agreement.
- 1.4 "Group Companies" in this Agreement means the Company, its subsidiaries or subsidiary undertakings, any holding company or parent undertaking and any subsidiary or subsidiary undertaking of any holding company or parent undertaking and "Group Company" means any of them.

2. Status of Engagement

You will be under training until your complete internship period which in this case is a period of four (4) months, during which your engagement with the Company may be terminated by either party giving to the other two (2) weeks' written notice or paying stipend in lieu thereof.

DocuSigned by:  
  
0A0C57ED72854C3



**TECHMAX**

**Techmax**

**Plot No.75,  
IDA Uppal  
Hyderabad 500007  
36ADFPV0149R1ZV**



March 29th, 2021.

Dear Nipuna Vancha,

Techmax, Hyderabad is pleased to offer you an internship opportunity as an associate Business Analyst for our organization effective 5<sup>th</sup> April, 2021 (date of commencement) till 31<sup>st</sup> May, 2021.

The terms and conditions of your internship, that govern the basis of our mutual relationship during the internship period, are outlined below:

1. The Internship will be effective from the date of your actual start of internship with us, which is 5<sup>th</sup> April, 2021.
2. You are expected to work for a minimum of five hours per day and report your progress at the end of every day.
3. During the internship you shall be eligible for any stipend or payment of Rs.15,000/- for every four weeks.
4. On successful completion of your working period, you will be issued a full time Internship Certificate in the field of Business Analysis.

For this position, your major duties will include:

1. Oversee the implementations of new techniques and systems within the organization.
2. Creating a detailed business analysis, outlining problems, opportunities and solutions for a business
3. Help run workshops and training sessions generating awareness about the organization's goals and work.

Congratulations and welcome to the team!

Sincerely,

Srinivas Reddy

CEO

Techmax, Hyderabad

# Experimental and FE Analysis of Tensile and Bending Properties of Glass/Jute Epoxy Hybrid Composite

Venkata Sushma Chinta

*Assistant Professor, Mechanical Engineering Department, Chaitanya Bharathi Institute of Technology(A), Hyderabad, India.*

P. Ravinder Reddy

*Professor, Mechanical Engineering Department, Chaitanya Bharathi Institute of Technology(A), Hyderabad, India.*

Koorapati Eshwara Prasad

*Professor, Mechanical Engineering Department, Siddhartha Institute of Engineering and Technology, Hyderabad, Telangana, India.*

**Abstract-** This paper explores on comparison of tensile and bending stresses of hybrid composite specimens by experiments and with finite element analysis ANSYS. The hybrid composites are prepared with woven E-glass fibre, woven Jute fibre reinforced in the Diglycidyl ether of Bisphenol-A (EP-306) epoxy along with hardener Diethylene tetra amine (EH-758). Composite is prepared by the hand layup technique at room temperature (28<sup>0</sup>C). Tensile specimens with ASTM 3039 standard and bending specimens with ASTM 7264 standard dimensions were cut from the laminate. The specimens FEA models were created using ANSYS 19.2 and failure loads of specimens from experiments are applied on the specimen models. The tensile stresses and bending stresses developed in the specimens were observed at failure loads. The results ensured that the experimental results have well agreed with the ANSYS results.

**KEY WORDS-** Woven jute fibre, Woven glass fiber, hybrid composite, tensile strength, bending strength, ANSYS 19.2

## I. INTRODUCTION

A composite is a material made of two or more materials. They have reinforcement and matrix material. If it consists of more than one reinforcement then it is called a hybrid composite. In hybrid composites the advantage of one fibre would complement what is lacking in another. A continuous fibre composite made of layers of fibres in unidirectional, bi directional etc. Each layer is called lamina and the composite is called laminate. Nowadays the use of natural fibres [1] (sisal, hemp, kenaf, jute and coir) draws more attention for low load applications, and now the research has moved towards sustainability of dynamically loaded components by partial replacement with natural fibres. Ashik et al. [2] found that hybrid glass/jute(60%-40%)-epoxy composite has 66% more tensile strength than non-hybrid jute-epoxy composite and hybrid glass/jute(40%-60%)-epoxy composite has 49% more tensile strength than non-hybrid jute-epoxy composite. Hybrid glass/jute-epoxy composite (60%-40%) has 61% more flexural strength than non-hybrid jute-epoxy composite and hybrid glass/jute-epoxy (40%-60%) composite has 44% more tensile strength than non-hybrid jute-epoxy composite. It is also observed that increasing glass fibre volume increases both tensile strength and bending strength in hybrid composite. However, for tensile specimen tabs modeling is not done and stress variation is not properly shown. Saravana Bavan et al. [3] had fabricated the natural composite beam using Maize fibre reinforced in unsaturated polyester resin polymer matrix and carried out a test to determine the deflection and stress characteristics finite element technique using ANSYS software. The research reveals by increasing the fibre content to an optimum content, there is a possibility of reducing the stress concentration in the matrix and at the fibre interface. But more stress deviation on the fibre matrix, and at the interface regions of the composite tends to fibre debonding. Khatri et al. [4] assessed the mechanical characteristics such as tensile strength, flexural strength, impact strength and Young's modulus of multiple composites. Free vibration features are also analyzed for natural fibre composite beams. In addition to analytical study from experiments on composites from

# Experimental investigation of near-wake characteristics of hydrodynamic cavitating flow around circular cylindrical pins of different geometries with and without ultrasonic transducers

Jagadeshwar Kandula<sup>a</sup>, Usha Sri P<sup>a</sup>, Ravinder Reddy P<sup>b</sup> and S.K. Gugulothu <sup>c</sup>

<sup>a</sup>Department of Mechanical Engineering, University College of Engineering, Osmania University, Hyderabad, India; <sup>b</sup>Department of Mechanical Engineering, Chaitanya Bharathi Institute of Technology, Tadepalligudem, Hyderabad; <sup>c</sup>Department of Mechanical Engineering, National Institute of Technology, Andhra Pradesh, India

## ABSTRACT

The primary objective of this research is to study the hydrodynamic cavitating effects of fluid flow past a circular cylindrical pin of different geometries. An experimental investigation is carried out to study the effect of cylinder diameter and its length on the formation of wake cavitation in the upper sub-critical flow regime, which corresponds to Reynolds number (Re) in the range of  $2 \times 10^4$  to  $2 \times 10^5$ . The vapour volume fraction was found to increase with a decrease in the cavitation number. The pressures in the cavitating region were found to be fluctuating and the Strouhal number was calculated. Additionally, to enhance the cavitation phenomena, an ultrasonic transducer is designed. Results reported that with an increase in the cavitation number, the size of the wake cavity decreased. Also, the size and the length of the wake cavity depend on the diameter of the cylinder and the size of the step provided. However, with an ultrasonic transducer, the time for inception cavitation decreases, and the noise level increases.

## ARTICLE HISTORY

Accepted 17 October 2020

## KEYWORDS

Wake Cavitation; stepped cylinder; ultrasonic transducer; drag coefficient and cavity length

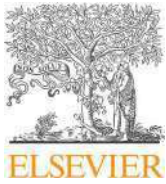
## 1. Introduction

Cavitation is the formation of vapour inside a liquid when the liquid's local pressure falls below the vapour pressure [1]. Cavitation can occur in internal flow in systems like venturi or machines like pumps and hydraulic turbines and also due to fluid flow of high-speed bodies underwater. Many times, these bodies are in axisymmetric shape [2]. The flow past axisymmetric bodies presents exciting features due to both longitudinal and circumferential pressure gradients. From a practical point of view, such flow is of considerable importance in aerospace engineering and underwater hydrodynamics.

Ye et al. [3] numerically and experimentally investigated the periodic shedding of cavitation flow over axisymmetric projectiles by implementing user-designed solver OpenFoam and reported that the initially recirculating jet is reported. However, in the second stage,

**CONTACT** S.K. Gugulothu  [santoshgk1988@gmail.com](mailto:santoshgk1988@gmail.com)  Department of Mechanical Engineering, National Institute of Technology Andhra Pradesh

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# Comparative analysis of the orientation dependent tensile deformation of commercially pure titanium and titanium alloy OT 4-1

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## ABSTRACT

Correlation of mechanical properties and tensile deformation of hexagonal commercially pure titanium (CP-Ti) and acicular alpha titanium alloy OT 4-1 was studied in the present investigation. Tensile specimens were prepared along the rolling direction, along 45° to the rolling direction and transverse to the rolling direction to obtain different tensile deformation from cold rolled annealed sheets of CP-Ti and titanium alloy OT 4-1. The conjoint control of essential microstructural features and the orientation of specimen on tensile properties of commercially pure titanium and the titanium alloy OT 4-1 was highlighted. © 2020 Elsevier Ltd. All rights reserved.

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## 1. Introduction

Commercially pure titanium has wide applications in a variety of areas such as marine, chemical, plate-type heat exchangers, pressed parts and they are highly formable. OT 4-1 is a titanium alloy used for high-temperature applications in the aerospace industry [1] i.e. airframes, these materials are used extensively in the automotive sector. These materials also utilized for chemical processing industries, textile and paper plants, medicine, marine, oil industry, and even in some sports components [3]. Titanium experiences allotropic transformations from  $\alpha$  to  $\beta$  at 882.5 °C if  $\beta$  stabilizers such as Mo, V, W, Nb, and Ta are present in the crystallographic structure [5]. If the above said  $\beta$  stabilizers are present in the material they should exhibit the response to heat treatment and  $\alpha$  stabilizers like Al, O, and N are present in the material they don't depend on heat treatment.

The present investigation makes attempts to correlate the uniaxial tensile deformation of CP-Ti and OT 4-1 including the correlation of microstructure. Three initial orientations are deformed in uniaxial tension and the evaluation is compared between two materials.

## 2. Experimental setup

### 2.1. Sample preparation

The samples were prepared by an electrical discharge machine (EDM) which can be used efficiently in machining high-strength and temperature-resistant material like titanium alloy OT 4-1 and commercially pure titanium as shown in Fig. 1. Alternatively, machining can be done by all conventional methods but after the machining, the properties of the material may certainly differ. So EDM was best suited for sample preparation to protect the inherent properties of the above said two different materials [2].

The workpiece substance for titanium alloy OT 4-1 has the following composition: 2.24% Al, 1.44% Mn, 0.001% C, 0.048% V and rest Ti [12]. For the Commercially Pure Titanium (CP-Ti) the composition 0.094% O, 0.018% N, 0.0032% H, and balance Ti [3].

The microstructural studies of both the materials were studied before going to mechanical testing. After metallographic specimen preparation, with the help of an optical microscope, the sample was observed and the microstructure of CP-Ti material was revealed and it has  $\alpha$  phase containing crystals of the hexagonal close-packed structure as shown in Fig. 2 [11].

Commercially pure titanium considered as  $\alpha$  titanium alloy [4], as  $\alpha$  indicates the phase present in the material and hexagonal

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## Comparison of experimental and simulation results using erichsen cupping test of titanium alloy OT 4–1

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## ABSTRACT

Titanium alloy is known for its higher tensile strength and ability to hold high temperatures thereby deforming at larger loads. Hence, it is incorporated in major appliances in the aerospace industry and automotive sector. Erichsen Cupping test is a ductility test performed in the sheet metal forming process in major industries. OT 4–1 material is selected for experimentation and the simulation using PAM STAMP™ software. Both the experimentation and simulation tests are carried out at a temperature of  $23 \pm 5$  °C under controlled conditions. Blank holder, die and punch are the major components in the standard stamping and the punch is allowed to form an indentation on the blank with a minimal force and minimal stroke. The maximum stress obtained is 0.085847 Pa. The formability limit diagram, formability index and the stress graphs are determined in the current research from the simulation and compared with the experimental values. The future work would determine the aerospace and automotive applications by analytically developing new material models.

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### 1. Introduction

Titanium alloy is a material with high tensile strength and hence withstands extreme temperatures. It is light in weight with high resistance to corrosion. In general, three forms of Titanium (Ti) alloy are available namely, alpha ( $\alpha$ ), beta ( $\beta$ ) and alpha–beta. These three forms are differentiated by the body structure of each element. The Hexagonal Closely Packed (HCP) structure corresponds to the alpha form of Titanium alloy, whereas, the beta type form is identified by the Body Centred Cubic Packed (BCCP) structure [1]. These structures are based on the elements that are mixed with the Titanium alloy. However, the alpha phase material maximises the strength of the alloy and decreases the density due to the mixture of Aluminium [2]. For beta phase, Vanadium acts as the stabilizer and at higher temperatures of about 800°C allotropic transformation of pure Titanium alloy occurs [3]. Both alpha and beta may coexist by the heat treatment method of Titanium alloy. With the addition of Aluminium or Vanadium to Titanium, the  $\alpha$ -to- $\beta$  transformation temperature changes over a particular range

of temperatures. Depending on the composition and heat treatment, both the alpha and beta forms may coexist. Availability of the material, high production costs and high affinity for Oxygen are the challenges possessed by the Ti alloy OT 4–1 grade. Considerable efforts are implemented by different researchers which are directed towards forming and diffusion bonding techniques that reduce production costs and impart superior properties to Ti alloys [4]. In the present research Titanium alloy of grade 4 – 1 is used.

Titanium alloy grade OT 4–1 generally works in the temperature range between 888°C and 963°C, which minimises risk for complex fractures. The part geometries are manufactured by forming [5]. In this range of operating temperatures, the membrane deformations are regulated by alloy stability. The nature and fracture of the sheet metal are observed with care by considering the Titanium formability with respect to physical and mechanical properties [6]. However, the wrinkle formation is observed effectively to identify the tear formation for the punch force applied on the blank. This tear formation is observed with the experimentation process along with the simulation [7]. The quality and the formability of the sheet metal is estimated by the inverse which simplifies the overall design and manufacturing process for the standard stamping procedure of Titanium alloy [8]. Hence, the

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# Aluminium metal matrix composites and effect of reinforcements – A Review

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**Abstract.** A composite is a fusion of two or more different material chemically and unsolvable phases; its properties and structural concert are greater the ingredients performing homogeneous phases. ceramics and Metals, as well, can be implanted with particles, to advances their property; these mixtures are known as MMCs. Aluminum alloy compose a significant engineering material generally engaged in the aerospace industries for the production of dissimilar parts and equipments. It is due to its more strength to density fraction that it a sought after MMCs. A variety of processing technique and mechanical properties testing's available for manufacturing the Aluminium matrix composites. The mutual reinforcement's effect on Aluminium Metal Matrix composites with individual and multiple particulate reinforcements like Hybrid Metal matrix composites are finding better applications in aerospace industries, automobile industries, underwater, and transportation. In the current situation, a bunch of research activities were on pipe line. This review particularly directs the engineers and researchers towards right reinforcement materials selection especially hybrid composites by their properties in the appropriate field and diverse technique involved in production of metal matrix composites.

## 1. Introduction

Metal matrix composites are mixtures of more than two materials where customized properties are attained by efficient blending of different ingredients. Metal matrix composites consisting of discontinuous fibers or else continuous fibers in a molten metal get mixture of specific modulus and very high strength. From the last few decades in much industrial application concentrate on MMCs due to their specific properties like ratio of strength to weight and also cost effectiveness. Here we discussed about reviews of the research papers relevant to Al MMCs. Before going to the discussion, we are required to know the variation between the composites and alloy. The alloys are made by mingling of more than two metallic elements, especially to give greater strength or resistance to corrosion properties etc. The composites (MMCs) are metallic elements combined with non-metals give their significant properties for specific application this called MMCs.





# **EXPERIMENTAL INVESTIGATIONS ON INJECTION TIMING VARIATION AT AN INJECTOR OPENING PRESSURE OF 190BAR ON SEMI- ADIABATIC DIESEL ENGINE WITH EXHAUST GAS RECIRCULATION**

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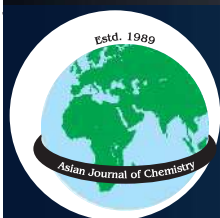
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## **ABSTRACT**

*Particulate emissions and Nitrogen oxides (NO<sub>x</sub>) levels are exhaust emissions from compression ignition (CI) engine. Once they are inhaled, they cause health hazards, besides environmental impact. Hence control of these emissions are important and an urgent task. In the context of depletion of fossil fuels, coupled with exponential growth rate of traction power engines in automobiles and for human luxuries, energy consumption has increased by many folds. This has triggered ever increase of fuel prices in international market and due to uneven distribution of oil resources in the world, a few oil rich countries are getting benefitted and oil lacking countries are suffering from non-affordability. Alcohols and vegetable oils are important substitutes for diesel fuel, as they are renewable. However, drawbacks associated with vegetable oils (high viscosity and low volatility) and alcohols (low cetane number and calorific value of the alcohols) call for low heat rejection (LHR) diesel engine. Exhaust gas recirculation (EGR) is one of the techniques to reduce pollution levels. Investigations were carried out to determine exhaust emissions of particulate matter and oxides of nitrogen with neat diesel operation at different values of brake mean effective pressure of the engine with varied injection timing with provision of*



## Green Mediated Synthesis of Macroporous Hierarchical CeO<sub>2</sub> Nanoparticles using *Mimosa pudica* Leaf Extract for Humidity Sensing Application

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Metal oxide nanoparticles are popular candidates for chemiresistive sensors application. Cerium oxide (CeO<sub>2</sub>) based semiconducting gas sensors have gained rapid interest in recent years. In this study, an environment-friendly green synthesis approach was employed for the synthesis of macroporous CeO<sub>2</sub> nanoparticles using *Mimosa pudica* leaf extract. Later the performance of CeO<sub>2</sub> nanoparticles for humidity sensor is demonstrated. X-ray diffraction studies revealed the cubic fluorite crystal structure with no impurities, scanning electron microscopy analysis revealed the macroporous morphology of CeO<sub>2</sub> hierarchical nanoparticles. Humidity sensing properties were studied using interdigitated electrode coated with CeO<sub>2</sub> nanoparticles. The results showed the sensing response of 0.5 times for 10% RH (relative humidity) and seven times for 90% RH. The response and recovery times were found to be as low as 12 s and 15 s, respectively. The experimental results provided an environment-friendly approach for the synthesis of CeO<sub>2</sub> particles and revealed promising results in humidity sensing application.

**Keywords:** *Mimosa pudica*, Sensing response, Humidity sensor, Interdigitated electrode, Response time.

### INTRODUCTION

In the flourishing industrial era where there is a prime necessity of monitoring operating ambience and pollutants released to the environment, sensors play a vital role in providing the qualitative and quantitative analysis of chemical effluents [1]. Ambient humidity is one of the crucial factors affecting the performance and efficiency of industrial operations. Hence, humidity sensors are extensively used for keeping a check of ambience in industries and day today's life [2].


Semiconductor metal oxide gas sensors are the most promising ones among different types such as electrochemical, optical, calorimetric gas sensors, etc. because they offer advantages like high sensitivity, durability, low cost, and simplicity in function. A variety of materials are used as sensing material in humidity sensors, such as ceramic [3], organic polymers [4], metal oxide [5], carbon nanotubes [6] and various other composites are tailored and equally used. To know, the general working principle of chemiresistive sensors is the change in impedance of sensing material on exposure to humidity [7].

Nanotechnology offers a unique opportunity to tailor and enhance the overall performance of the above-said materials [8]. Because of their small grain size and large surface area, nanomaterials are advantageous for producing chemical sensors. The properties that attract nanomaterials for sensing applications are the availability of more surface-active sites and stronger absorption and adsorption ability than other materials [9]. As humidity sensing is a surface phenomenon, a material with a high surface area is preferable. Hence, porous materials are gaining importance in chemical sensing applications due to the presence of pores (voids) and ease of creation and functionalization of those voids for specific applications [10].

Among the metal oxide nanoparticles in the lanthanide series, cerium is the second and the most reactive element. By virtue of its electro positivity, cerium exhibits dual oxidation states, Ce<sup>3+</sup> and Ce<sup>4+</sup>. Ce<sup>4+</sup> state is considered as stable over Ce<sup>3+</sup>, hence cerium oxide or ceria (CeO<sub>2</sub>) is the most stable oxide of cerium [11]. Cerium oxide is a popularly used semiconducting material having wide bandgap energy of 3.19 eV and high



# Numerical and experimental evaluation of near-wake cavitation flow around axisymmetric cavitators

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## ABSTRACT

The primary objective of this research is to study the cavitating effects of fluid flow past different axisymmetric cavitator in the upper sub-critical flow regime, which corresponds to the Reynolds number ( $2 \times 10^4$  to  $2 \times 10^5$ ). Experiments are conducted in a water tunnel with a fluid flow velocity of 30 to 60 m/s at a constant rate of injection. The commercial software tool, ANSYS Fluent 18.1, is used to simplify three dimensional Reynolds averaged Navier Stokes equation with the compressible fluid flow by considering the pressure-based solver with standard  $k-\epsilon$  turbulence model. A comparison of the numerical and experimental results shows that the numerical method can predict accurately the shape parameters of the natural cavitation phenomena such as cavity length, cavity diameter, and cavity shape. Results reported that with an increase in velocity, the cavity length and diameter increased to 250% and 20% respectively.

## ARTICLE HISTORY

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## KEYWORDS

Wake cavitation; conical body; finite volume method; drag coefficient and cavity length

## 1. Introduction

Cavitation is the formation of vapour inside a liquid when the liquid's local pressure falls below the vapour pressure (Arndt 2012; Kandula et al. 2016). Cavitation can occur in internal flow in systems like venturi, or machines like pumps and hydraulic turbines and also due to fluid flow of high-speed bodies underwater (Luo et al. 2016). Many times, these bodies are in axisymmetric shape (Kandula et al. 2020; Gugulothu 2020). The flow past axisymmetric bodies presents exciting features due to both longitudinal and circumferential pressure gradients. From a practical point of view, such flow is of considerable importance in aerospace engineering and underwater hydrodynamics.

Feng et al. (2020) investigated the cavitating flow past conventional models to alternatively develop an appropriate model by simplifying the Rayleigh–Plesset equation on turbulent flows at a different mass flow rate and reported that the proposed model developed better results in comparison with the experimental data. Gogate and Pandit (2010) conducted an exhaustive literature review on hydrodynamic cavitation to understand how well it fits as a replacement for acoustic cavitation and reported similarity between hydrodynamic and acoustic cavitation but with better efficiency. Bai et al. (2018) developed a theoretical analysis to study bubble interactions and conducted an experimental analysis with a piezoelectric sensor to observe the various impacts and amplitudes and reported that the maximum impact loads are developed within a range of 0.5–0.8 mm. Mancuso (2018) investigated the swirling jet reactor by adopting a computational fluid

analysis code to study the influence of various geometries, injection slots, and fluid pressure distribution. They reported that the maximum flow velocity and minimum pressure gradient are observed with the smaller injection slot diameter. Huang et al. (2019) conducted an exhaustive literature review on the unsteady cavitating mechanism in terms of both qualitatively and quantitatively by considering different cavitation regimes and reported that the development of cloud cavity and subsequent collapse due to recirculation of the fluid particles are discussed. Setareh et al. (2020) presented a numerical analysis by developing specific user-defined solvers in OpenFoam and carried out an experimental investigation in an annulus by developing ultrasonic waves in the fluid flow. They reported that with an increase in the Reynolds number, acoustic cavitation's impact decreased, and the obtained results are found to be in good agreement. Zhang et al. (2017) investigated the unsteady cavitating flow past the underwater body to study the effect of dynamic pressure and reported that mass flow rate has a significant effect on ventilated cavitation that adverse pressure gradients emphasized due to periodic shedding in the downstream. Carrat et al. (2019) investigated the unsteady cavitation erosion phenomena over hydrofoil by implementing a user-designed solver  $k-\epsilon$  RNG turbulence model and reported that numerical results are in good agreement with the experimental results. Subburaj et al. (2018) conducted a numerical investigation on cavitating flow past an elliptical cylinder at a constant Reynolds number to study the effect of a different angle of attacks, aspect ratio and other non-dimensional parameters and reported that varying the aspect ratios does not bring a

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# Numerical Investigation of Cavitating Flows in the Step Nozzle

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**Abstract.** Cavitation is the structure of water foam in a liquid molecules and consecutive partition in its flow. When the vapour pressure at certain temperature is less than the absolute pressure the air molecules are formed. Cavitation processes have lots of troublesome in turbo machinery reducing capability and generating noise. The process of control measures is considered when the negative approaches are done to control it. The simulations are done by varying the diameter of the circular disk by choosing some fixed cavitation numbers and by varying flow pressures. The tendency of the cavity such as diameter, length, and drag coefficient are to be studied and compared with the laboratory information or data and diagnosticsimilarity. The analysis which is done is based on the pressure and velocity as we observe from the graphs pressure contours where the fluid is entering the step part in the nozzle there is an increase in pressure at one phase, but as we observe it clearly there in a low pressure area that is created in between the flow where there is a gradual pressure drop. This low pressure area is the region where the bubbles are going to form and when these bubbles meet the high pressure region, due to the pressure difference these bubbles are going to explode and damage the internal surfaces. Plot the velocity contours and static pressure contours at different pressures (2 bar, 3 bar and 5 bar), increase in pressure and velocity the value of cavitation increases.

**Keywords:** Cavitation, Step nozzle, CFD and Axisymmetric bodies.

## INTRODUCTION

Cavitation is the formation of vapor cavities in a liquid, small liquid-free zones ("bubbles" or "voids"), that are the consequence of forces acting upon the liquid the water evaporates within the liquid and small bubbles are formed. Pressure of the liquid all over the place the bubbles causes the bubbles to then breakdown which releases energy. In a hydraulic system, cavitation releases so much energy that destruction and corrosion can occur on the solid aspects of the system. We can see the undesirable results of cavitation in pumps, turbines and dams. Cavitation is an unnecessary appearance in many processes. In many equipment's like propellers and pumps, cavitation becomes route case for noise, damages the equipment's, vibrations, and a loss of reliable working functionality.

Hydrodynamic cavitation is nothing but the process of evaporation, bubble making and bubble breakdown which occurs because of the moving liquid as a result of a reduced and subsequent improvement in local pressure. Cavitation will only occur if the local of fluid dynamics it is sometimes useful and is not cause damage when the bubbles collapse away from machinery, such as in supercavitation. The technique of bubble generation, and the



# Experimental Investigation and Comparative Study of Sintering of Microcrystalline Nickel Using Microwave and Conventional Method

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## Abstract

The present work has been conducted to investigate and compare the mass transport mechanism of Ni-powder particles in conventional and microwave sintering process. The linear shrinkage method was used to investigate the mass transport mechanism on the basis of estimated sintering exponent ( $n$ ) at different temperatures. Both types of sintering were carried out at various temperatures, and the results revealed that microwave sintering provides better results of densification and shrinkage as compared to conventional sintering. Field emission scanning electron microscopy (FESEM) and energy-dispersive X-ray spectroscopy (EDX) analysis were carried out for the characterization of Ni-powder for microstructural and elemental analysis. The value of sintering exponent found through linear shrinkage method for conventional was 9.4791, 8.1836, 6.9013, 7.3286, 5.2006 and 4.9531 at 500 °C–1000 °C, respectively, and microwave sintering was 7.0972, 5.2957, 5.2942 and 6.0934 at 500 °C–800 °C, respectively.

**Keywords** Mass transport · Microwave sintering · Microcrystalline nickel · Densification · Shrinkage · Conventional sintering

## 1 Introduction

Sintering is a process of agglomeration in which powder particulates are compacted and converted into a solid mass by heating below fusion point in order to achieve strength. There are various types of sintering process which are used in agglomerating the powder particulates such as plasma, laser, radiation, induction, and microwave sintering [1–4]. The microwave heating and radiation heating process are being popularly used for sintering of varieties of powder particulates. Here, microwave sintering is the process in which

microwaves are used as a heating source to heat the powder particles to form sintered compact [5]. This microwave sintering process ensured diffusion enhancement, decreased sintering temperature, reduced energy consumption, and reduced processing time [5–11]. Microwaves are coherent and polarized electromagnetic (EM) radiation of which frequency lies between the radio and visible light frequencies in EM spectrum as shown in Fig. 1. Generally, microwaves are used in food processing, textile, communication, wood products, vulcanization of rubbers, and drying the ceramic powders [12–14]. Material processing is one of the recent applications of microwaves [15, 16].

Sintering is a three-stage process. In the initial stage, when the heat is provided, the particles which are in immediate contact with each other start forming small neck. As the sintering proceeds, this small neck enhanced itself as shown in Fig. 2. This stage eventually results in creating a pore inside the specimen. The intermediate stage creates an impact on the densification and on the final properties of the sintered part. This stage corresponds to grain growth, pore rounding and densification. The intersection of three or four grain boundaries results in creating the pores and pores remain interconnected in 3 dimensions in this stage. The final stage of the sintering is a slow process that includes

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# 3D Printing Technology for Biomedical Practice: A Review

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**3D printing or additive manufacturing is an emerging technique for the fabrications of biomedical components. Several researchers are working on fabrications of the biomedical components, future prospective of implantation, and transplantation aspects. The current review presents a meticulous summary of research work done so far by the researchers in the view of design and fabrications about biomedical components by using 3D printing technology such as fused deposition modeling (FDM), inkjet printing, stereolithography, and selective laser sintering (SLS). The design and fabrications of biomedical components include 3D printing of bone, low-cost high-quality prosthetics, intervertebral disks, medical equipment, heart valve, building tissues using blood vessels and drugs. The objective of this review article is to explore different additive manufacturing processes, challenges, and future developments for 3D printing for biomedical components.**

**Keywords** additive manufacturing, biomedical components, bioprinting, implants, tissue engineering

## 1. Introduction

Additive manufacturing is a technique where a 3D product is created by adding material in successive layers (as opposed to removing material from a block). It is a material joining process to make objects from 3D model data layer-by-layer. This process is one of the main constituents of industry 4.0 where industrial practices are executed using smart technology Internet of things, cloud computing, cybersecurity, big data analytics, autonomous system, simulation, system integration, etc. (Ref 1). There are various types of additive manufacturing state-of-the-art and techniques in the design and development of various 3D components. In this technique, one can create different components using CAD software and then fabricate the components using 3D printers. Common materials for 3D parts fabrication include polymer, metal, ceramic, composites, functionally graded materials, etc, whereas the form of these materials could be powder, filament, sheet, and liquid. Manufacturing of 3D parts can be carried out through direct energy deposition, powder bed fusion, binder jetting, material extrusion, material jetting, sheet lamination, and vat polymerization. Post-processing of the

fabricated parts includes support removal, surface finishing, defects removal, destructive/non-destructive testing. There are many applications of additive manufacturing in the fabrication of 3D-printed products such as tooling components, production parts, biomedical implants, devices, structures, and artificial organs. The key barrier to the implementation of this technology is a lack of awareness about the process, and it fits in the design and development process. Figure 1 shows various constituents of industry 4.0 in which 3D printing is a fabrication method for products with very complex shapes and sizes.

Recently, biomedical applications have been evolved progressively drastically due to the dedications of scientists, medical practitioners, engineers, and researchers around the globe. With continuous development in technology, researchers are making their effort to decrease the cost of the 3D-printed parts and easing the fabrication process. Some of the examples of 3D printing include fabrication of bones, spinal implants, prosthetics, skin, organs, etc. The main objective of this technology is to potentially print replacement body organs to treat a patient's specific defects due to accidents or misshaping. Researchers use laser technology to build complex customized components using different layers of powder of biocompatible materials. Chronic back problems because of the intervertebral disk can be resolved using a spinal implant created on a 3D printer. Nowadays, it becomes possible to treat multiple trauma injuries and bracing of the top jaw, nose, cheekbone, and fracture using facial reconstructive surgery. 3D printing can be used to rebuild the patient's face and other body parts. At present, doctors and researchers can develop a new 3D scaffold that regenerates real bones (Ref 2). In this technique, the building of the scaffold happens to be the same materials that build up the bone. This scaffold is bone-friendly and helps in bone healing. Another aspect of the biomedical application of 3D printing is to produce a patient's anatomy as a visual aid for surgical planning. The fabricated physical model gives the surgeon ability to conceptualize the ideal course of action before surgery. Figure 2 represents scaffold and tissue formation surrounding the scaffold.

This review article mainly focused on the research work that has been published on additive manufacturing of 3D biomedical components such as 3D printing of bone, low-cost high-quality prosthetics, intervertebral disks, medical equipment, heart valve, building tissues using blood vessels, and drugs.

This invited article is part of a special topical focus in the *Journal of Materials Engineering and Performance* on Additive Manufacturing. The issue was organized by Dr. William Frazier, Pilgrim Consulting, LLC; Mr. Rick Russell, NASA; Dr. Yan Lu, NIST; Dr. Brandon D. Ribic, America Makes; and Caroline Vail, NSWC Carderock.

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# Effect of Number of Passes on Surface Properties of Burnished Aluminium Alloy

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**Abstract:** Basically, roller burnishing process is one of the surface finishing processes. In this process, a hard and highly polished roller will be pressed against a rotating specimen, this causes plastic flow on specimen surface from the peaks of surface irregularities into the valleys, which results in a reduction in the surface roughness considerably. This is a type of cold working which also results in improvement of micro-hardness, refinement of microstructure on the surface of the specimen under consideration. This work aims to understand the versatility of roller burnishing process and to understand the effect of the number of burnishing passes to enhance surface properties. Surface roughness, electrical conductivity and microhardness were studied in the present work. Experimental work was done on aluminium AA7075-T6 alloy. The parameters under which the burnishing was done were burnishing force, spindle feed and speed and are kept constant in the present work.

Keywords: Roller burnishing, microhardness, surface roughness, AA7075-T6.

## 1. Introduction

Finishing processes are becoming predominant in the production of machines and instrument components, the burnishing process has fascinated great interest among the engineers and researchers due to the versatility involved in the process. To increase productivity, and to reduce machining times and to sustain competitiveness in the market of machining production systems, it is becoming crucial to improve existing technologies. Burnishing process is one surface finishing technique applied widely to improve surface properties. Many researchers are working in this area and developed analytical models, for studying surface properties. Lars Hiegemann et al., [1] conducted various experiments on ball burnishing and developed an analytical model which was used to predict the roughness after ball burnishing for a thermally sprayed coating. Kable et al., [2] examined surface roughness, microhardness on medium carbon steel by changing different parameters like speed, feed and number of passes on the drilled hole, by using Taguchi analysis, a significant improvement in hardness was observed i.e., from 377Hv to 528Hv and surface roughness was reduced from 2.44  $\mu\text{m}$  to 0.13  $\mu\text{m}$ . Recently, a newly designed ball burnishing tool made of HSS ball of 8mm diameter have been employed on AA6061 using a conventional lathe and process parameters have been optimized using Taguchi method [3]. Many researchers have worked on roller burnishing using lathe on various ferrous and non-ferrous materials [4-9]. In reference [10] roller burnishing is carried on  $\text{Al}_2\text{O}_3/\text{A356}$  composite specimens with varying process parameters, it is clearly evident from this reference that multi passing improves surface roughness and also by this process microhardness and subsurface hardness improves. Even in mild steel roller burnishing increases hardness, Malleswara Rao et al., [11] has investigated surface hardness by varying process parameters. After the third pass hardness slightly decreased. Surface finish has a positive and longevity effect on the functioning of the machined parts. When compared to permanent metallic alloys, the biodegradable magnesium-calcium (MgCa) alloy proved to be an attractive orthopaedic biomaterial [12]. A correlation was developed between mechanical, structural properties and corrosion resistance of 18-9 stainless steel after burnishing [13]. To improve the



# Optimization of dry sliding wear parameters of Al4Mg system reinforced with high strength alloy particulate (HSAp)

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**Abstract:** The dry sliding wear behaviour of Al4Mg binary alloy and Al4Mg reinforced with Al20Cu20Mg composites was examined using pin on disc apparatus. The composites were synthesized by the reinforcement of different weight % (5, 10 and 15) of the high strength alloy particulate (HSAp) in the base binary alloy Al4Mg using stir casting technique followed by hot extrusion. In this way, composites were prepared with metal particulate reinforcement which are termed as metal-metal composites which is a novel idea instead of reinforcement of ceramic particulate. These extrudates of non-reinforced base alloy and composites were characterized to optimise dry sliding wear parameters, wear resistance and coefficient of friction under the load conditions of 0.5, 1 and 1.5 kgf at the sliding velocities is of 100, 120 and 140 metre per second and sliding times of 15, 30 and 45 seconds respectively. The wear parameters were optimised using Grey relational analysis (GRA) and ANOVA techniques and obtained the optimal combination of input parameters.

**Keywords:** High strength alloy particulate (HSAp), metal-metal composites, stir casting, hot extrusion, GRA, ANOVA.

## 1. Introduction

'Wear' is the property that acts on both ends positive and negative when considered in engineering applications. For anecdotal reasons the wear property intentionally induced or reduced depending on the application. Wear may be because of corrosion, adhesion, and abrasion. Each of these has their own advantages and disadvantages that lead to benefits and troubles depending on the type of application for a particular purpose. The benefits or problems may be influenced by the factors type of material, type of lubrication and amount of surface finish. Among Metal matrix composites (MMCs), Aluminium matrix composites (AMCs) hold more than 69% by weight for industrial functions as they holds excellent mechanical and thermal properties couples with better tribological properties [1-2]. Under dry lubrication conditions, the Aluminium based matrix composites are exhibiting poor wear resistance. These are confined to very limited applications due to this inadequacy [3]. It is examined that the strength of matrix alloy AA7075 was enhanced by 6%, on addition of hybrid particulate (SiC+ Al2O3) [4]. Among the hybrid reinforcement particulates RHA (Rice Husk Ash), Al2O3 and graphite in AA6063, the graphite influenced more on the wear rate. As graphite composition increases from 0% to 1.5% the rate of decreases drastically, as the graphite particulates are soft in nature [5]. The AMMCs with inclusion of hard metallic or ceramic particulates are greatly influenced by wear mechanisms like abrasive and adhesive [6-8]. In the global scenario, due to increasing competition for manufacturability with reduced weight to strength





# Anfis-Based Defect Severity Prediction on a Multi-Stage Gearbox Operating Under Fluctuating Speeds

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## Abstract

Previous research investigators have exploited machine-learning algorithms to diagnose the defects in rotating machinery. However, with increasing complexity in the design of rotating machinery, it is quite challenging to quantify the faults precisely. In this present study, an attempt has been made to predict the defect severity of the rotating machinery using Adaptive Neuro-Fuzzy Inference System (ANFIS). This ANFIS algorithm employs artificial neural networks to define the membership functions, rules and weights to construct the fuzzy inference system. Experiments are performed on a multi-stage spur gearbox model while it is subjected to fluctuating operating speeds. Two local defects on bearing race as well as on gear tooth with four different severity levels are seeded intentionally. Three condition monitoring (CM) strategies, namely, vibration, lubrication oil and acoustic signal analyses are executed, and the raw data is recorded synchronously. The raw vibration and acoustic waveforms are decomposed through discrete wavelet transform to extract the descriptive statistics from the wavelet coefficients. Among them, most discriminating features are selected and given as input to ANFIS classification tool to train the network for obtaining the Sugeno-type FIS, which in turn estimates the severity of the component. Later, the features from the individual CM strategies are combined to devise an integrated feature dataset which is further channelled as input to the ANFIS for predicting the defect severity levels. The investigation reveals that, the proposed integrated feature set in conjunction with ANFIS can discriminate between the defect severity conditions of the gears as well as bearings under fluctuating speeds.

**Keywords** Condition monitoring · Multi-stage gearbox · Fluctuating speeds · Adaptive-neuro fuzzy inference system

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# Detection of Local Gear Tooth Defects on a Multistage Gearbox Operating Under Fluctuating Speeds Using DWT and EMD Analysis

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## Abstract

Contemporary fault diagnosis algorithms constitute advanced signal processing techniques integrated with the data-driven feature classification algorithms which make an effective fault diagnosis scheme for rotating machinery such as gearboxes and motors. Feature extraction is a prevalent task which is intended to assist the fault diagnosis process by eliciting a set of condition indicators (features) from the input raw signal. In actual scenario, the gearboxes may have multiple stages and are rather operating under fluctuating speeds. The feature extraction technique employed at medium and high ranges of operating speed may not be adequate during low operating speeds. In this present study, the feature extraction abilities of discrete wavelet transform (DWT) and empirical mode decomposition (EMD) in terms of their relative effectiveness while ascertaining the local gear tooth defects of a multistage gearbox are compared. Two local gear tooth defects, namely root crack and tooth chip with three severity levels, are seeded artificially. The experiments are carried out on a three-stage spur gearbox experiencing fluctuating operating speeds. Vibration analysis is performed, and the recorded raw vibration signatures are decomposed using DWT and EMD analyses separately. Mother wavelet selection is done using the criteria of *energy-to-Shannon entropy ratio*. The identification of intrinsic mode functions (IMFs) is made by examining the Pearson correlation coefficient. Various descriptive statistics are obtained from the wavelet coefficients and IMFs and the potential indices among them are chosen by implementing the decision tree algorithm. Finally, support vector machine (SVM) algorithm is executed to distinguish among the various defect severity levels. It has been observed that the SVM in conjunction with DWT has resulted in better classification than SVM in conjunction with EMD.

**Keywords** Multistage gearbox · Vibration analysis · Fault diagnosis · DWT · EMD

## 1 Introduction

Gearboxes are essential components in the transmission of torque/power and have prolific applications such as in helicopters, wind turbines, mining machinery and conveyors. The gearbox is rated as one of the most critical components because it is having the longest downtime among the other subsystems in machinery [1]. The gearbox failures are reported quite often as it is subjected to fluctuating loads and speeds. They act as the fundamental sources of vibration because of the discrete shifting of the load resulting from

meshing of teeth. Gear failures are classified as lumped/local defects and distributed defects. Tooth breakage and root crack are lumped defects, whereas misalignment and eccentricity are the examples of distributed defects [2]. It was reported that the spectrum corresponding to lumped defects contains the side bands across the entire spectrum [3]. However, the spectrum pertaining to distributed defects shows peaks having high energy contribution at gear mesh frequency and its harmonics. These defects have to be diagnosed at the nascent levels, which otherwise may protrude to fatal failures.

Condition monitoring (CM) is intended to identify the defect of a system and it is also capable enough to predict the defect from its symptoms. Condition monitoring has three stages: (a) data collection—acquisition of data which describes the condition of the component; (b) signal processing extraction and interpretation of diagnostic information from the acquired data; and (c) decision making—diagnosing the fault and estimating the remaining lifetime of the

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## Heat Transfer Analysis of Gas Turbine Blade by Varying Number of Cooling Holes and at Suitable Coolant Speeds Using CFD

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### ABSTRACT

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#### Keywords:

*turbine blade, internal cooling, cooling holes, Nusselt number, heat transfer coefficient, CFD simulation, FLUENT 14.5*

In the present work, heat transfer analysis of a gas turbine blade consisting of 5, 7, and 10 holes, coolant flowing with suitable velocities 40 m/s, 75 m/s, and 110 m/s. From the results of several investigations, the suitable velocity ranges of coolant fluid have been taken. The coolant fluid used in this work is air, as it is suitable for aircraft engines working on open cycle gas turbines, and of course, it is cheaply available, and the blade material used is Inconel 718. Simulations are carried out using Computational Fluid Dynamics (CFD) software, ANSYS FLUENT 14.5. An analysis is being done on how the temperature is varying in blade with different configurations. Temperature distribution in the blade is studied and variation of different parameters like velocity, Nusselt number, heat transfer coefficient is observed. It is found that the blade cooling is maximum in the case of a blade with 10 holes and coolant inlet velocity 110 m/s. The average Nusselt number with the coolant inlet velocity of 40 m/s, 75 m/s, and 110 m/s is around 11, 19, and 21, respectively. The lowest temperature attained by the blade on the coolant inlet surface is 1152 K and the coolant exit surface is 1334 K. These two temperatures are observed when the blade has 10 cooling holes and coolant inlet velocity is 110 m/s.

## 1. INTRODUCTION

A turbine is a rotating component that uses a fluid action to produce work. In a gas turbine, compressed, high-temperature gas is the conductor. In power generation and marine applications, it is often referred to as a power turbine. For aviation purposes, it is referred to as a gas generator. One of the reasons why gas-powered engines are used to power aircraft is that they are lightweight and compact and have a high degree of power to weight ratio. The distinctness between gas turbine blades and rocket nozzles is the wall curvature. Turbine blade walls are curved in the stream-wise direction, and rocket nozzles walls can be curved in both stream-wise and span-wise directions [1]. Gas turbines are used extensively for aircraft propulsion, land-based power generation, and industrial applications. One of the critical areas of gas turbine engines is the blade tip region, concerning durability and cooling air use [2].

## 2. PROBLEM STATEMENT AND METHODOLOGY

The higher operating temperatures of hydroelectric power are used to increase the power as well efficiency of a gas turbine. The motivation behind this is that higher temperature gases yield higher energy potential. As a result of the rotation, the local heat transfers in turbine blade internal cooling passages are different from those of stationary channels [3]. However, the components and the gas system meet the high thermal load, which can cause damage [4]. HPT (High-

Pressure Turbine) blade is one of the components continuously exposed to hot gas. Turbine blades are operated at temperatures between 1200°C to 1500°C [5]. This temperature is far beyond the melting point of current materials technology. Hot gases from the combustor enter the turbine increasing heat load on the turbine components. The flow field becomes more complex when the turbine is rotating and there are differences between the high and low-pressure walls [6]. One of the components more prone to thermal failure is the blade tip region due to its intense environment and difficulty in cooling [7]. The heat transferred to the blades in the turbine depends on the turbine inlet temperature and is directly proportional [8]. Turbine blades are required to work for a longer period operating at temperatures above their melting point.

Various cooling techniques are used to reduce the ambient temperature of the blade below the melting point [9]. The way to provide acceptable cooling of the blade tips is to extract some cooling air from various coolant passages, to protect the tip surface from the hot leakage gas [10]. The performance of cooling holes placed along the pressure side tip was good for a small tip gap when compared to a large tip gap [11]. An overall benefit to the tip obtained by releasing coolant from the pressure side holes [12]. Film cooling effectiveness for the coolant injection from both tip and pressure side holes case was higher potential due to the pressure side injected coolant-carrying over the tip surface [13]. Rib arrays inside an internal cooling channel are often used in heat exchanger systems to improve the heat transfer rate [14]. Heat transfer data in internal coolant channels with film cooling extraction is important to the design of a cooling system [15]. Internal

# Energy Efficient Scheduling Algorithm To Increase The Life Time Of Battery Power In Wireless Sensor Networks For Structural Health Building Monitoring Applications

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**Pornthep Kaewchur , Charcrit Sritong , Banterng Sriard , Thawatchai Nima**

## Abstract

Because of its ability to reduce the costs associated with the installation and maintenance of SHM systems, structural health monitoring using wireless sensor networks has piqued researchers' interest. These systems are used to monitor critical infrastructure like high-rise buildings, bridges, and stadiums, and they have the potential to extend the life of structures and improve public safety. WSNs for SHMs face unique network design challenges due to their high data collection rate. This paper provides a comprehensive overview of SHM using WSNs, including a description of the algorithms used in physical harm detection and localization, network design issues, and future systematic investigation directions. Time synchronization, sensor placement, data processing, and quantifiability are all discussed and compared as network design issues. For improving the lifespan of a wireless sensor network, the proposed framework includes four stages: node investigation and deployment, clustering nodes, shortest path construction, and data transmission. This paper proposes a novel framework that consists of four stages: optimal node deployment, clustering of nodes, shortest route construction, and data transmission. It's built into the NS2 software, and the results are double-checked. Finally, the proposed framework's performance is assessed by comparing its results to those of other approaches and demonstrating its efficiency

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# Mechanical Behavior of Hybrid Fiber Reinforced High Strength Concrete with Graded Fibers

Document Type : Original Article

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## Abstract

Brittleness, which was the inherent weakness in High Strength Concrete (HSC), can be avoided by reinforcing the concrete with discontinuous fibers. Reinforcing HSC with more than one fiber is advantageous in an overall improvement of the mechanical performance of the composite. In this experimental study, Hybrid Fiber Reinforced High Strength Concrete (HyFR-HSC) mixes were formed by blending single length glass fiber and single length steel fiber with a total volume fraction of 1.65% into the concrete and Hybrid Graded Fiber Reinforced High Strength Concrete (HyGrFR-HSC) mixes were obtained by mixing different lengths of glass fiber with different length of steel fibers at a total volume fraction of 1.65% into the concrete. A comparative study was made between HyFR-HSC and HyGrFR-HSC specimens to investigate the effect of fiber grading on strength properties and the uniaxial compressive behaviour of HSC with hybrid fibers. In both HyFRC and HyGrFRC mixes, glass fibers improved the pre-peak behaviour, and steel fibers improved the post-peak behaviour of concrete, thereby exhibiting a positive synergy in combining glass and steel fiber into the concrete. Among the two-hybrid FRC's, HyGrFRC outperformed HyFRC with substantial improvement in both strength and ductility. Among all the HyGrFRC mixes, HyGr9 mix, which contain a higher amount of long-length fibers exhibited better improvement in peak strain, ductility factor, total energy and toughness index. The replacement of single length of fibers with graded length fibers at higher volume fraction in HyFRC is useful in improving workability, thereby providing better fiber dispersion and thus enhances both the pre-peak and post-peak performance of the concrete. From this investigation, it can be inferred that grading of fibers improved the mechanical behaviour of HyFRC by exhibiting positive synergy from both fiber geometry and fiber type.

## Keywords

Crimped Steel Fiber ; Alkali-resistant Glass Fiber ; High Strength Concrete ;

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# Effect of Accelerated Curing on Strength of Quaternary Blended Cement Concrete with Recycled Aggregate

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### Abstract:

This paper presents the results of an experimental investigation carried out on accelerated curing of Quaternary Blended Cement (QBC) Concrete with and without recycled aggregate. Cement is partially replaced with fly ash, micro silica and nanosilica to produce QBC Concrete. The variables of study include the grade of concrete, powder content and percentage of recycled aggregate. Two grades of concrete M-40 and M-60 were used in this investigation. Based on the earlier studies, fly ash and micro silica are kept constant as 20% and 10% respectively while nanosilica is varied as 2% and 3%. Three percentages of recycled aggregate as partial replacement of natural aggregate (0%, 50% and 75%) were used. Two methods of curing were employed; boiling water method and hot air curing. The test results are encouraging and it is observed that 90% of the design strength could be achieved in one day for both the grades of concrete by curing at 100°C for a period of 3 hours. Keywords: Quaternary Blended Cement Concrete (QBCC), Fly ash (FA), Micro silica (SF), nanosilica (NSF), Recycled Concrete Aggregate (RCA), Accelerated Curing.

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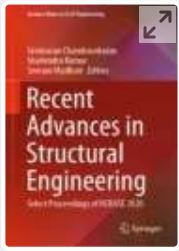
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**Recent Advances in Structural Engineering**, pp 51–59

## Stress–Strain Behaviour of Self-consolidated Processed Recycled Aggregate Concrete

[Nune Srikanth](#), [N. R. Dakshina Murthy](#)  & [M. V. Seshagiri Rao](#)

Conference paper | [First Online: 01 April 2021](#)

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### Abstract

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Self-consolidating concrete (SCC) is considered as a special concrete that streams and strengthens by its self-weight and passes through the congested

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self-consolidating concrete. In the present study an experimental investigation has been carried to develop SCC mixes of standard grades M35 and M45 using unprocessed and processed RCA at different percentage replacements of natural coarse aggregate (NCA) (0, 25, 50, 75 and 100% by weight) as per Nan-Su method. The processing of RCA is done using Deval's abrasion testing machine for different number of revolutions. Fresh properties of SCC were determined by means of slump-flow, L-box and V-funnel. The perfunctory properties such as compressive strength and stress–strain behaviour were determined. It has been observed that the usage of processed recycled coarse aggregate obtained higher compressive strength compared with unprocessed recycled coarse aggregate in SCC. The portion of recycled aggregate content increase has shown that the peak stresses are lower and their corresponding strains are higher. From the experimental findings it has been noticed that the processing of recycled aggregate up to 500 revolutions and 50% replacement of natural aggregate showed the

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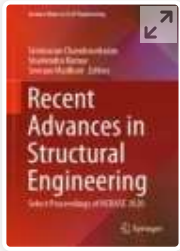
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**Recent Advances in Structural Engineering** pp 21–28

## Studies on Infiltration Rate of Pervious Concrete

[Nune Srikanth](#) & [N. R. Dakshina Murthy](#) 

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### Abstract

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Concrete is the only material in the construction engineering for which the usage has been multifold over the last decade. Owing to rapid urbanization, there has been an increase in the consumption of construction materials by which the natural

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interconnectivity. The perviousness is the only parameter which indicates the penetrability of no fines concrete. Since the rate of infiltration depends upon pore sizes, geometry and interconnectivity of coarse aggregate, it exactly indicates the effectiveness of pervious concrete. To preserve the water quality for future generations, the pervious concrete can be used as sustainable construction practice. In the current study, the experiments were carried out with a constant water/cement, varying cement/aggregate and also varying size of aggregate in the total aggregate content. The compressive strength was determined for standard cubes of 150 × 150 mm. The falling head permeability apparatus was designed to determine the coefficient of permeability for various samples. The cylinder-shaped casts of 11 cm in diameter and 18 cm in depth were used to determine the rate of infiltration by conducting permeability test on pervious concrete. The mix proportion satisfying infiltration rate and strength properties is recommended as the sustainable pervious concrete.

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In this investigation, studies were done to know the effect of the presence of recycled coarse aggregates (RCA) and Pozzolans in shear deficient rectangular beams in evaluating the shear strength of concrete. The selected slender and moderate deep beams without shear reinforcement were tested under two-point loading and the obtained results are compared with the renowned research work and design codes on natural coarse aggregates. An important observation is the replacement ratio of RCA is an important parameter to be introduced in the equations proposed by the various researchers on shear strength prediction while the current design codes are conservative in the prediction of ultimate shear strength of beams. The proposed method is then verified using the available experimental data of 330 RCA and NCA data of rectangular beams without stirrups.

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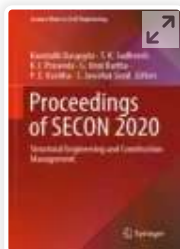
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# Performance Characteristics of Self-cured Recycled Aggregate Concrete with SCM's

[Lakshmi Thotakura](#) , [Sankar Kumar Reddy](#)

[Pullalacheruvu](#), [Ganesh Babu Kodeboyina](#) & [V. Krishna Rao Mupparisetty](#)

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## Abstract

Self-cured recycled aggregate concrete with shrinkage reducing admixtures is one of the pioneering researches in the construction industry.

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Hydration plays a predominant role in the properties of hardened concrete. Particularly in high strength concretes, micro cracking occurs due to the absence of pore water and lack of relative humidity thus causes self-desiccation. The experimental studies exhibit the performance of concrete mixes with 35% limestone powder in LP60 and 35% fly ash in SC60 and RA60. The mechanical and durability properties of M60 concretes with SCM's and PEG6000 were investigated. The results indicated that concretes with 1% self-curing compound shows improved results than the mixes with 0%. All the concretes mixes achieve the properties at the range of self-compacting concrete in the green state.

#### Keywords

**Concrete**    **Curing-internal curing**

**Self-curing**

**Supplementary cementitious materials-limestone powder**

**Fly ash**    **Recycled aggregate**    **PEG6000**

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