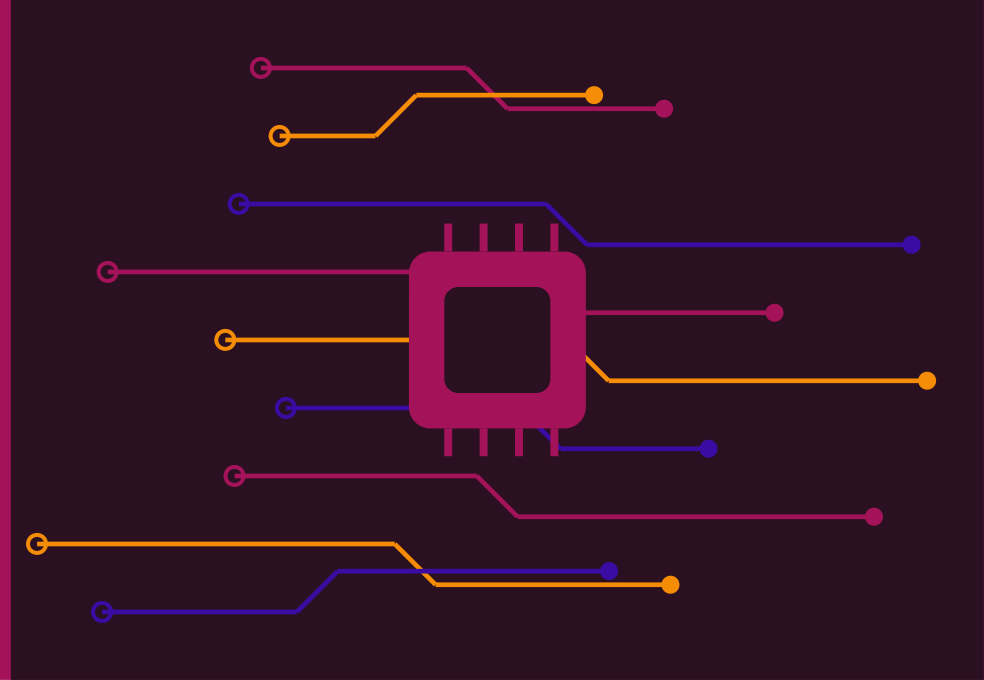


FINAL YEAR PROJECT · B.TECH ENVIRONMENTAL ENGINEERING

Air Quality Monitoring Network



Low-cost sensors mapping pollution across a campus

Aarav Sharma · Diya Patel · Prof. R. K. Mehta · Environmental Engineering, 2025–26

Agenda

01

Introduction

02

Literature & Gap

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04

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Conclusion

KEY IDEA

Air quality can change block by block, but most cities have only a few monitors.

Why this project matters

Problem statement



Sparse data

One station may cover a whole district.



High cost

Reference monitors cost lakhs of rupees each.



Low awareness

People rarely see local, live readings.

Objectives

- Build nodes measuring PM2.5, PM10, CO₂ and humidity
- Calibrate against a reference instrument
- Publish a live campus air-quality map
- Send alerts when levels cross safe limits



Image

Literature survey

Study	Approach	Limitation
Kim et al.	Low-cost PM sensors	Drift without calibration
City AQ networks	Dense sensor grids	Proprietary platforms
Patel & Joshi	LoRa-based nodes	Small pilot only

Representative summaries — replace with your own citations.

System architecture

1 Measure

PMS5003 and CO₂ sensors in each node

2 Transmit

LoRa sends readings to a gateway

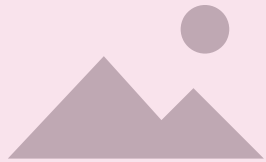
3 Calibrate

Correction model on the server

4 Visualise

Live map and alerts

Block diagram



Block diagram / flowchart

Every module talks through one simple, testable interface.

Solar-powered nodes send readings over LoRa to a gateway, which forwards them to a time-series database. A calibration model corrects drift before the map is updated.

Technology stack



ESP32 + LoRa

Node controller and
radio



PMS5003

Particulate matter
sensor



InfluxDB

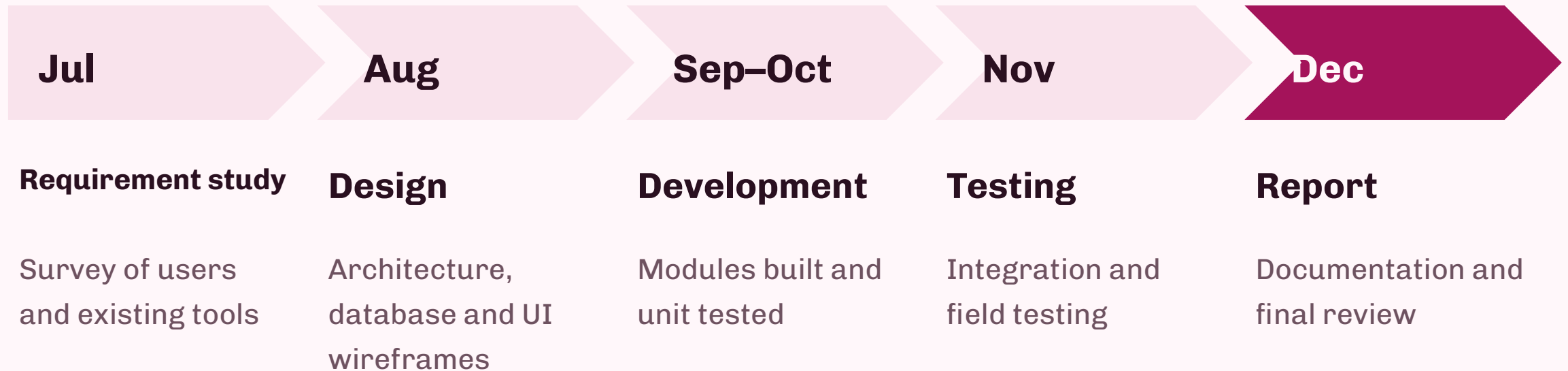
Time-series storage



Leaflet

Interactive map

Project timeline



Implementation snapshots



Image 1

Sensor node

Weatherproof enclosure with solar panel



Image 2

Gateway

Rooftop LoRa receiver

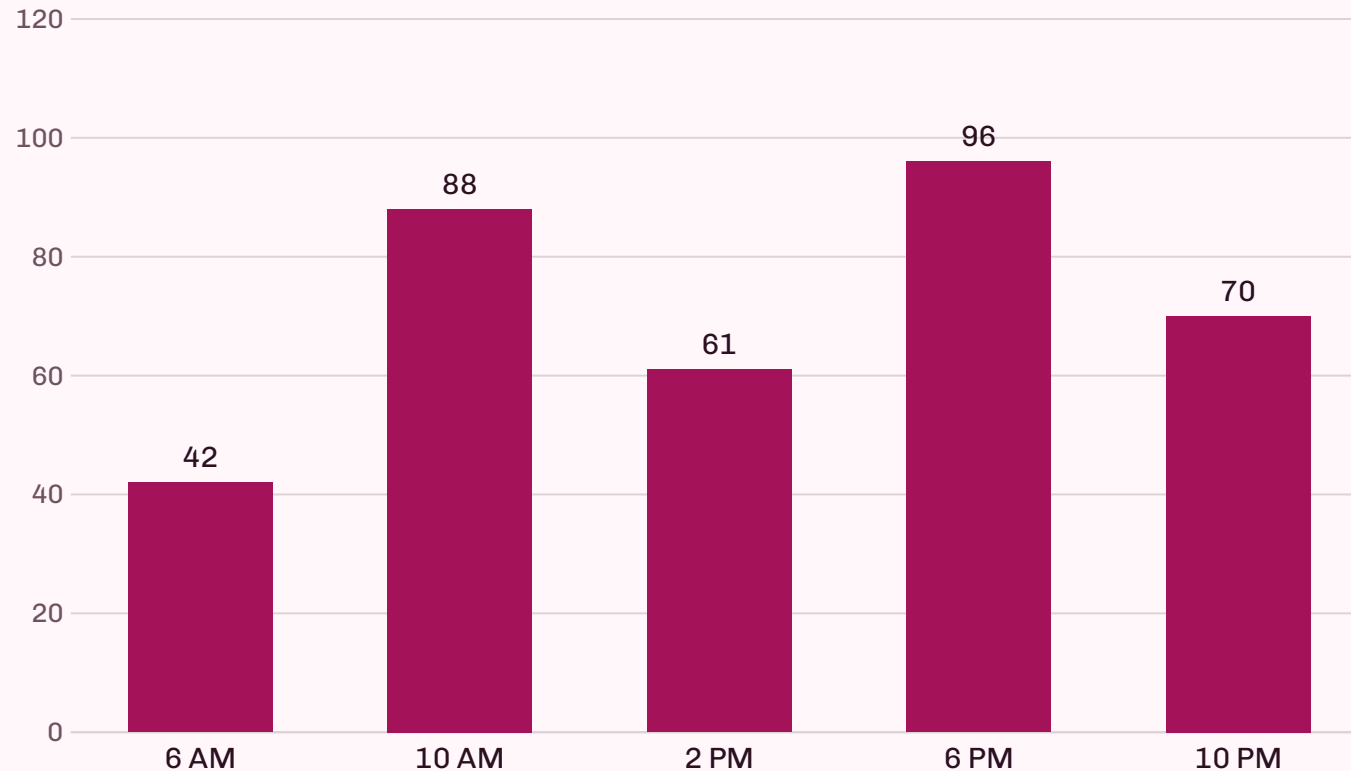


Image 3

Live map

Colour-coded AQI by location

Results



Sample data for illustration — replace with your own figures.

0.91

correlation with the reference monitor

Readings peak with morning and evening traffic, matching the reference station trend.

Key outcomes

12

nodes deployed

0.91

correlation after
calibration

1 min

update interval

Figures from our test setup (sample data).

Conclusion

- Low-cost nodes give useful, local air-quality data
- Calibration is essential for accuracy
- A live map raises awareness quickly



Image

Future scope



City scale

Expand to nearby wards



Forecasting

Predict next-day AQI



Health alerts

Notify sensitive groups

Thank you

Questions and suggestions are welcome.

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