MEMORANDUM OF UNDERSTANDING (MOU)

BETWEEN

AVANTHI'S ST. THERESSA'S INSTITUTE OF ENGINEERING & TECHNOLOGY
GARIVIDI, ANDHRA PRADESH 535101
www.sttheressaengg.ac.in

AND

MVP COLONY SECTOR-12 USHODAYA JUNCTION VISHAKHAPATNAM,
ANDHRA PRADESH, INDIA 530017
www.robocoupler.com

About IITP:

Unlock the doors to innovation and skill mastery with our Industrial Internship Training Program (IITP) tailored for Diploma and Engineering enthusiasts. Over the course of 4 transformative months, participants will dive deep into the realms of Robotics, Artificial Intelligence, Embedded Systems, Web Development, and 3D Printing technology. Each week, dedicated sessions spanning 3-Days will blend hands-on practical applications with in-depth theoretical knowledge. Our immersive curriculum, guided by seasoned mentors, is designed to equip students with a holistic understanding of cutting-edge technologies, empowering them for future success. Elevate your skills and embrace the future of technology with IITP.

Course Module for EEE, ECE & EIE: EMBEDDED SYSTEMS

Module 1: Introduction to Embedded Systems
- Overview of Embedded Systems
- Introduction to Arduino and its Ecosystem
- Setting up Arduino IDE
- Basic Arduino Programming
- Understanding Digital Signals
- Digital Input/Output using Arduino
- Analog Input/Output using Arduino
- Sensor Interfacing
- Control Structures (if, else, switch)
- Loops (for, while)
- Functions and Procedures
- Debugging and Troubleshooting

Module 4: Communication Protocols
- Serial Communication (UART)
- I2C and SPI Protocols
- Wireless Communication with Bluetooth and WiFi modules
- Practical Projects: Implementing Communication in Projects

Module 5: Interrupts and Timers
- Introduction to Interrupts
- Timer Modules in Arduino
- Practical Use of Interrupts in Embedded Systems
- Interfacing with Accelerometers, Gyroscopes, and Magnetometers
- Advanced Sensor Calibration Techniques
- Real-world Sensor Applications

Module 7: Motor Control
- Introduction to Motor Types (DC, Servo, Stepper)
- Motor Drivers and Control
- Practical Projects: Motor Control Applications

Module 8: Display Technologies
- Working with LED Displays (7-segment, Dot Matrix)
- TFT and OLED Displays
- Practical Projects: Display Applications
- Design Principles and Best Practices
- Case Study: Designing a Complete Embedded System
- Project Development and Implementation
- Capstone Project: Integrating Concepts Learned
- Project Presentation and Demonstration

Course Module for MECH: 3D PRINTING

Module 1: Introduction to 3D Printing
- Overview of Additive Manufacturing
- Historical Evolution of 3D Printing
- Types of 3D Printing Technologies
- Applications and Industries using 3D Printing

Module 2: 3D Printing Processes
- Stereo lithography (SLA)
- Fused Deposition Modeling (FDM)
- Selective Laser Sintering (SLS)
- PolyJet Printing
- Binder Jetting
- Digital Light Processing (DLP)
- Comparison of 3D Printing Processes

Module 3: Understanding 3D Printers
- Components of a 3D Printer
- Print Bed and Build Volume
- Extruders and Nozzles
- Filaments and Materials
- Calibration and Maintenance
- Introduction to 3D CAD Modeling
- Design Principles for 3D Printing
- Software Tools for 3D Modeling (e.g., Tinkercad, Fusion 360)
- File Formats for 3D Printing (STL, OBJ)

Module 5: Preparing 3D Models for Printing

- Slicing Software and its Importance
- Optimizing Print Settings
- Support Structures and Rafts
- Bed Adhesion Techniques
- Previewing and Analyzing G-code

Module 6: Material Science in 3D Printing

- Types of 3D Printing Materials (PLA, ABS, PETG, etc.)
- Specialty Filaments (Flexible, Composite, etc.)
- Material Properties and Selection
- Post-Processing Techniques (Sanding, Painting, Smoothing)

Module 7: Quality Control and Troubleshooting

- Common Printing Issues and Solutions
- Monitoring and Adjusting Print Parameters
- Calibrating Printers for Precision
- Quality Assurance Techniques
- Multi-material and Multi-color Printing
- Hybrid Printing Technologies
- 3D Bioprinting and Medical Applications
- Large-scale 3D Printing
- Future Trends in 3D Printing
- Automotive Prototyping
- Aerospace and Defense
- Healthcare and Biotechnology
- Consumer Goods and Customization
- Architectural Models and Construction

Module 10: Practical Projects and Case Studies

- Design and Print a Functional Prototype
- Reverse Engineering with 3D Printing
- Case Studies on Successful 3D Printing Applications

Course Module for CSE, CSM: FULL STACK DEVLOPMENT (FSD)

Module 1: Introduction to Full Stack Development
- Overview of Full Stack Architecture
- Roles and Responsibilities of a Full Stack Developer
- Importance of Database in Full Stack Development
- Introduction to PostgreSQL
- Basics of HTML5 and Semantic Markup
- CSS Styling and Layouts
- Introduction to JavaScript and DOM Manipulation
- Front-End Frameworks (e.g., React, Angular, or Vue.js)

Module 2: Back-End Development

Server-Side Programming
- Introduction to Server-Side Programming (Node.js, Python)
- Building Restful APIs
- Handling HTTP Requests and Responses
- Authentication and Authorization
- Basics of Relational Databases
- Introduction to PostgreSQL
- Creating and Managing Tables
- SQL Queries and Joins
- Indexing and Optimization
- Consuming APIs from the Front-End
- Restful API Integration
- Handling Data between Front-End and Back-End

Course Module for CSE, ECE, EEE: Fundamental of Python with Ai

Module 1: Introduction to Artificial Intelligence
- Definition and Scope of Artificial Intelligence
- Historical Overview and Milestones
- Types of AI: Narrow AI vs. General AI
- Ethical Considerations in AI
- Introduction to Python
- Data Types, Variables, and Operators
- Control Flow: If-Else Statements, Loops
- Functions and Modules in Python

Module 3: Introduction to Machine Learning
- Understanding Machine Learning vs. Traditional Programming
- Types of Machine Learning: Supervised, Unsupervised, Reinforcement
- Applications of Machine Learning
- NumPy for Numerical Operations
- Pandas for Data Manipulation
- Matplotlib and Seaborn for Data Visualization

Module 4: Data Preprocessing and Exploration
- Handling Missing Data
- Data Scaling and Normalization
- Exploratory Data Analysis (EDA)
- Linear Regression
- Polynomial Regression Logistic Regression
- Decision Trees
- Random Forests
- Support Vector Machines
- Evaluation Metrics: Accuracy, Precision, Recall, F1 Score

Module 5 :UnsupervisedLearning
- K-Means Clustering
- Hierarchical Clustering
- DBSCAN
- Principal Component Analysis (PCA)
- t-Distributed Stochastic Neighbor Embedding (t-SNE)

Module 6: Natural Language Processing (NLP)
- Introduction to NLP
- Text Preprocessing
- Tokenization and Lemmatization
- Text Vectorization
- Introduction to Neural Networks
- Building a Neural Network using TensorFlow and Keras
- Convolutional Neural Networks (CNNs) for Image Classification
- Recurrent Neural Networks (RNNs) for Sequence Data

Module 7: AI Project
- Identifying a Real-world Problem
- Data Collection and Preprocessing
- Model Selection and Training
- Evaluation and Optimization
- Deployment Considerations

STUDENT REQUIREMENT FROM COLLGE: 150+
PROJECT PLAN:

For the final project of the Internship we will provide a prototype on Emerging technologies which is based on Embedded Systems, Full Stack development, 3D printing Technology, Mechatronics with control System. A single working model will be provided with multiple domains integrated for making one project.

EEE & ECE DEPARTMENT:

On Board Embedded Programming for Feedback Control system with Input based Modulation with self-thinking and controlling accuracy.
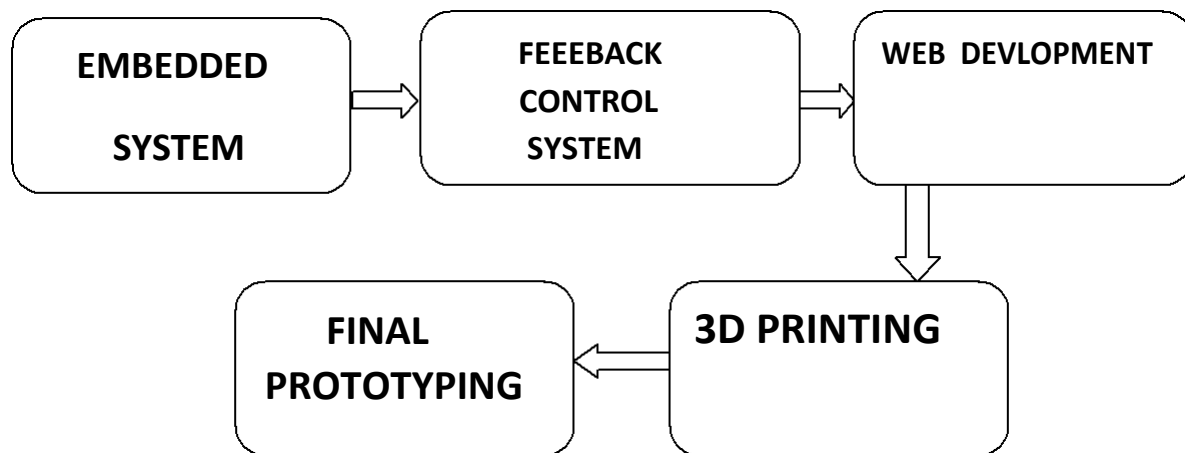
CSE DEPARTMENT:

It works with developing a cloud based Web page for monitoring the patient health product to enhances the real time data and control the output peripherals.

MECHANICAL DEPARTMENT:

Our innovative project harnesses the power of 3D printing technology to revolutionize medical solutions. By leveraging advanced 3D printing techniques, we aim to create bespoke medical implants, prosthetics, and anatomical models tailored to individual patient needs.

This cutting-edge approach allows for precise customization, optimizing the fit and functionality of medical devices. Moreover, our project explores the creation of intricate medical models for pre-surgical planning and training, enhancing the precision of medical procedures. With a commitment to advancing healthcare, our 3D printing-based medical project pioneers a new era of personalized, accurate, and accessible medical solutions.

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│  EMBEDDED    │ ──▶ │  FEEEBACK    │ ──▶ │ WEB DEVLOPMENT│
│              │     │  CONTROL     │     │              │
│   SYSTEM     │     │  SYSTEM      │     │              │
└──────────────┘     └──────────────┘     └──────┬───────┘
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        ┌──────────────┐     ┌──────────────┐
        │   FINAL      │ ◀── │ 3D PRINTING  │
        │ PROTOTYPING  │     │              │
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CSE PROJECT LIST

1. Collecting Real time Data Set in 14 days Observation with different humans.
2. Constructive data Analysis with Machine Learning.
3. Multiple Algorithms Analysis with deep Learning.
4. Design of real time user interface for Vital's monitoring (three Vitals') with serial Communication in Php.
5. Design of real time user interface data fetching with live data Analysis.
6. Analysis of heart rate variability using multiple Algorithms.
7. Analysis of Oxygen variability using prediction and find deep curve
8. Analysis of Temperature variability using CNN technique
9. Comparative Analysis of three vitals in UI Interface.

10. Preparing a total Health Dashboard (THD) with multiple graph representation.
11. Developing of Android Applications for body vital's with UI.
12. Integrating Total (THD) in Blink Cloud with Alerting System.
13. Dynamic Data Analysis of THD in Dashboard via Serial.

14. **Algorithm Development:**
    Compression Algorithm: Design an algorithm that optimizes chest compression depth, rate, and recoil based on real-time sensor data.
    Adaptive Algorithms: Develop adaptive algorithms that adjust compression parameters according to patient-specific factors and conditions.
15. **Machine Learning and AI:**
    Patient State Recognition: Implement machine learning models to recognize the patient's current health state and adjust CPR strategies accordingly.
    Decision-Making System: Develop an AI-driven decision-making system for the robot to respond dynamically to changing conditions during CPR.
16. **Computer Vision:**
    Facial Recognition: Integrate facial recognition to identify the patient and assist in monitoring vital signs.
17. **Human-Robot Interaction:**
    Natural Language Processing (NLP): Implement NLP for effective communication between healthcare professionals and the CPR robot.
18. **Simulation and Training Software:**
    Scenario Generation: Develop software that generates diverse CPR scenarios for training purposes.
19. **Data Analytics and Reporting:**
    Performance Analytics: Implement data analytics tools to evaluate the performance of the CPR robot during simulated or real-life CPR sessions.
20. **Customizable Reports:** Design a reporting system that provides detailed insights into CPR procedures, including compression effectiveness and patient response.

MECHANICAL PROJECT LIST

1. Design of Robot in solid works with assemble & dissemble with miniature components.
2. Fabrication of Robotic parts in 3D printing material.
3. Mechatronics based actuator control with effective drive technique (EDT)
4. Design of prototype in 3D printing fastest scotch yock mechanism (FSM).

ECE PROJECT LIST:

1. Real Time monitoring of multiple Body vital with single MEMS sensor (HRBPM, SPO2) with Embedded programming
2. Design of on Board PCB board with sensor and Controllers with soldering of SMD devices
3. IOT based multi vital parameter monitoring system with Atmega 328P microcontroller
4. Controlling the Oxygen as per the input heart rate sensor Max30100
5. Bluetooth of Things (BOT) based android monitoring with Graphical response and Emergency alerting system
6. Automatic Vibration alert to the human body when zero HRBBM which acts life Defiblator
7. Electronic Simulation and Training Mode: Simulation Software: Develop simulation software for training healthcare professionals in CPR techniques using the robot.

EEE PROJECT LIST:

1. Interfacing Adaptive Feed Back control system with HVDC and HRBPM
2. Developing a MOSFET based Motor Drive unit for controlling HVDC with temperature resistant heat sink
3. Pressure sensor based sudden current cut-off actuation control system in Simulation.
4. Developing efficient and reliable battery systems to power the robot during operation

MOU FOR INTERNSHIP TRAINING PROGRAM

This Memorandum of Understanding is executed on 9ᵗʰ Jan 2024 at Garvidi, Vijaynagaram by & between
Party A: St Theressa Institute of Engineering and Technology Garividi, Andhra Pradesh 535101
Party B: Robocoupler Pvt Ltd, MVP Colony Branch, Andhra Pradesh, 530017

NOW THIS MEMORANDUM OF UNDERSTANDING WITNESSTH AS FOLLOW

The purpose of this MOU is to formalize the collaboration between Party A and Party B for the execution of an Internship Training Program. This program aims to provide a comprehensive learning experience for B.Tech Engineering students, encompassing intensive training, hands-on projects, and meticulous assessments.

Duration:
Embark on a comprehensive learning journey with our Internship Program, spanning 2-Months of intensive Training followed by 1-Month of hands-on experience project, It is a further request to the college to grant an additional days if needed in order to accomplish the targets which are tailored for Engineering students in completion of live projects.

Commencement:
The sessions commencing on 22nd January 2024 for respective branches CSE, ECE, EEE, MECHANICAL Departments as agreed.

Assessment Breakdown:
Immerse yourself in the learning process with a meticulous assessment structure, comprising 8 individual assignments, each carrying 10 marks, accumulating to a total of 80 marks. The pinnacle of the program is the Final Project, carrying a weightage of 100 marks, culminating in a comprehensive evaluation with a total of 180 internship marks.

Internship Fee:
For Engineering enthusiasts, the Internship Fee stands at Rs 3380/-. This inclusive package covers a spectrum of benefits, including 3-4 months of dedicated service, the creation of a Prototype Working Model, examination fees, and a coveted Internship Certificate.
As per the terms and conditions of this MOU, the Industrial Internship Training Program (IITP) sessions begins on 22-01-2024, so the total payment regarding this Internship training program will be divided into 3-4 modes of payment (i.e. First Payment on 22-02-2024, Second payment on 22-03-2024, Third Payment on 22-04-2024), the same is agreed.

Signature of the College Head   **Signature of the Company Head**