AMAL JYOTHI COLLEGE OF ENGINEERING AUTONOMOUS

COMBINED MICRO PROJECT – RMCA2024-26

24MCAT213 – INTERNET OF THINGS
24MCAT231 – CLOUD COMPUTING
24MCAT203 – VIRTUALIZATION AND CONTAINERS

Workflow: Develop an IoT project using an ESP32 with at least one sensor/module (24MCAT213), set up a private cloud environment with OpenStack (24MCAT231), configure a containerized backend with database support (24MCAT203), and implement a real-time dashboard for sensor data visualization.

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1. FULL NAME	ALBIN JIJI	**2. REGISTER NUMBER**	AJC24MCA-2011
3. PROJECT TOPIC	IoT Indoor Airborne Particle & Temperature Tracker		
4. ABSTRACT	Indoor air quality is a major factor influencing human health, particularly for individuals suffering from respiratory conditions such as asthma, allergies, and chronic obstructive pulmonary disease (COPD). This project, IoT Indoor Airborne Particle & Temperature Tracker, is designed to provide a real-time, low-cost solution for monitoring indoor air conditions. The system employs a PM2.5 Dust Sensor as the primary sensor to accurately detect fine particulate matter, which is one of the most harmful pollutants for respiratory health. In addition, a TVOC sensor is integrated to monitor the presence of volatile organic compounds that contribute to poor indoor air quality. A BME280 sensor serves as a secondary module to measure temperature, humidity, and atmospheric pressure, providing valuable environmental context. An ESP32 microcontroller collects and processes sensor data, transmitting it wirelessly to a cloud-based platform for visualization, historical analysis, and real-time alerts. Users can track pollutant levels, receive notifications when thresholds are exceeded, and take proactive measures to improve indoor environments. This project combines IoT technology, environmental sensing, and cloud connectivity to deliver a practical tool for maintaining healthy indoor spaces, making it especially beneficial for sensitive groups such as children, elderly individuals, and patients with respiratory issues.		
5. GUIDE	Mr. Binumon Joseph, Assistant Professor, Department of Computer Applications, Amal Jyothi College of Engineering Autonomous		

6. REQUIREMENTS & COST

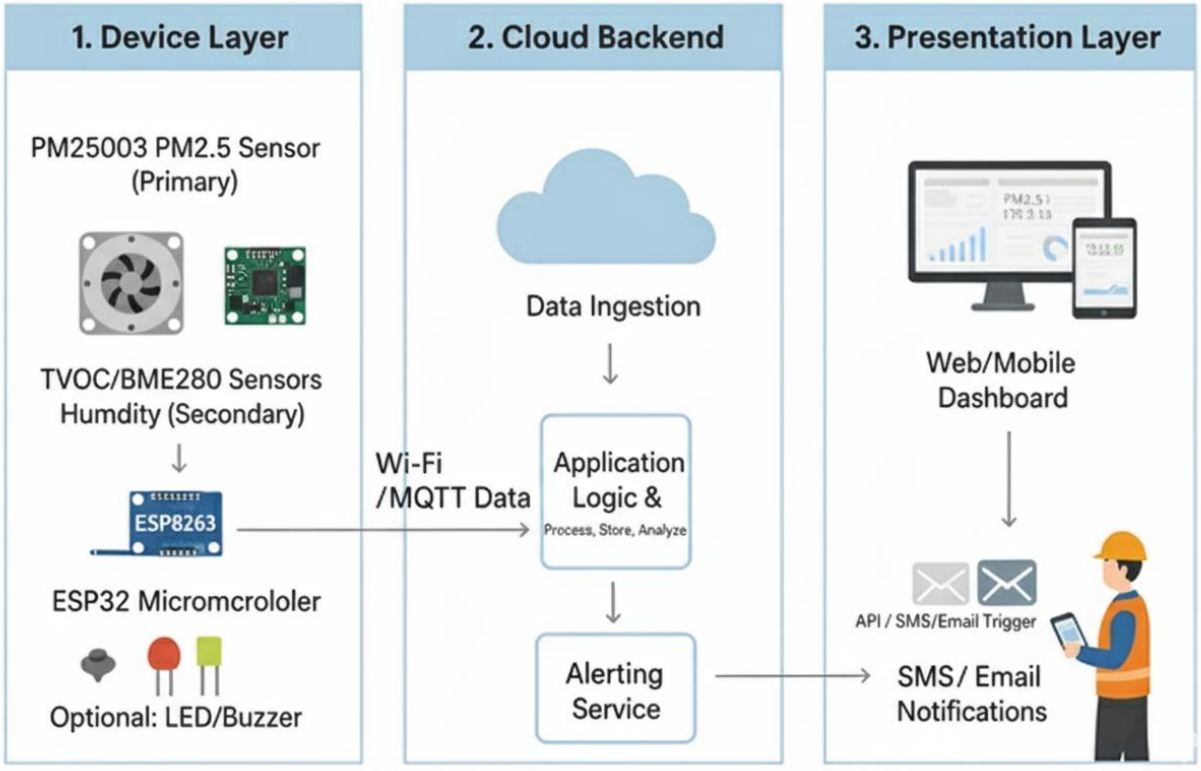
Area	Requirements	Cost	Units	Total
IoT Sensors / Modules	ESP32	345.00	1	345.00
	PM2.5	430.00	1	430.00
	BME280	350.00	1	350.00
	VOC	360.00	1	360.00
	Breadboard, Jumper wires, LED or Buzzer	250.00		250.00
Others				
	Cloud Setup & Configuration	500.00	1	500.00
	Container Setup & Configuration	200.00	1	200.00
Total Cost				2435

7. APPLICATIONS / USE CASES	Healthcare & Patient Support:- Continuous monitoring of indoor air quality for individuals with asthma, allergies, COPD, or other respiratory conditions. Sends real-time alerts when PM2.5 or TVOC levels exceed safe limits, helping prevent health complications.

	Smart Homes & Indoor Comfort:- Integrates with air purifiers, HVAC, or ventilation systems to automatically improve indoor air quality. Ensures a comfortable and safe environment by maintaining optimal temperature, humidity, and low pollutants. Workplaces & Offices:- Monitors air quality to reduce sick building syndrome and improve employee productivity. Detects poor air conditions in meeting rooms, labs, or workstations. Schools & Educational Institutions:- Protects children, who are more sensitive to pollutants, by monitoring classrooms and indoor spaces. Helps administrators maintain safe indoor environments for students and staff. Public Spaces & Healthcare Facilities:- Hospitals, clinics, and elderly care homes can ensure safe air quality in wards and common areas. Useful in respiratory wards and ICUs where air quality directly affects patient recovery. Research & Environmental Data Collection:- Collects historical data on PM2.5, VOC, temperature, and humidity. Useful for researchers and environmental studies to analyze trends and develop preventive measures. Personal Preventive Health Device:- Individuals can track their home or workplace air quality in real-time. Alerts help in taking preventive actions, such as ventilating rooms or using air purifiers.
8. EXECUTION PLAN	• Gather Components:- PM2.5 Dust Sensor (Primary) TVOC Sensor (Secondary) BME280 Sensor (Secondary) ESP32 Microcontroller Power supply (USB/5V adapter) Optional: LED/buzzer for alerts • Connect Sensors to ESP32:- PM2.5 → analog or digital pin TVOC → I^2C (SDA, SCL) BME280 → I^2C (SDA, SCL) • Program ESP32:- Read data from all sensors Process readings to detect unsafe air quality levels Send data to cloud dashboard (Blynk, ThingSpeak, Firebase) • Set Up Dashboard & Notifications:- Visualize PM2.5, TVOC, temperature, and humidity Configure alerts for unsafe levels via mobile or LED/buzzer • Test & Calibrate:- Verify sensor readings Adjust thresholds for alerts

	• Deploy System:- Place sensors in indoor space Monitor air quality in real time and take preventive action
9. EXPECTED OUTCOMES	Real-Time Monitoring:- PM2.5 levels, TVOC, temperature, and humidity are measured continuously. Cloud Dashboard Display:- Data is shown in real time on a mobile or PC dashboard with graphs. Alerts:- LED/buzzer or mobile notifications trigger when air quality is unsafe. Data Logging:- Historical data is stored for trend analysis and preventive actions.

10. PROJECT DESIGN



11. MILESTONES

TARGET	DATE	NOTES / STATUS	SIGNATURE
PROJECT TOPIC ENTRY	15-09-2025		
APPROVAL BY GUIDE	18-09-2025		
APPROVAL BY PANEL	22-09-2025		
ORDER PREPARATION	24-09-2025		
CLOUD SETUP & CONFIGURATION	26-09-2025		

	CONTAINER SETUP & CONFIGURATION	30-09-2025		
	IMPLEMENTATION & REVIEW - 1 BY GUIDE	06-10-2025		
	REVIEW - 2 BY GUIDE	08-10-2025		

10. ASSESSMENT BY SUBJECT CO-ORDINATORS					
SUBJECT	**COORDINATOR**	**ARES OF ASSESSMENT**	**MAX SCORE**	**AWARDED SCORE**	**SIGNATURE**
24MCAT213 INTERNET OF THINGS	Ms. Meera Rose Mathew Assistant Professor, CA	IoT Implementation, Sensor Data Dashboard	50		
24MCAT231 CLOUD COMPUTING	Mr. Binumon Joseph Assistant Professor, CA	Cloud Setup, Openstack Installation	50		
24MCAT203 VIRTUALIZATION & CONTAINERS	Mr. Amal K Jose Assistant Professor, CA	Container Configuration, Environment Setup	50		