

# Environmental Data Sensing and Monitoring System Using Community-based Private LoRa Network



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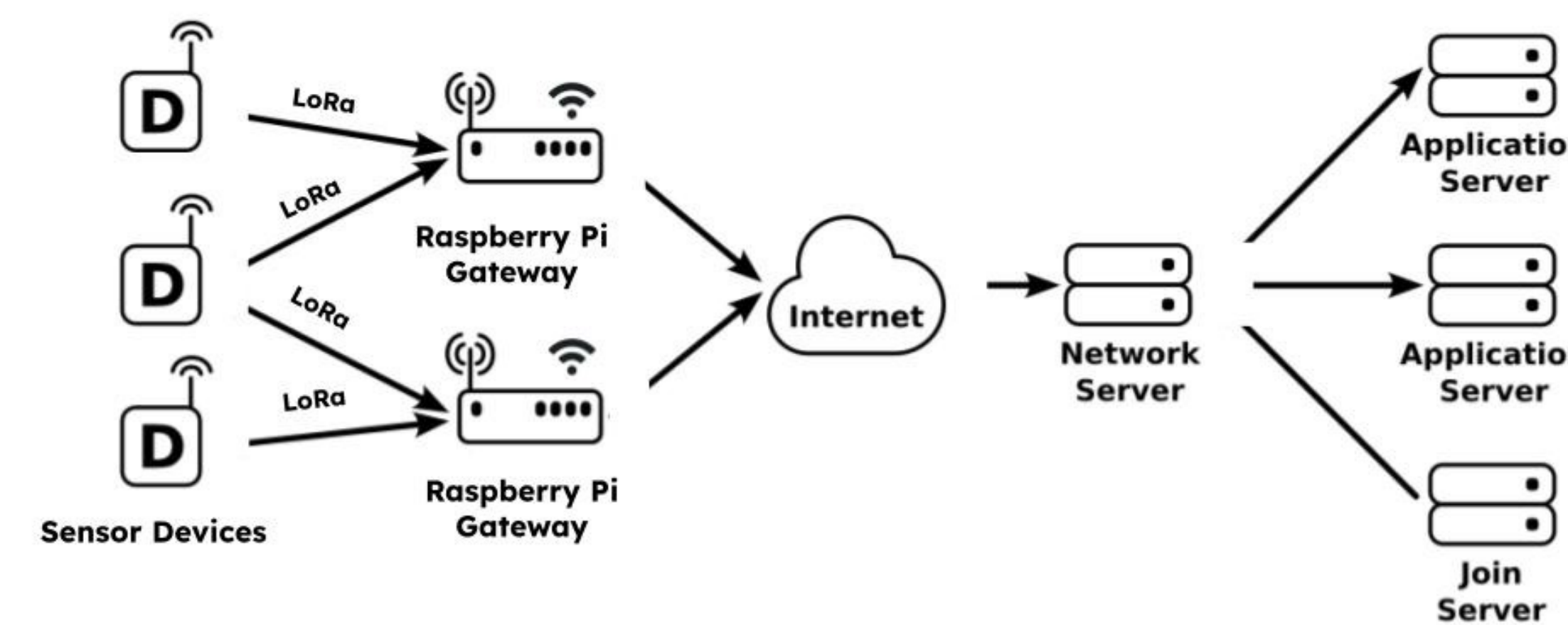


## BACKGROUND

**Environmental Data Sensing and Monitoring System:** A network of sensors tracking temperature, humidity, altitude, air quality, UV, and rainfall.

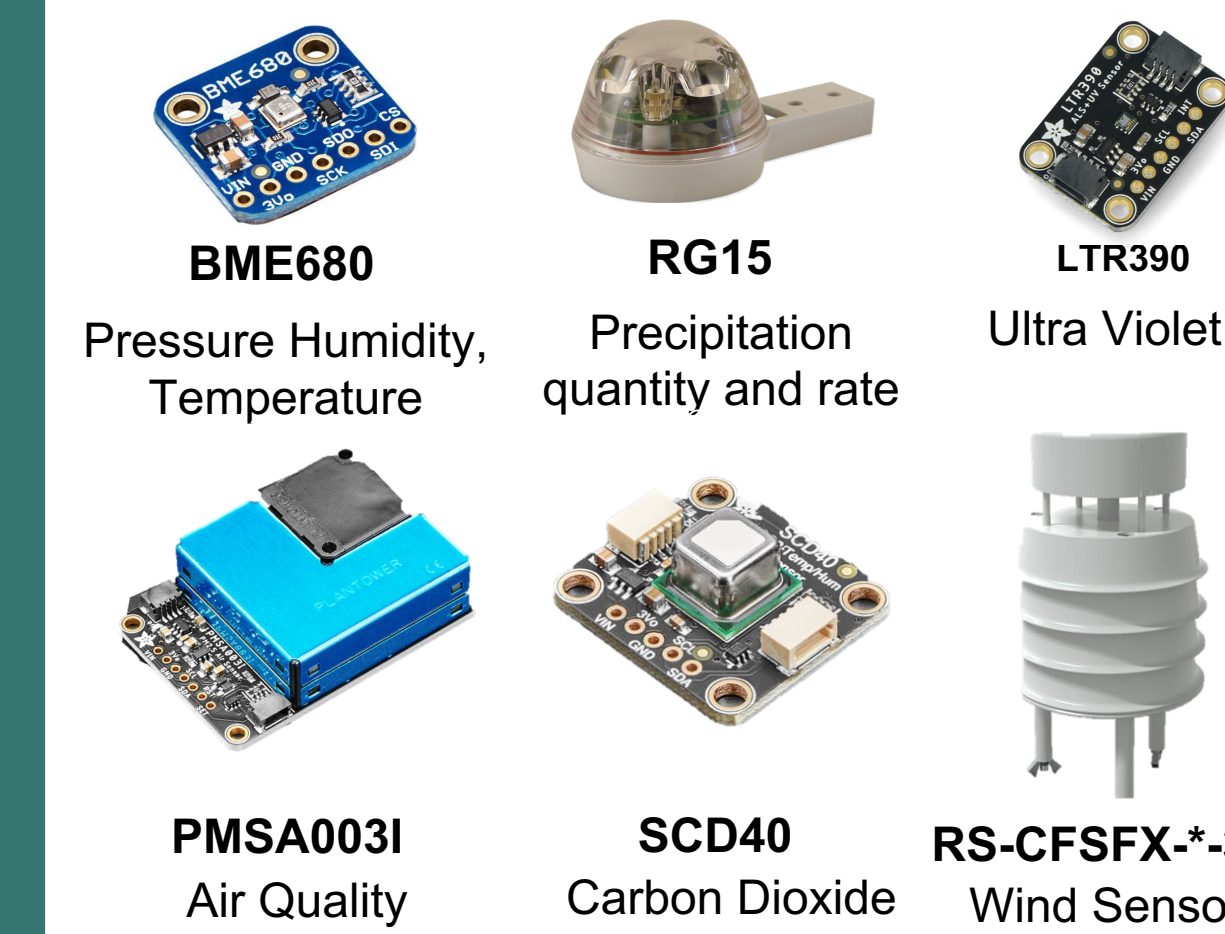
- Methodology: Sensor devices → Raspberry Pi gateways → Network server → Application servers, with a Join server for secure communication.
- Data collected: Temperature, humidity, altitude, air quality, UV levels, and rainfall.
- Use Cases: Real-time alerts, environmental monitoring, agricultural optimization, and urban planning, pollution and climate change tracking.

## METHODS



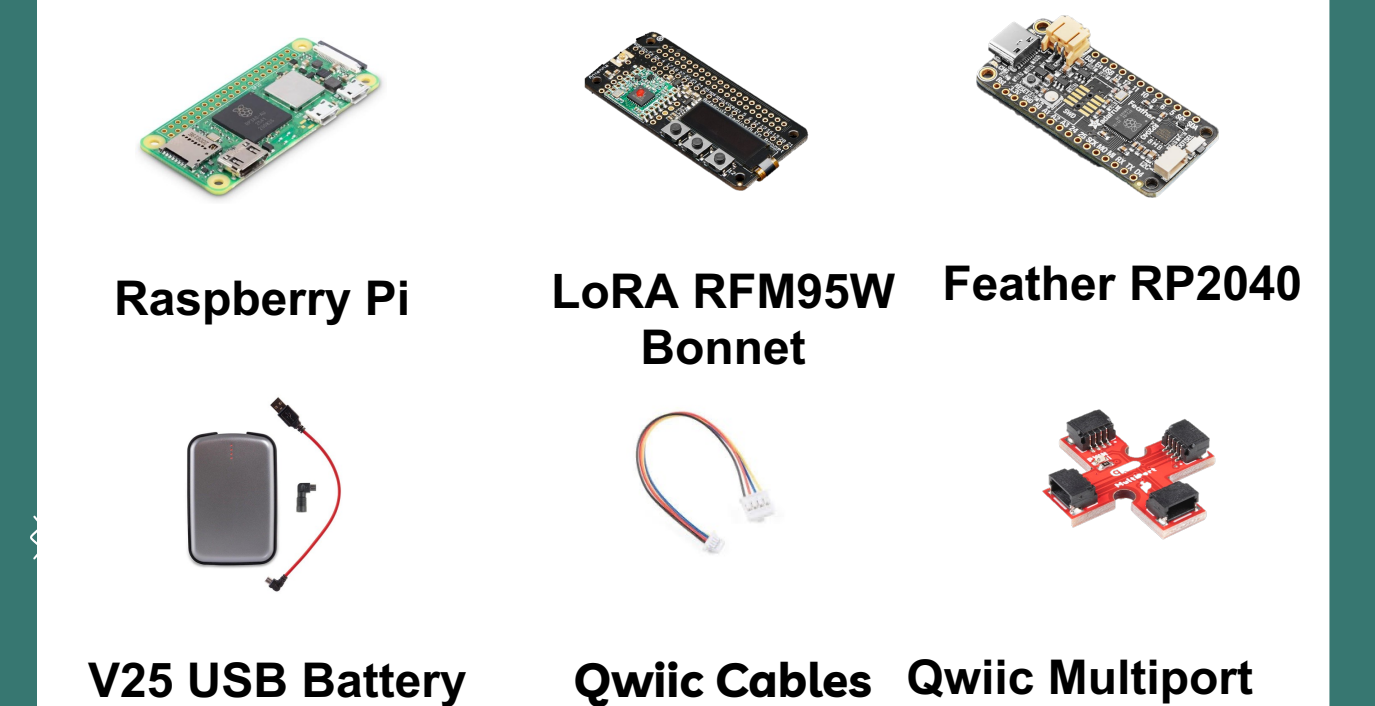
Data transmitted via a community-maintained private LoRa network, using custom Raspberry Pi gateways to forward data to central servers for further processing and analysis.

## Hardware

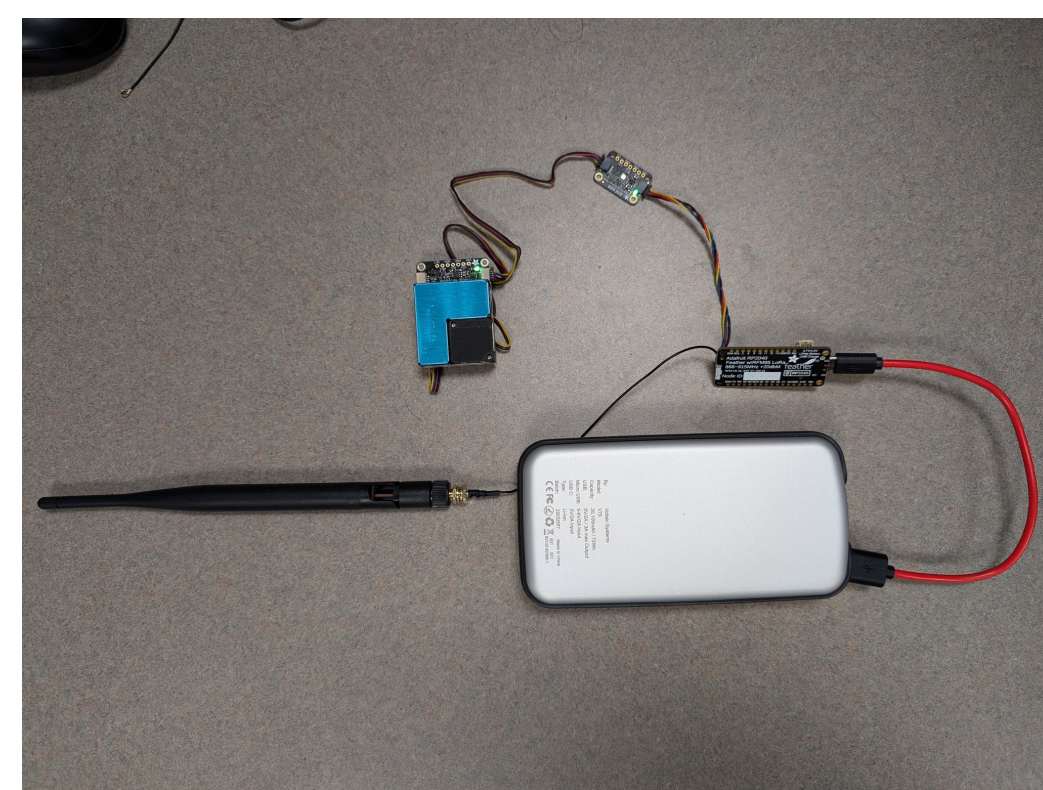


Configurable without any soldering and breadboarding

Modular Sensing Station: consisting of multiple 'nodes' that run as a single transmitting client.



## Software & Setup



Sensor Setup



Raspberry Gateway Setup

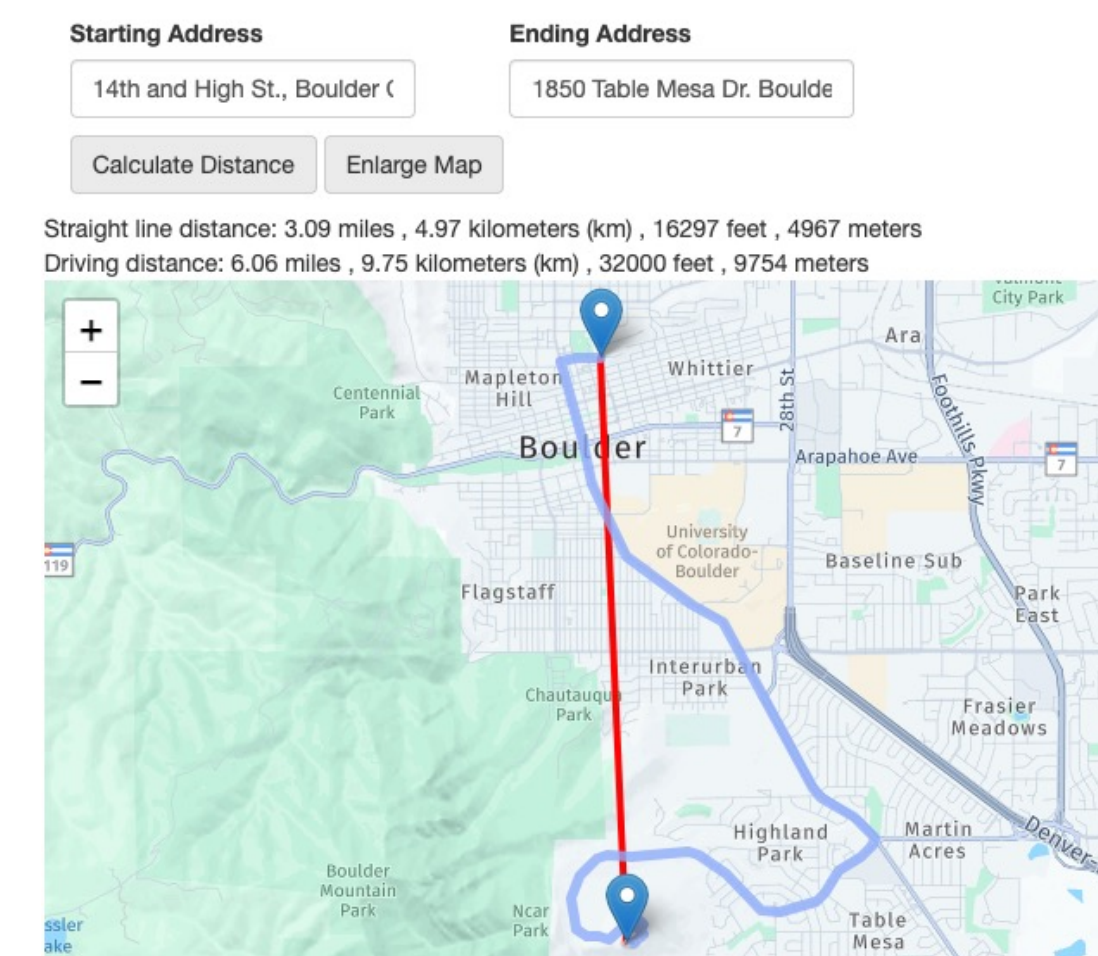


Software



GitHub Repo

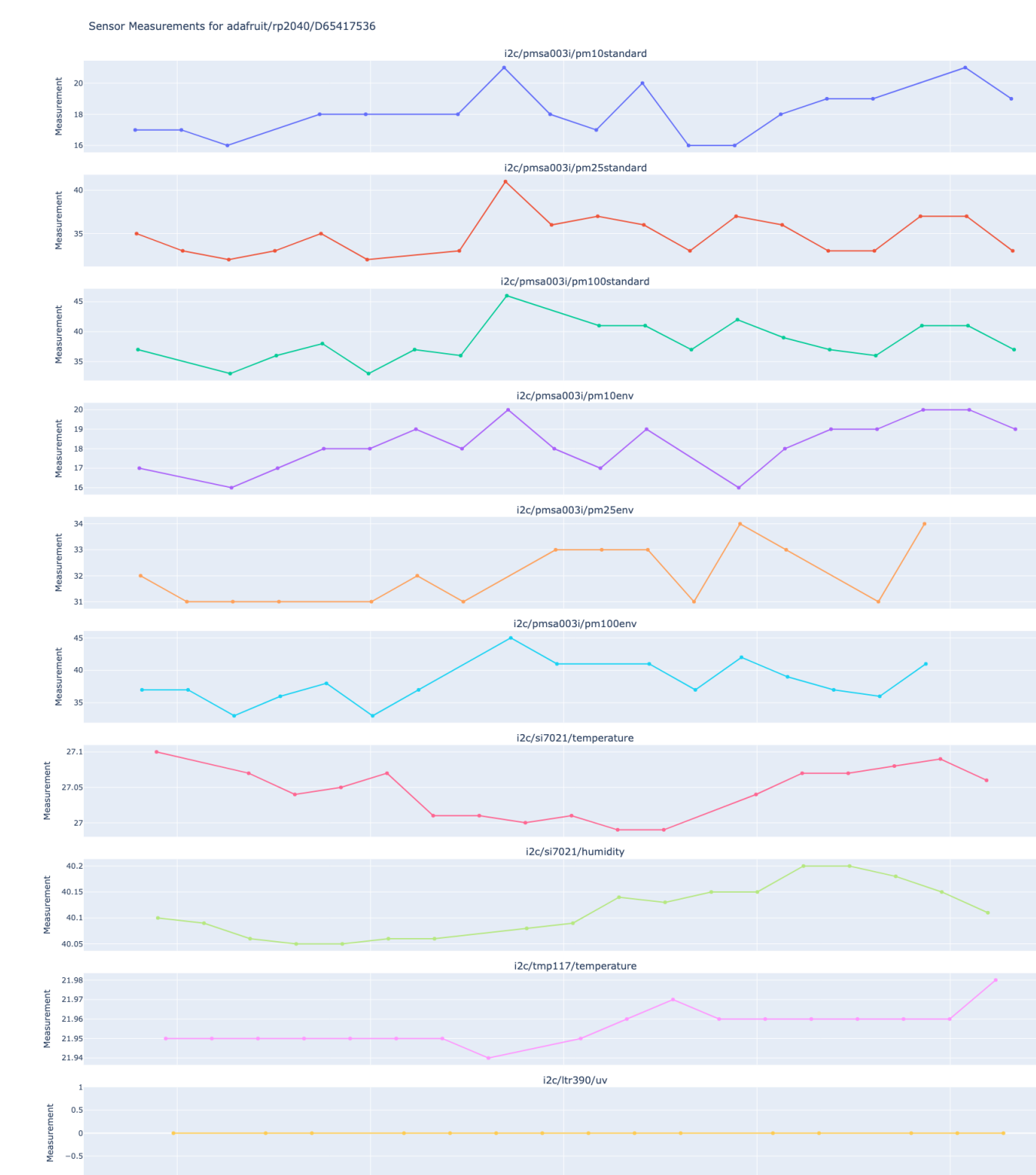
## RESULTS



Range Testing Results



Live Dashboard Portal



Sensor Data

## Future Work

- Free and open anemometry solutions
- Reduced LoRa deployment costs
- Enable edge computing and AI-ready weather modeling

## Conclusion

We devised a decentralized IoT weather monitoring system leveraging LoRa-enabled sensors and Raspberry Pi gateways, which enables real-time alerts, and informed decision-making for environmental sustainability, agriculture, and urban planning.

## ACKNOWLEDGMENTS

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