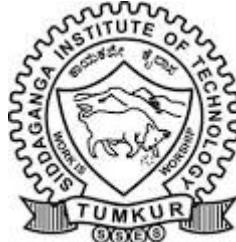


SIDDAGANGA INSTITUTE OF TECHNOLOGY, TUMAKURU-572103
(An Autonomous Institute under Visvesvaraya Technological University, Belagavi)



Industrial Training Report on
“SMART PARKING SYSTEM USING IoT AND
ANDROID”

submitted in partial fulfillment of the requirement for the award of the
degree of

BACHELOR OF ENGINEERING
in
ELECTRONICS & COMMUNICATION ENGINEERING
Submitted by

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
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Figure 0.1: Certificate

Course Outcomes

- CO1: Identify and model a given engineering problem
- CO2: Apply prior acquired knowledge and identify an appropriate problem solving methodology
- CO3: Implement the methodology and propose a meaningful solution
- CO4: Demonstrate the use of modern tools
- CO5: Demonstrate individual and team work
- CO6: Effectively communicate the solution to problem orally and writing
- CO7: Demonstrate life- long learning skills

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO-1		3										3	3	3
CO-2	3											3	3	3
CO-3			3		3							3	3	3
CO-4			3		3							3	3	3
CO-5									3					3
CO-6	3	2	2		2			2		2		3	3	2
CO-7	3	2	2		2							3	3	3
Average	3	2	3		3			2	3	2		3	3	3

Attainment level: - 1: Slight (low) 2: Moderate (medium) 3: Substantial (high)

POs: PO1: Engineering Knowledge, PO2: Problem analysis, PO3: Design/Development of solutions, PO4: Conduct investigations of complex problems, PO5: Modern tool usage, PO6: Engineer and society, PO7: Environment and sustainability, PO8: Ethics, PO9: Individual and team work, PO10: Communication, PO11: Project management and finance, PO12: Lifelong learning

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Chapter 1

Introduction

1.1 Profile of the Industry

Monkfox is the educational division of Glia Services Pvt Ltd, Bangalore focused on the higher education space. Monkfox expertise in providing solutions to educational institutions to improve the quality of their graduate students, develop a thriving ecosystem in the campus and build better connections with the Industry. Innovative Training Programs aim to impart the knowledge required to build products and equip students with Industry relevant skills. Student Training Programs (STPs) and Faculty Development Programs (FDPs).



Figure 1.1: Monkfox logo

The advanced technology workshops which they have conducted include Internet of Things (IoT), Machine Learning, Robotics, Python and Blockchain. Figure 1.1 shows the company logo

Mission : To inculcate the practice of hands on practical learning in all the Colleges and Universities.

1.2 Objectives

To design and deploy robust parking system that utilizes advanced sensors, Android and IoT technology to accurately detect the status of parking area slots in traffic congested areas like multistorey buildings or malls facilitating optimized parking. Additionally, The project's goal is to ensure scalability, making it accessible to a broader range of organizations in need.

1.3 Scope of the Training

1. Gain knowledge and precious experience in the entire field of IoT including android, python and machine learning.
2. Learn to know the proper way and procedure required to approach a problem statement.
3. Understand the technical competence required from a student as expected by an industry.
4. Hands-on implementation of the modern tools.

Chapter 2

Technical Competency

2.1 Hardware description

2.1.1 Raspberry Pi

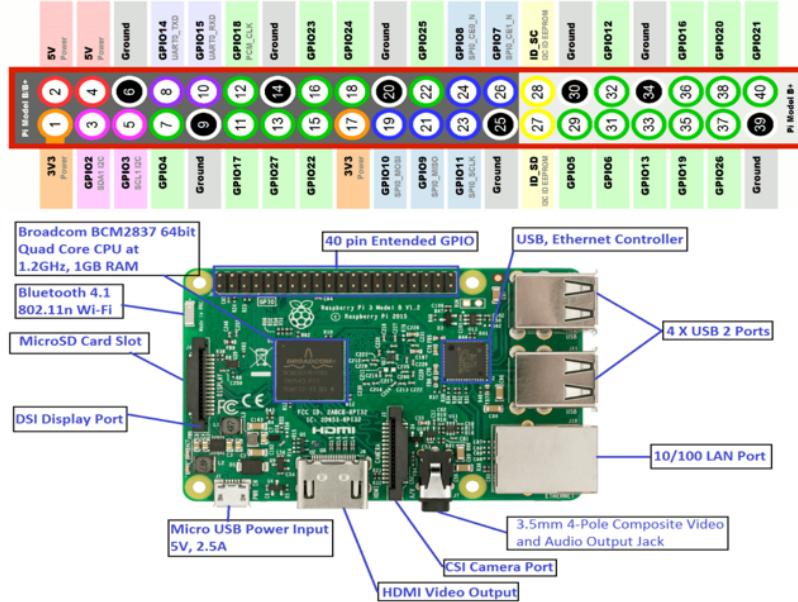


Figure 2.1: Raspberry Pi

Specifications:

- Processor: Broadcom BCM2837 SoC (System-on-Chip)
- Quad-core ARM Cortex-A53 CPU 64-bit architecture Clock speed: 1.2 GHz RAM: 1GB LPDDR2 SDRAM
- Storage: microSD card slot for storage
- Video Output : HDMI port (supports Full HD 1080p output) Composite video (PAL/NTSC) via a 3.5mm jack
- Audio: 3.5mm audio jack HDMI audio output

- USB Ports: 4 x USB 2.0 ports
- Networking: 10/100 Ethernet port (RJ45) Built-in Wi-Fi 802.11n Built-in Bluetooth 4.2 BLE (Bluetooth Low Energy)
- GPIO Pins: 40 GPIO pins (compatible with Raspberry Pi 2)
- Operating System Support: Raspberry Pi OS (formerly Raspbian) and various other Linux distributions
- Power Consumption: Typically around 2.5-2.7W

2.1.2 IR Sensor

An infrared (IR) sensor is an electronic device that detects infrared radiation in order to sense some aspects of its surroundings.

IR transmitter(source) is used to emit radiation of required wavelength. This radiation reaches the object and is reflected back. The reflected radiation is detected by the IR receiver. The IR Receiver detected radiation is then further processed based on its intensity. IR sensors can be classified in two types based on presence of IR source :

1. Active Infrared Sensor
2. Passive Infrared Sensor

Applications:

Burglar Alarm , Item Counter

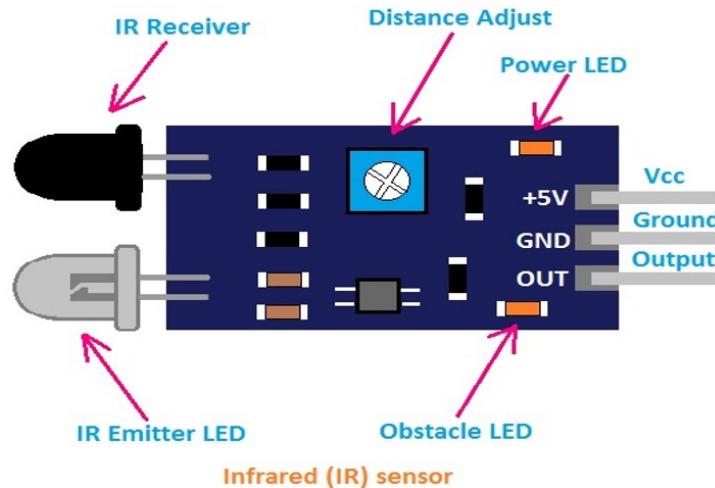


Figure 2.2: IR Sensor

2.1.3 Servo Motor



Figure 2.3: Servo Motor

Servo motor works on PWM (Pulse width modulation) principle, means its angle of rotation is controlled by the duration of applied pulse to its Control PIN .

Basically servo motor is made up of DC motor which is controlled by a variable resistor (potentiometer) and some gears. The servo motors usually have a revolution cut off from 90° to 180° . A few servo motors also have a revolution cutoff of 360° or more. But servo motors do not rotate constantly. Their rotation is limited between the fixed angles.

Servo motors are used in industrial applications, Robotics , in-line manufacturing etc..

2.1.4 Radio Frequency Identification-RC522

RC522 is the highly integrated RFID card reader which works on non-contact communication . It is designed by NXP as low power consumption, low cost and compact size read and write chip . The RFID system is comprised of two components : The RFID reader and the tags . RFID tags are a type of tracking system that uses radiofrequency to search, identify, track, and communicate with items and people.

Specifications :

- 1) 13.56MHz contactless communication card chip.
- 2) Working current 13 – 26mA / DC 3.3V
- 3) Working frequency 13.56MHz
- 4) Card reading distance 060mm

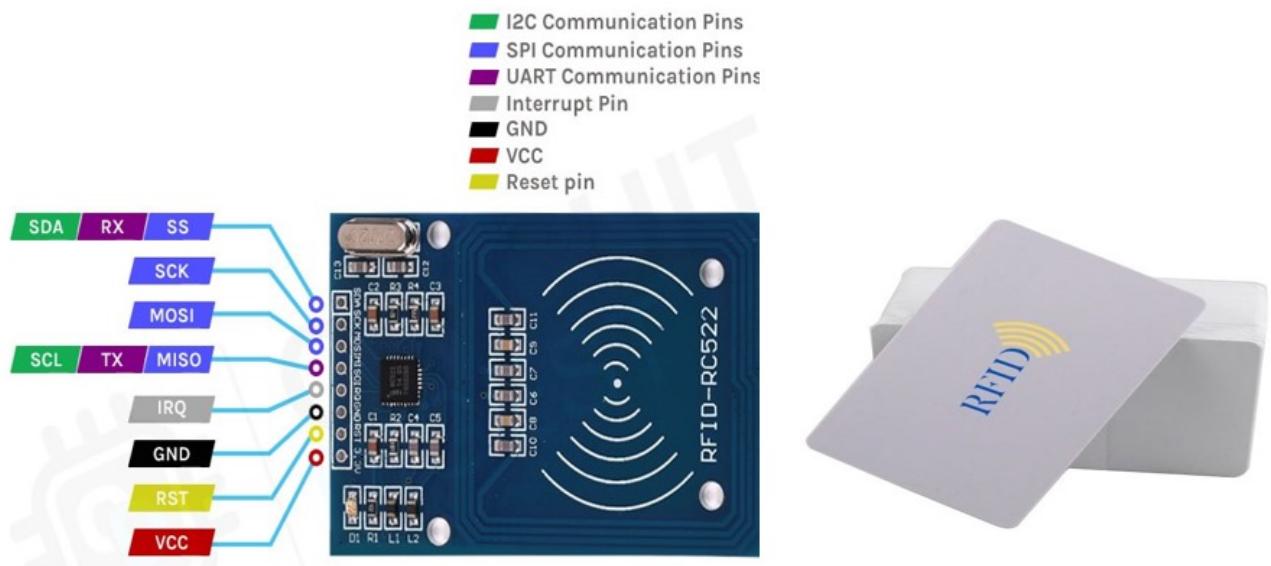


Figure 2.4: RFID tags and Reader

2.2 Software Description

2.2.1 MQTT

MQTT (Message Queue Telemetry Transport) is a lightweight, publish-subscribe, machine to machine network protocol for Message queue/Message queuing service. It is designed for connections with remote locations that have devices with resource constraints or limited network bandwidth. It must run over a transport protocol that provides ordered, lossless, bi-directional connections typically, The MQTT protocol defines two types of network entities: a message broker and a number of clients.

An MQTT broker is a server that receives all messages from the clients and then routes the messages to the appropriate destination clients.

An MQTT client is any device (from a micro controller up to a fully-fledged server) that runs an MQTT library and connects to an MQTT broker over a network

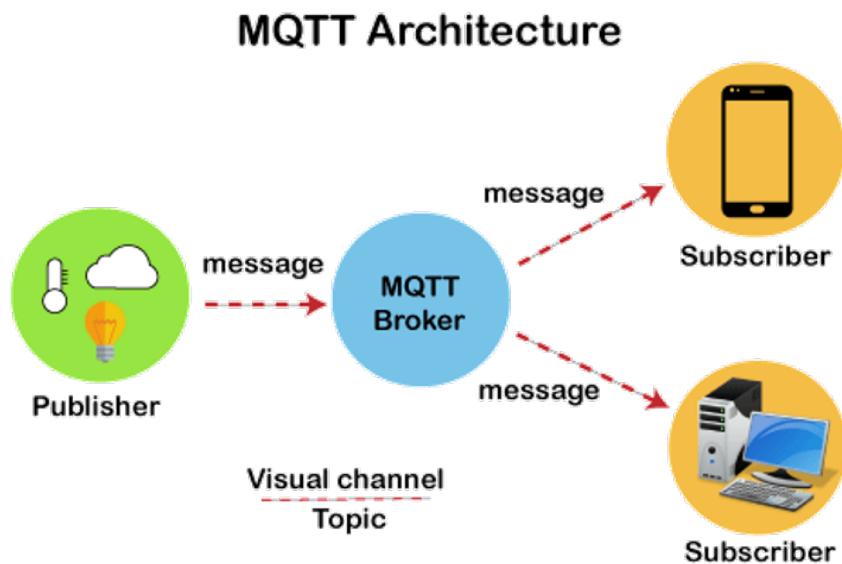


Figure 2.5: MQTT Architecture.

2.2.2 Android app using Android Studio



Figure 2.6: Android Studio.

Android Studio is an integrated development environment (IDE) specifically designed for developing Android applications. It is the official IDE for Android app development and is widely used by Android developers around the world.

- 1).Open source and Linux based operating system .
- 2).System for Mobiles such as smartphones and tablet computers .
- 3).Applications are usually developed in the Java language using the Android software Development kit .

2.3 Results

A Smart Parking System has been developed, enabling users to monitor parking slot occupancy via an Android app using MQTT. The app consists of three primary screens: Login, Register, and Output. To optimize parking slot detection, various key components have been integrated and are coordinated by a Raspberry Pi. These components include Infrared (IR) sensors, Servo Motors, and RFID Tags and Readers. When an IR sensor detects a vehicle in a parking slot, it automatically sends this information to the Android app via an MQTT broker. This data is crucial for users searching for available parking spaces. Additionally, on-site RFID Readers have been integrated to grant access to parking areas exclusively to registered users with RFID Tags, enhancing security and control to ensure only authorized individuals can use the parking facilities. In essence, the Smart Parking System is a robust and intelligent solution that harnesses technology to streamline parking management, all seamlessly managed by the Raspberry Pi at its core.

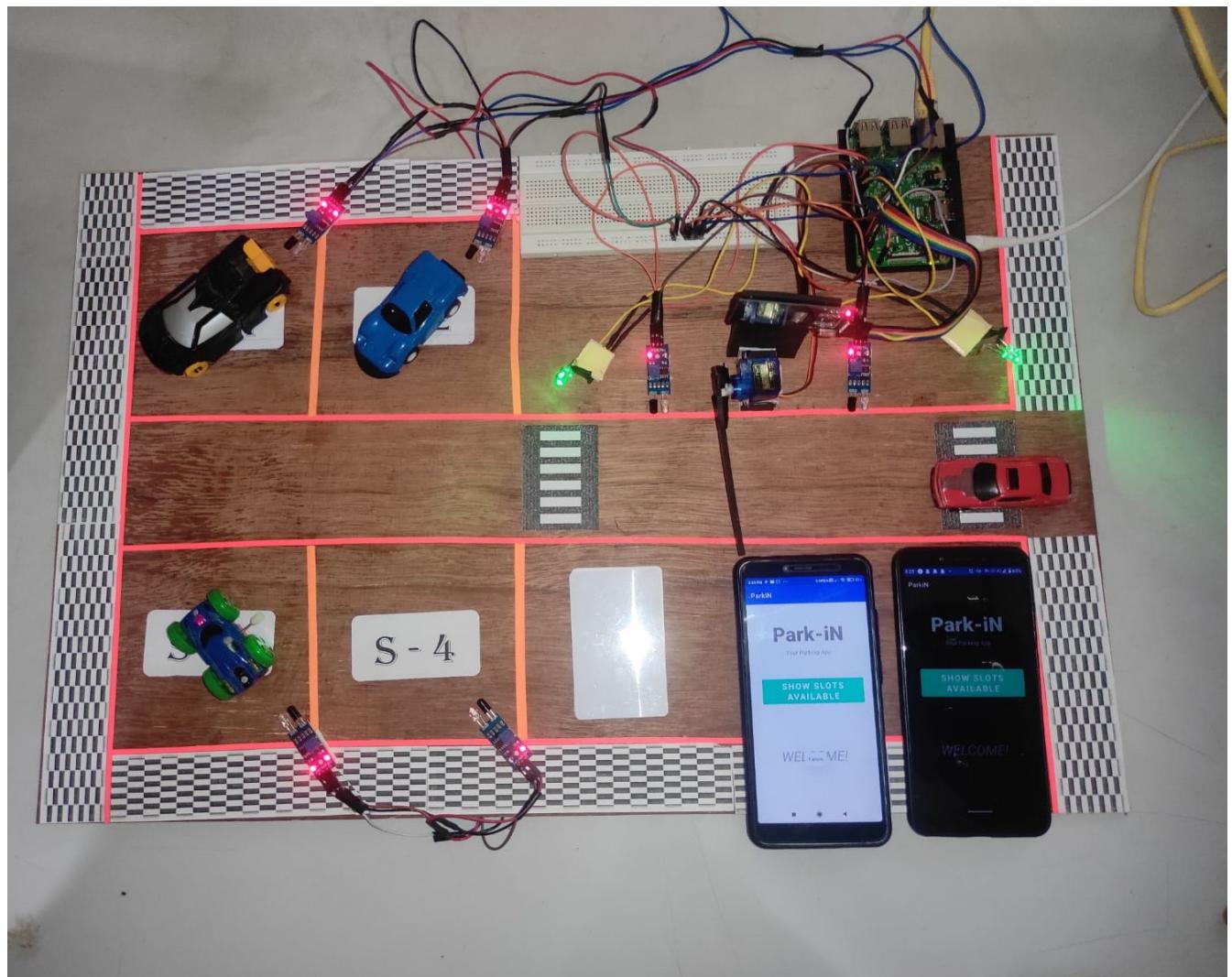


Figure 2.7: Top view of the Smart parking System model

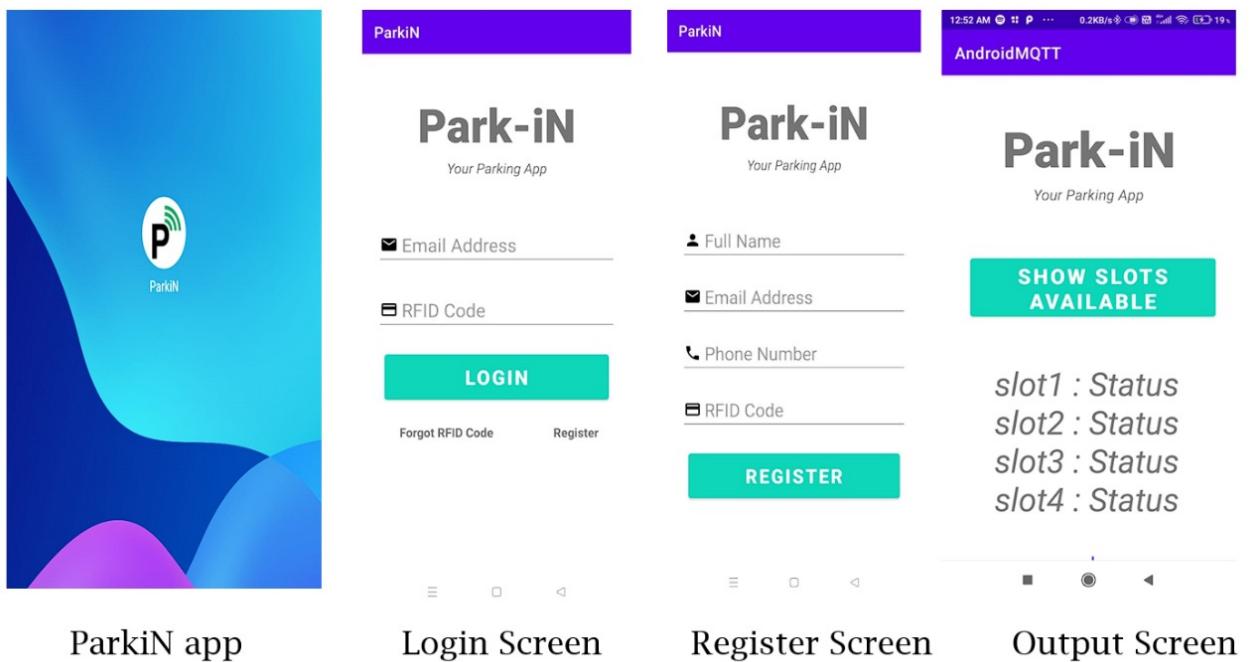


Figure 2.8: Snapshot of Park-iN app



Figure 2.9: Corner view of the Smart parking System model

Chapter 3

Soft Skills and Best Practices

3.1 Soft Skills acquired

1. Team work

Teamwork is defined as: Co-operation between those who are working on a task. Team-work is generally understood as the willingness of a group of people to work together to achieve a common aim.

2. Project Management

Project Skills: Project managers have developed many tools and techniques over the years. A basic understanding of typical PM skills such as schedule management and scope management will help you organize and control your project effectively. Interpersonal Skills: Projects involve many stakeholders, from project team members to external clients. Interpersonal skills such as leadership and communication are critical for effective interaction with these stakeholders to ensure your project's success.

3. Financial Management

Project Financial Management is a process which brings together planning, budgeting, accounting, financial reporting, internal control, auditing, procurement, disbursement and the physical performance of the project with the aim of managing project resources properly and achieving the project's objectives.

4. Ethics

Project management is driven by decisions, often dozens or more per day. Some decisions are small and barely noticed while others are prominent. Some require deep thought because they involve people, resources and the environment. And sometimes these factors are in conflict, creating a dilemma and perhaps significant risks. While project managers normally know what to do, how to do it can become a puzzle especially when stakeholder interests conflict. Like all leaders, project managers build trust by the way they make decisions. Here again, the how to do it can be puzzling yet is instrumentally important. Ethics is the discipline of how to do it best.

3.2 Practices followed in industry related to society, health, and safety issues

IOT Monkfox follows 6-D process

1. Discover: In Discovery stage the company compare current and future Job requirements with the current education in the colleges.
2. Define: In Define Stage the company draws up multiple plans on how to fill up the skill gap of the students.
3. Design: In the Design stage the main aim is to come up with solutions for persisting and future problems.
4. Develop: In the Development stage, the company interacts with numerous Industry professionals and trainers to give the program its shape, structure and content based on the industry and job standards and requirement. This helps students to take up advanced technological jobs in any industry.
5. Deploy: In the Deployment stage, the company tries to find out different channels to deliver the program like classroom, online, audio/ video recording etc.
6. Deliver: In the Delivery stage, the company selects only those trainers and professionals who are Subject Matter Experts in their field and have experience in training and skill development.

Chapter 4

Conclusion

Industrial Training on IoT completed successfully. This training takes through all phases of designing a circuit and provides knowledge about Internet of things and helps to solve problems with real data sets, programming skills such as problem decomposition and Internet of Things(IOT) based application. This training helps in understanding how the sensors are connected, how they communicate through internet and send data to the cloud and also helped in complete understanding of IOT.

4.1 Outcomes of the Training

- A unique and in-depth study method to strengthen your conceptual and practical knowledge during your engineering phase.
- Improve understanding of concepts of industry standards under expert guidance.
- A flipped classroom concept running parallel with the university with a complete hands-on training in IoT and Machine Learning from Grass root Level.
- Development of technical skills required in Industry

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