

Madhav Institute of Technology & Science, Gwalior

Deemed University

Centre of Excellence (CoE) of IoT

Presented by
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Coordinator
Centre for Internet of Things



Developed Centre of Excellence (CoE) of IoT

at

Centre for Internet of Things MITS-DU

*In Industry Collaboration with
Uniconvergence Technologies Private Limited, Noida*

Developed Centre of Excellence (CoE) of IoT



B.Tech Electrical and Computer Engineering

B.Tech Internet of Things(IoT)

Technologies Covered



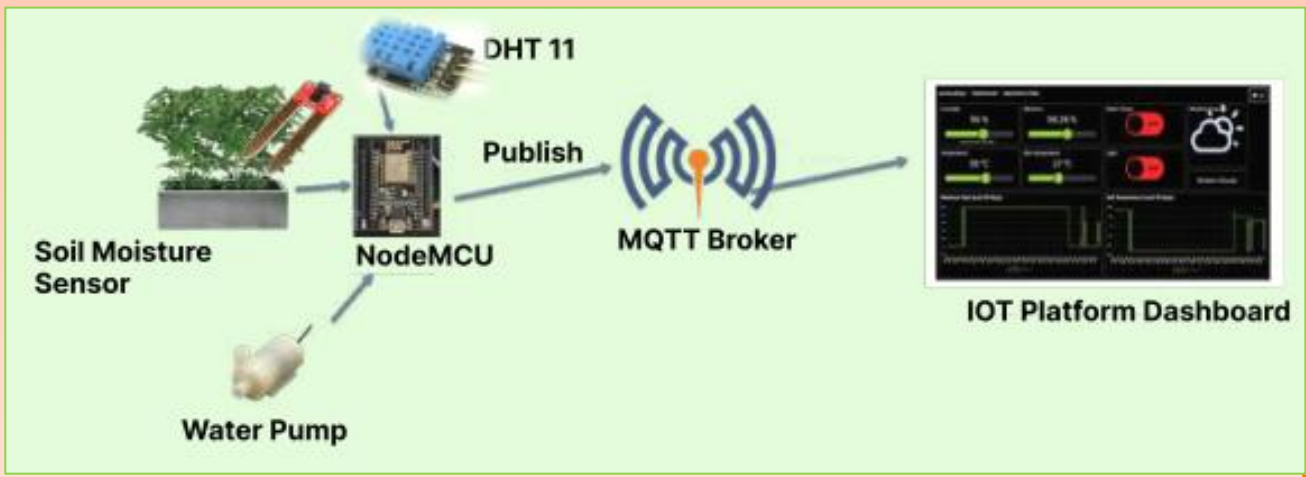
Establishment of CoE: Possible Solutions

Smart Agriculture IoT Solution

ITEM-01

Smart Agriculture IoT Demo measures key parameters such as *soil moisture, humidity, temperature, and weather data.*

It wirelessly controls the irrigation cycle and monitors all the data on the web platform, along with a mobile app for real-time updates and recommendations based on the crops

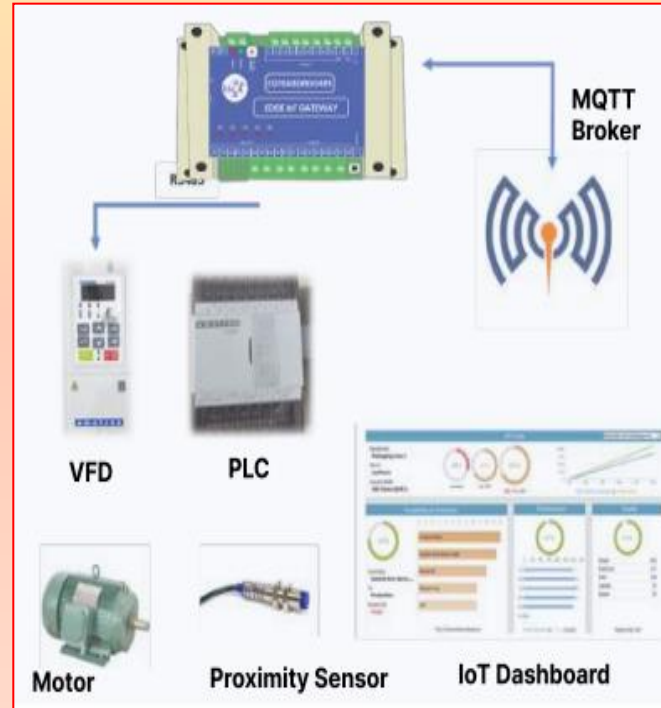


Industry 4.0 and IIOT Solution

ITEM-
02

Industrial automation panel with:

- PLC (Programmable Logic Controller)
- HMI (Human Machine Interface)
- VFD (Variable Frequency Drive)
- Edge IIOT Gateway
- Sensors and Actuators
- SCADA and web-based IoT software
- For learning various industrial and IoT protocols like MQTT, MODBUS, OPC, TCP/IP, RS485."



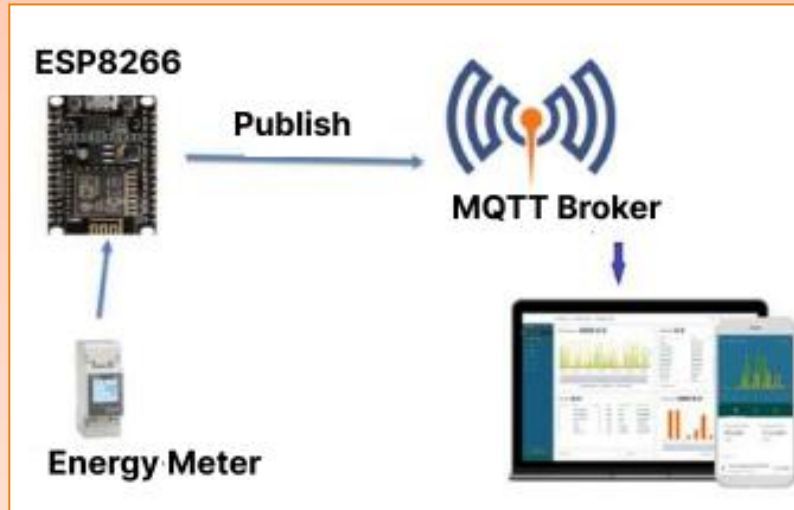
Establishment of CoE: Possible Solutions

Energy Monitoring Solution

ITEM-03

The Energy Monitoring Solution monitors all critical parameters from the multifunction meter and sends data to the server via *Wi-Fi communication* using *MQTT/HTTP*.

The data can be monitored and analyzed through a web dashboard, facilitating efficient energy use and the detection of any faults or blackouts



Proposal for Establishment of CoE: Possible Solutions

Air Quality Monitoring Solution

ITEM- 04

Problem Statement: Air quality is crucial for human life, making monitoring and implementing corrective measures imperative.

WiFi-based air quality monitoring node measuring

➤ *real-time air quality (PM2.5 and PM10), temperature sensing, and humidity sensing.*

➤ *Sending data to a web-based dashboard for monitoring and generating notifications*

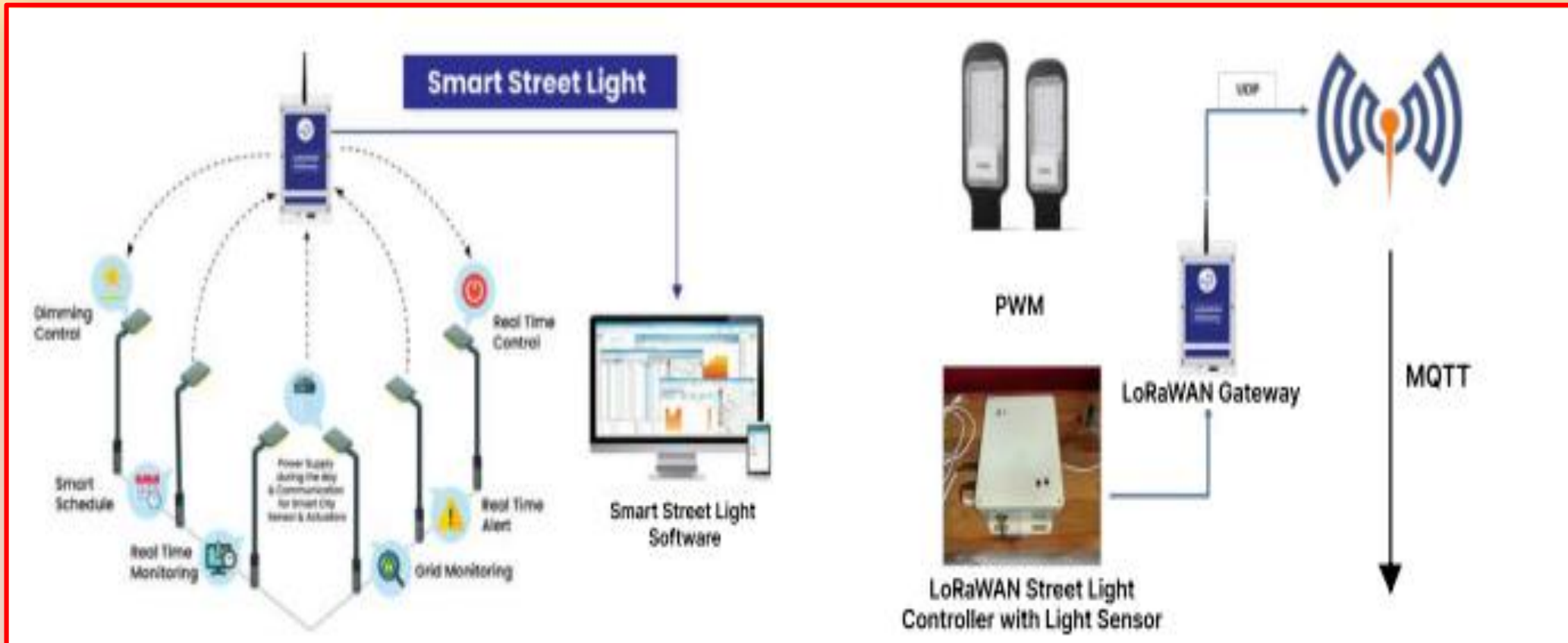


Proposal for Establishment of CoE: Possible Solutions

Smart Street Light Solution

ITEM-
05

Problem Statement: Optimal and Efficient street lighting is now need of hour to save power, better control of malfunctioning of light, reduced carbon footprints



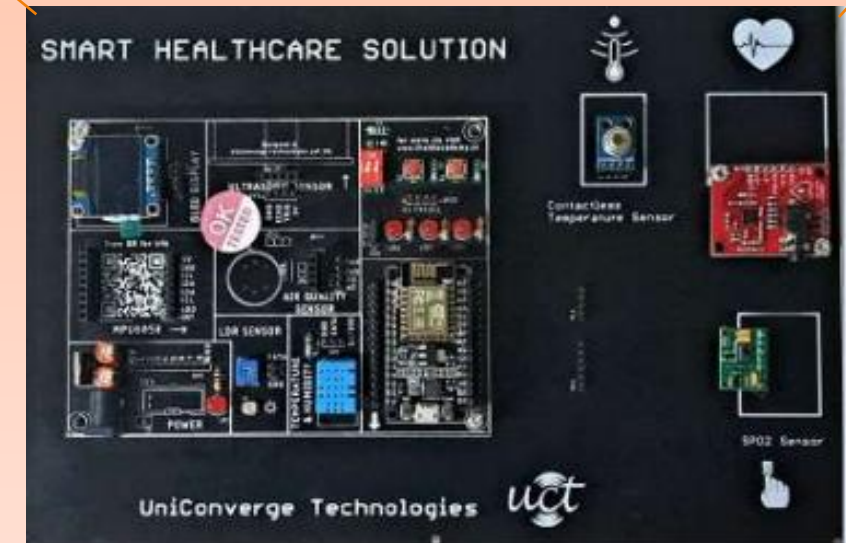
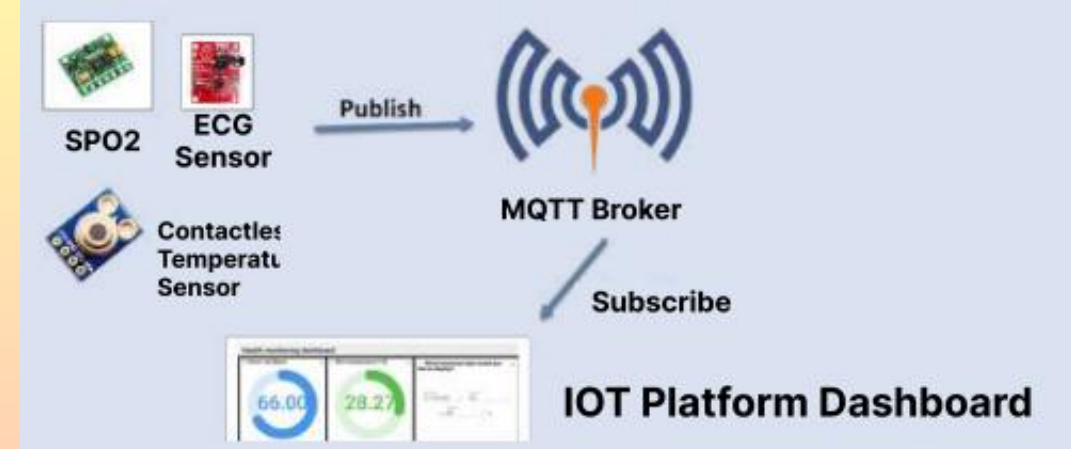
Establishment of CoE: Possible Solutions

Smart Healthcare Solution

ITEM-
06

Problem Statement: Healthcare has always been the highest priority for mankind. Smart healthcare includes the monitoring of various vital parameters and tracking via cloud applications.

- ✓ *Smart Healthcare solution monitors critical parameters for human health, such as body temperature, SPO2 levels, heart rate, and ECG.*
- ✓ *Given that healthcare is one of the key areas that can benefit from IoT, it serves as a great learning and development platform for students interested in designing products in the healthcare sector.*
- ✓ *With the dashboard, one can remotely monitor a patient's vital signs using an internet connection*



Water Metering Solution

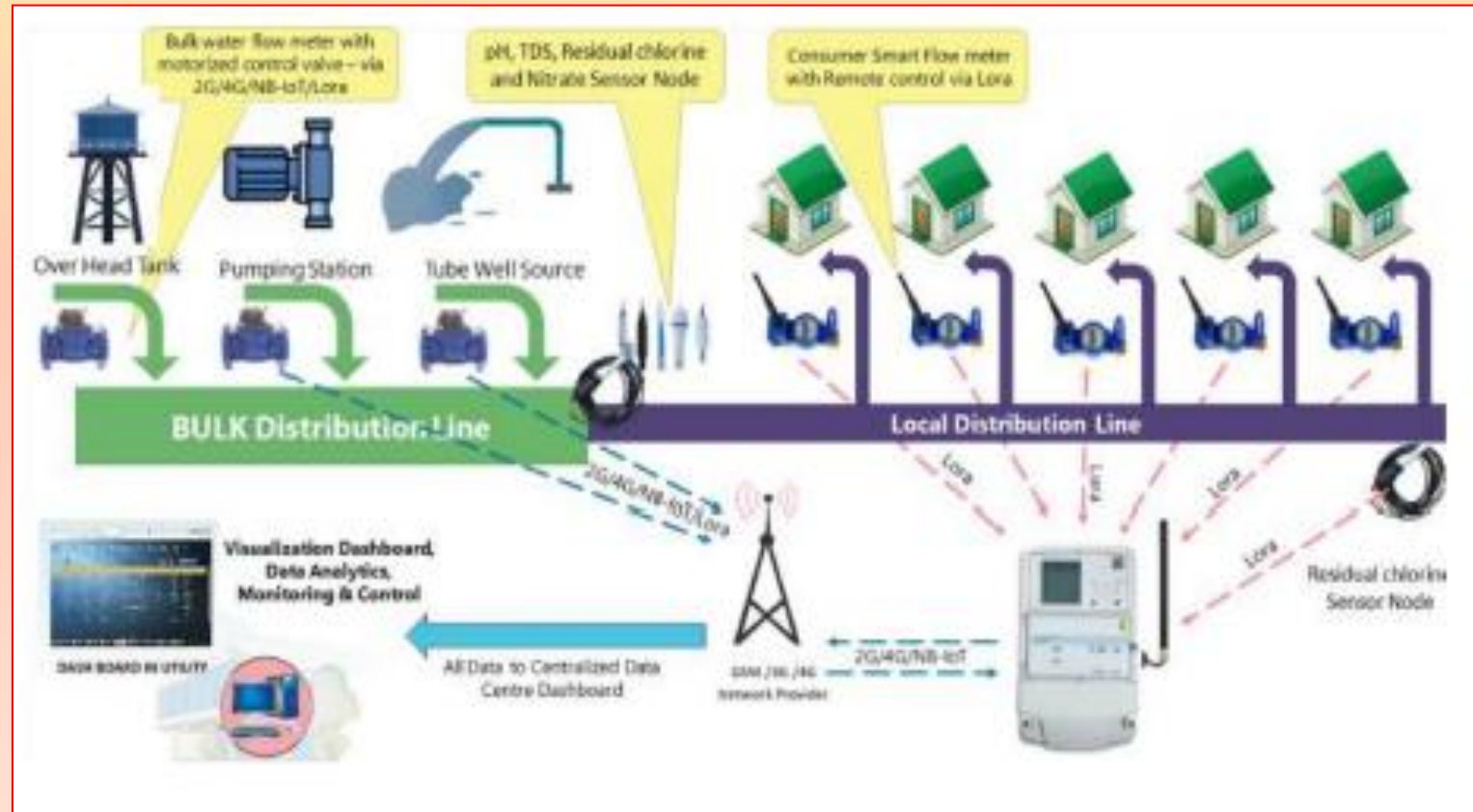
ITEM-
07

Problem Statement: Water conservation is a necessity, and automatic metering is required for creating smart cities, smart villages, and implementing the 'Har Ghar Jal Yojna'

LoRaWAN-based smart water metering for residential and commercial purposes involves

- an ultrasonic meter with an RS485-based communication interface to read data such as instantaneous flow, total water consumption, and water leakage.

- The meter sends data to the Water Metering AMR Software via a LoRaWAN Gateway



Establishment of CoE: Additional Equipments

Smart Solar Street Light Training System

Problem Statement: Street lights are a part of our everyday life. They play an important role in creating safe and more productive cities. Most people know that they only light our sidewalks and roads during the night and during the day they are shut off and unused

ITEM-
08

Facilities : Smart Solar Street Light Training Platform is designed for studying and understanding smart street lights.

This panel consists of temperature, humidity, LDR, PIR motion, air quality sensors.

These sensors are connected with smart node which is mounted on smart pole and transfer data through zigbee to the main board for display and analysis. One can also explore charge controller and solar PV analyzer



Proposal for Establishment of CoE

Electronic Workbench

ITEM-
09

The test bench that is flexible to accommodate any testing setup from general to industry specific requirements. The Workbench has ergonomically designed instrument panel in vertical position and with sufficient space for working

- WorkBench will comprises following instruments
- 10 MHz AM / FM Function-Pulse Generators with 40MHz Frequency Counter
 - 50MHz, 1GSa/s, 4CH Digital Storage Oscilloscope
 - Dual Tracking DC Power Supply Soldering / Desoldering Station
 - 3¾ Digital Multimeter



Predictive Maintenance Demo Solution

ITEM-
10

Working model and setup for Predictive Maintenance consists of:

- *Vibration sensor*
- *Temperature sensor*
- *Edge Gateway*
- *Fully functional industrial web-based monitoring software for conducting IoT analytics*
- *Running custom machine learning algorithms on sensors.*
- *Data is sent to the Predictive Maintenance Dashboard and Mobile App via Bluetooth connectivity using BLE Gateway*



ITEM-
11

Arduino Development Board



Features:

- Arduino Uno
- I2C (MikroBus Interface) for connecting multiple communication modules optionally
- LCD Interface
- Sensor Interface, such as:
 - Ultrasonic Sensor
 - Temperature and Humidity Sensor
 - Air Quality Sensor
 - Light Sensor
 - Accelerometer and Gyroscope Sensor (MPU6050)
 - Relay and Buzzer
 - Motor Driver
 - RS232 Module
 - L298N Motor Driver
 - Switches and Buttons

ITEM-
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Raspberry Pi Development Board

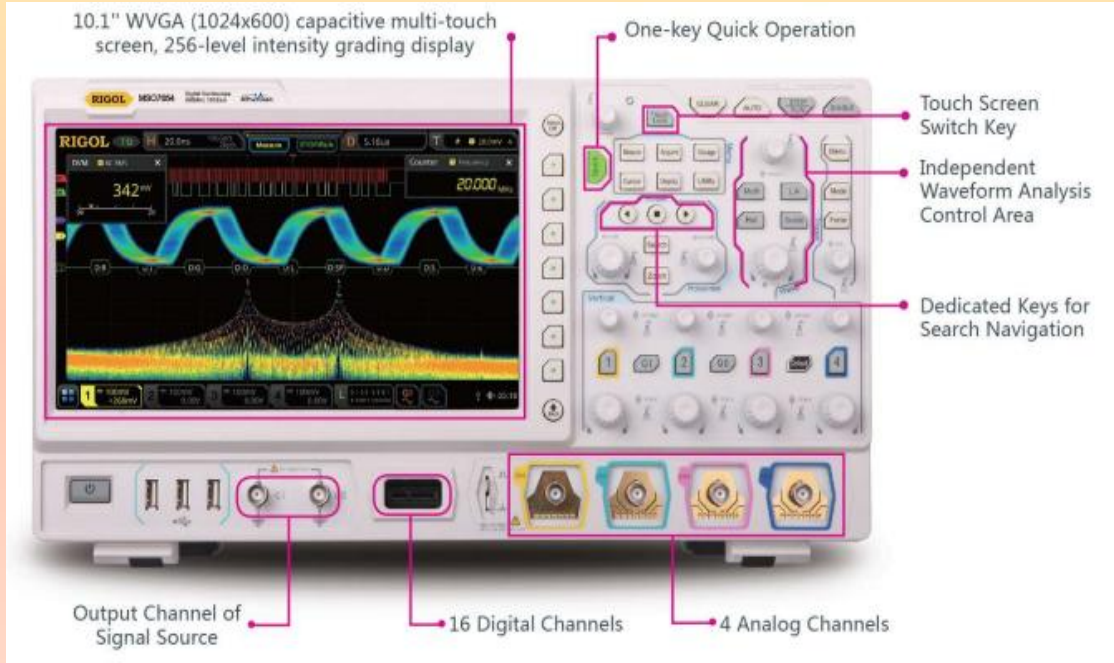
➤ Features:

- Broadcom BCM2711, Quad-core Cortex-A72 (ARM v8, 64-bit SoC @ 1.8GHz)
- 4GB LPDDR4-3200 SDRAM (amount depends on model)
- Dual-band 2.4 GHz and 5.0 GHz IEEE 802.11ac wireless, Bluetooth 5.0, BLE
- Gigabit Ethernet
- 2 USB 3.0 ports; 2 USB 2.0 ports
- 2 × micro-HDMI ports (up to 4kp60 supported)
- 2-lane MIPI DSI display port
- 2-lane MIPI CSI camera port
- 4-pole stereo audio and composite video port



Digital Storage Oscilloscope

ITEM-13



- Features:**
- 4-Channel
 - 100MHz

Industrial IOT Development Board

ITEM-14



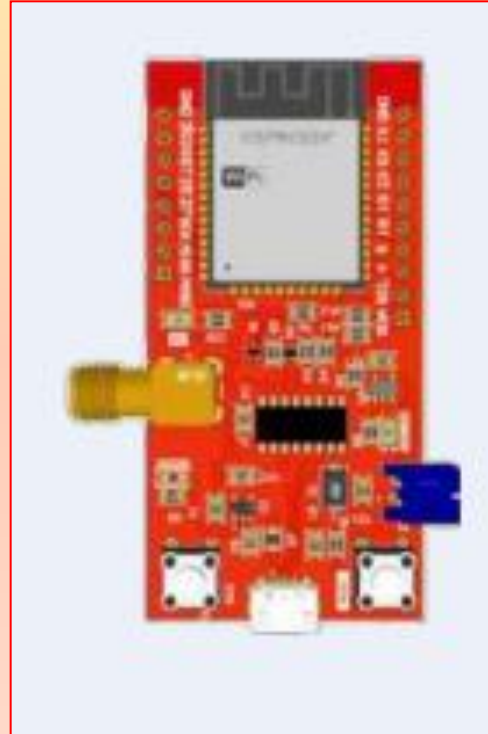
- Features:**
- NodeMCU
 - Sensor interface like:
 - LDR Sensor
 - Temperature and Humidity Sensor
 - Air Quality Sensor
 - Ultrasonic Sensor
 - Accelerometer and Gyroscope Sensor (MPU6050)
 - OLED Display
 - LED, Switch, and Push Button

ITEM-
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ESP32 Lora Development Board

Features:

- ESP32-WROOM-32 module - 16MB
- WiFi, BT+BLE microcontroller
- Integrated PCB antenna
- RFM95W LoRa module
- Frequency range: 868/915 MHz
- Spread factor: 6-12
- SPI control interface
- SMA antenna connector for LoRa radio
- Reset and ESP32 pin 0 buttons
- 1Hz GPIO ESP32 pin-breakout
- Power and user LEDs
- CH340C USB-to-Serial interface
- Micro-B USB connector for power and programming
- All current consumption tested at 5V
- 1000mA when formatting SPIFFS in Gateway mode



ITEM-
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Google Coral Development board

A development board to quickly prototype on-device ML products. Scale from prototype to production with a removable system-on-module (SoM).

- CPU: NXP i.MX 8M SoC (Quad Cortex-A53, Cortex-M4)
- GPU: Integrated GCv000 Lite Graphics
- ML accelerator: Google Edge TPU processor, 4 TOPS (int8); 2 TOPS per watt
- RAM: 1 or 4 GB LPDDR4
- Flash memory: 8 GB eMMC, MicroSD slot
- Wireless: Wi-Fi 2x2 MIMO (802.11b/g/n/ac 2.4/5GHz) and Bluetooth 5.0
- USB: Type-C OTG; Type-C power; Type-A 3.0 host; Micro-B serial console
- LAN: Gigabit Ethernet port



LoRaWAN Gateway

ITEM-
17

Features:

- Commercial Grade Indoor LoRaWAN® Network Gateway:
- Works on Semtech LoRa® Packet Forwarder
- Default Ethernet Backhaul, Automatic Fallback to Wi-Fi
- Range up to 5 km Line of Sight
- Ambient operating temperature: -20 to 75 °C
- Suitable for small in-building private LoRaWAN® networks



LoRaWAN Server

ITEM-
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Dedicated IoT Server with all the required software for data acquisition, data visualization, and analytics platforms preloaded, along with sample applications.

Proposal for Establishment of CoE

BASIC PROJECT LAB TOOLS ,INSTRUMENTS and Cosumables

ITEM-
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Arduino	50
Node MCU	25
Wimos Kit	10
Bluetooth Sensor Node	25
Zigbee Sensor Node	30
Wifi Sensor Node	25
Bluetooth/ Zigbee/ WiFi Sensor Tag	10
GSM Module	25
Wifi Router	5
Ethernet Module	5
IoT Gateway with WiFi	15
Temperature Sensor	25
Light Sensor	25
Smoke Sensor	25
Humidity Sensor	15
Force Sensor	10
Pressure Sensor	25
Motion Sensor	25

Speed Sensor	25
Vibration Sensor	10
pH sensor	5
Camera Sensor Module	5
Dust Sensor Module	5
Alcohol Sensor	10
Heartbeat Sensor	10
Tilt Sensor	10
Air Quality Sensor	15
Water Quality Sensor	10
DC Motor	10
LED Set Assorted	5
Relay Board	25
IR Module Set + Remote	10
Breadboard Jumper Wire	1000
LoRa Gateway & Sensor Module set	5
IoT Board Kit	5
OBLU Footprint Navigation System with Software	5
Bread Board	50
Power Supplies	50



माधव प्रौद्योगिकी एवं विज्ञान संस्थान, ग्वालियर (म.प्र.), भारत
MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR (M.P.), INDIA

Deemed University
NAAC ACCREDITED WITH A++ GRADE
Centre for IoT



Centre for Internet of Things

***Thank You
for Watching***

Innovate | Connect | Automate