SUMMER INTERNSHIP PROGRAMME 2022

E&ICT Academy IIT Guwahati, The Assam Kaziranga University & Mantra Associates to organize the one month **SUMMER INTERNSHIP PROGRAMME 2022** through online mode from 01/07/2022 to 30/07/2022.

Following are the course details for the SIP 2022:

1. **COURSE NAME: INTERNET OF THINGS (IoT) & Embedded Systems Design**

Total Time Duration: 30 Days

COURSEOBJECTIVE: To give a brief idea about how to design an intelligent IoT based embedded system using different controller and sensor networks. The main intuition is to develop technical or hardware skills to design an embedded hardware.

COURSEOUTCOME: Students will be able to understand how to write program to develop a smart embedded system using different programming language like C, Assembly, Arduino programming etc. in different platform like keil µVision, AVR studio, Arduino IDE etc. Students will also get a very clear knowledge to develop their own embedded system hardware in real time.

ELIGIBILITY: EE/CSE/ETE/IT/IE/EEE students

PRE-REQUISITES (hardware/software required by the participants):

Software	**Hardware (Optional)**
Proteus 7.0, Keil uVision5, AVR Studio, Arduino IDE, Nuvoton Software	8051,AVR development board, Arduino UNO, Arduino NANO board, Sensor module etc.

Annexure-I

SL. No	**Day**	**Topic Covered**
1.	1	Brief introduction to embedded system, Embedded system designing tools and software.
2.	2	Brief introduction to embedded system hardware and basics of electronics components.
3.	3	Brief introduction of 16x2 LCD, Interfacing of 16x2 LCD Arduino UNO/Nano.
4.	4	16x2 4bit and 8bit mode of operation, Interfacing of 8051 with 8051 controllers.
5.	5	Brief introduction to different communication standard-Serial communication, I^2C communication etc.
6.	6	Introduction to different communication module- ZigBee, Bluetooth etc.
7.	7	Brief introduction to ADC, ADC0804/0809, Interfacing of analog sensor with 8051 and Arduino.

8.	8	Introduction to GSM communication, different AT commands of GSM, Interfacing GSM with 8051 & Arduino
9.	9	Introduction to DC Motor, types, working of driver circuit, hay's bridge.
10.	10	Speed control of DC geared motor, Interfacing of DC motor with 8051 using LM293D driver
11.	11	Brief introduction to 7 segment display, interfacing of 7 segment display with 8051 and Arduino.
12.	12	Introduction to ultrasonic senor- HCSR04, working, interfacing with 8051 and Arduino.
13.	13	Brief Introduction to Hex keypad, interfacing with Arduino
14.	14	Interfacing of hex keypad with 8051
15.	15	Brief introduction of digital sensor, Interfacing of DHT11 with Arduino.
16.	16	Interrupt and timer of 8051, Interfacing of DHT11 with 8051.
17.	17	Introduction to Internet of Things (IoT), tools and software to develop IoT based system.
18.	18	Introduction to IoT enable device/SoC, ESP8266, ESP32 etc.
19.	19.	Practical application of IoT: Precision agriculture using IOT (Project 1)
20.	20.	Practical application of IoT: Smart home automation system using IOT (Project 2)
21.	21.	Introduction to servomotor, Different applications, Interfacing with Arduino and 8051 controllers.
22.	22.	Introduction to stepper motor, applications, Interfacing with Arduino and 8051 controllers.
23.	23.	PROJECT WORK
24.	24.	PROJECT WORK
25.	25.	PROJECT WORK
26.	26.	PROJECT WORK
27.	27.	PROJECT WORK

Annexure-II
SAMPLE PROJECTS

1. Design a magical lightning system using LED's and switch for festival. (Both in Arduino uno and 8051)
2. Design an automatic fire alarm system using OPAMP/Controller.
3. Design a visitor counter system for a hall using 16x2 LCD and PIR/IR sensor. (Both in Arduino uno and 8051)
4. Design a 3-phase fault detection and analysis system using 16x2 LCD. (Both in Arduino uno and 8051)
5. Design a weather status monitoring system using Zigbee and 16x2 LCD. (Both in Arduino uno and 8051)
6. Design a home automation system using Arduino and different sensor module.
7. Design an automatic fan speed controller system using LM35 and 16x2 LCD. (Both in Arduino uno and 8051)
8. Design a home automation system using GSM. (Both in Arduino uno and 8051)
9. Design a mobile control robot using Arduino and L293D/L298 driver.

10. Design a smart wheel chair for physically disable person using Arduino.
11. Write a program in Arduino and 8051 to display numbers in 7-segment display.
12. Design an obstacle avoiding robot using ultrasonic sensor module.
13. Write a program to interface a hex keypad with 8051/Arduino.
14. Design a password-based security system using 8051 & GSM.
15. Design a wireless system to measure humidity and temperature of air using Arduino.
16. Design a system to measure humidity and temperature of air using 16x2 LCD, DHT11 and 8051 controllers.
17. Write a program to develop a local server to dump data from real world.
18. Design an IoT based smart home automation system using ESP8266 controller.
19. Write a program to interface a servomotor with Arduino and 8051.
20. Write a program to interface a stepper motor with Arduino and 8051.

2. COURSE NAME: DATA SCIENCE USING PYTHON

Total Time Duration: 30 Days

COURSE OBJECTIVE:

- The basic process of data science, Python and Jupyter notebooks
- An applied understanding of how to manipulate and analyze datasets
- Basic statistical analysis and machine learning methods
- How to effectively visualize results

COURSE OUTCOME:

Students will be able to

1. Install Anaconda & Work Within The iPython/Jupyter Environment, A PowerfulFramework For Data Science Analysis
2. Understand the Common Python Data Science Packages Including Numpy, Pandas,Scikit & Matplotlib
3. Carry Out Data Exploratory & Pre-processing Tasks Such As Tabulation, Pivoting& Data Summarizing In Python
4. Carry Out Data Visualization & Understand Which Techniques To Apply When
5. Carry Out The Most Common Statistical Data Analysis Techniques In Python Including Linear Regression.
6. Understand The Difference Between Machine Learning & Statistical Data Analysis
7. Implement Supervised Learning (Both In The Form Of Classification & Regression) Techniques On Real Data

ELIGIBILITY: Open to all Engineering branches and Science Students

PRE-REQUISITES (hardware/software required by the participants):

This course is intended for learners who have a basic knowledge of programming in any language (Java, C, C++, Pascal, Fortran, Javascript, PHP, Python, etc.).

ANNEXUR I

SL. No	Day	Topic Covered
1.	1	Installation of Python and other notebook and data sciencepackages
2.	2	Fundamentals of Python Programing
3.	3	Basic Data Manipulation with python Example: Filtering, Cleaning, Manipulating Data
4.	4	Basic Data Analysis using NumPy and Pandas Example 1
5.	5	Basic Data Analysis using NumPy and Pandas Example 2
6.	6	Data Processing with Pandas Example: Excel data, CSV data, JSON data.
7.	7	Python data Cleaning, standardization, etc with example
8.	8	Data Visualization using MatPlotLib & Seaborn Example 1 (Python Chart Properties, Python Chart Styling, Python Box Plots, Python Heat Maps, Python Scatter Plots)
9.	9	Data Visualization using MatPlotLib & Seaborn Example 2 (Python Bubble Charts, Python 3D Charts Python Time Series, Python Geographical Data, Python Graph Data)
10.	10	Statistical Data Analysis • Python Measuring Central Tendency • Python Measuring Variance, • Python Normal Distribution, • Python Binomial Distribution, Python PoissonDistribution
11.	11	Statistical Data Analysis • Python Bernoulli Distribution • Python P-Value, • Python Correlation • Python Chi-square Test • Python Linear Regression
12.	12	Exploratory data analysis – Example 1
13.	13	Exploratory data analysis – Example 2
14.	14	Exploratory data analysis – Example 3
15.	15	Exploratory data analysis – Example 4
16.	16	Introduction to Machine Learning:
17.	17	Types of machine learning Algorithm
18.	18	Supervised ML Algo with tabular Data example 1
19.	1	Supervised ML Algo with tabular Data example 2

	9.	
20.	20.	Introduction to text Data
21.	21.	Basic of Natural Language Processing (NLP)
22.	22.	Sentiment Analysis of NLP
23.	23.	PROJECT WORK
24.	24.	PROJECT WORK
25.	25.	PROJECT WORK
26.	26.	PROJECT WORK
27.	27.	PROJECT WORK

ANNEXURE II

Real Time PROJECTS

Assignment - Stock Market Analysis	Apply the basics of investing and your knowledge of Data Science to Determine when to buy and sell a stock.
Python Assignment - Movies Dataset	An assignment based on the concepts learnt in Python for Data Science. In this assignment, students will try to find some interesting insights into a few movies released between 1916 and 2016, using Python
Assignment: Uber Supply-Demand Gap	An assignment to study, visualize and solve uber supply-demand gap problem. This Assignment contains data set, which is a masked data set i.e. similar to what data analysts at Uber handle. Solving this assignment will give you an idea about how problems are systematically solved using EDA and data visualization.
Gramener Case Study	Use the concepts of EDA to decipher which types of customersdefault on a loan. Solving this case study will give you an idea about how real business problems are solved using EDA. by solving this case study, apart from applying the techniques they have learnt in EDA, they will also develop a basic understanding of risk analytics in banking and financial services and understand how data is used to minimise the risk of losing money while lending to customers.

Statistics Assignment	Assignment based on the concepts learnt in Inferential Statistics and Hypothesis Testing
Prediction of Car Pricing Dataset Assignment	This assignment is a programming assignment wherein they have to build a multiple linear regression model for the prediction of car prices. By doing this assignment they build a model to understand the factors car prices vary on and help a Chinese company enter the US car market.
Bank Marketing Assignment	Build a model for deciding whether a campaign will be successful in getting a client to sign up for the term deposits.
Apparent Temperature Prediction	Apparent Temp. prediction project is designed in order to walk the students through the approach used in solving a use case
Web & Social Media Analytics:Capstone Project	In this capstone project, students will be solving a problem in the mobile phone industry of the US, one of the major smartphones markets in the world. They will analyse some of the statistics in the US phone market and how the businesses benefit from analysing the market data.

Sample projects

1. Pima Indians Diabetes Database analysis
2. Suicide data of India –EDA
3. IMDB 5000 Movie Dataset Analysis
4. Stock Price Prediction
5. Uber Data Analysis
6. Indian Agriculture data analysis
7. Sentiment analysis of Indian Language
8. Crop recommendation data analysis
9. Credit Card Fraud Detection Project
10. Plant Identification data analysis