NOISE POLLUTION MONITORING

GOVERNMENT COLLEGE OF ENGINEERING ERODE

B.E Electronics and Communication Engineering

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Phase 1:

Problem Definition And Design Thinking

Project definition:

The project involves deploying IOT sensors to measure noise pollution in public areas and providing real time noise level data accessible to the public through a platform or mobile app. The primary objective is to raise awareness about noise pollution and enable informed decision-making. This project includes defining objectives, designing the IOT sensor system, developing the noise pollution information platform and integrating them using technology and python.

Designing Approach

Hardware Approach:

Components required:

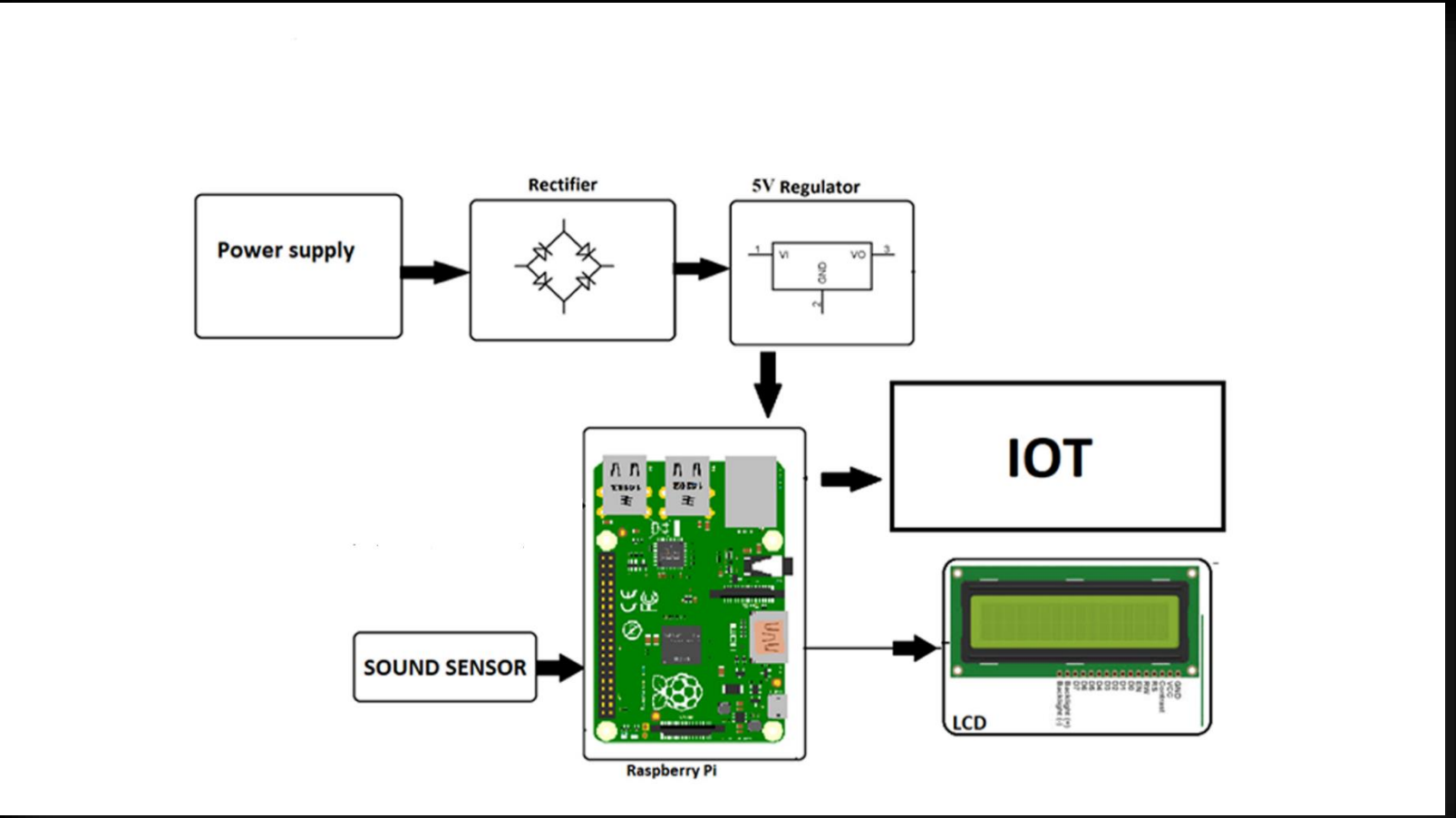
- Arduino
- Sound sensor
- Open log
- Groove OLED Display
- Electric lump
- Power from 5V DC to DC setup- 2xAA

Software Approach:

Software applications can be used for simulation:

- Cayenne
- Tinker cad
- Arduino IDE
- MQTT
- ThingSpeak

Block Diagram



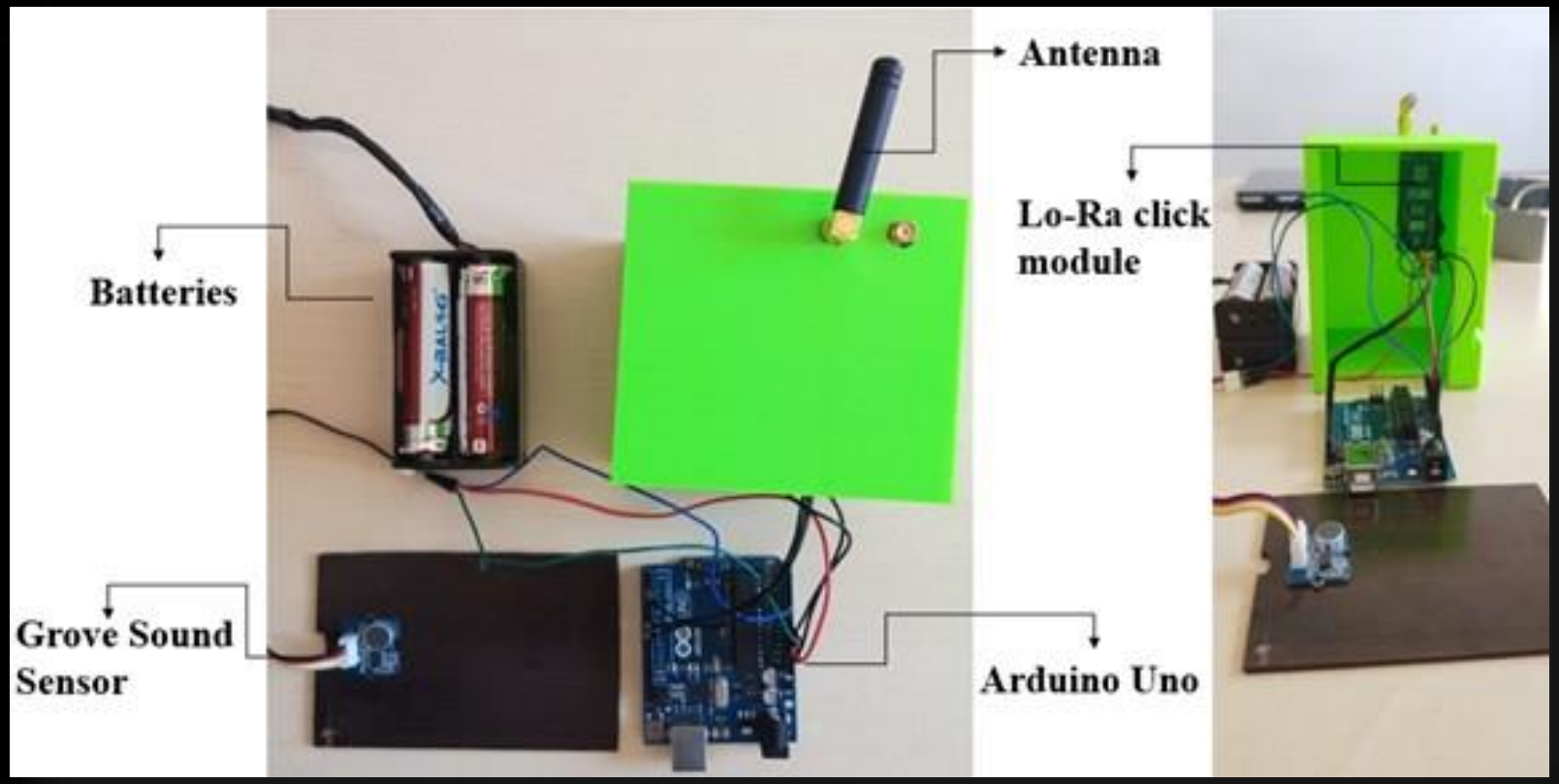
Objectives

- IoT sensors can be designed to operate efficiently, conserving energy and prolonging the lifespan of batteries or power sources.
- IoT-based noise monitoring systems can engage the community by allowing residents to access noise data and report noise issues through dedicated apps or websites.
- Data collected through IoT-based monitoring can inform the development of noise regulations, zoning decisions, and urban planning to mitigate noise pollution effectively.
- IoT-based monitoring can assess the impact of noise pollution on local ecosystems and wildlife, aiding in conservation efforts.

IoT Sensor Design:

- Deploy IoT sensors equipped with microphones and sound level meters in various locations where noise pollution is a concern. These sensors can continuously measure noise levels and send data to a central database or cloud platform.
- IoT sensors collect noise data, including sound intensity (in decibels), frequency, and duration of noise events. The data is time-stamped and geo-tagged to identify where and when noise events occur.
- IoT sensors typically use wireless communication protocols such as Wi-Fi, cellular, or LoRa WAN to transmit data to a central server or cloud-based platform. This enables real-time data collection and analysis.

Elements of the sensor node

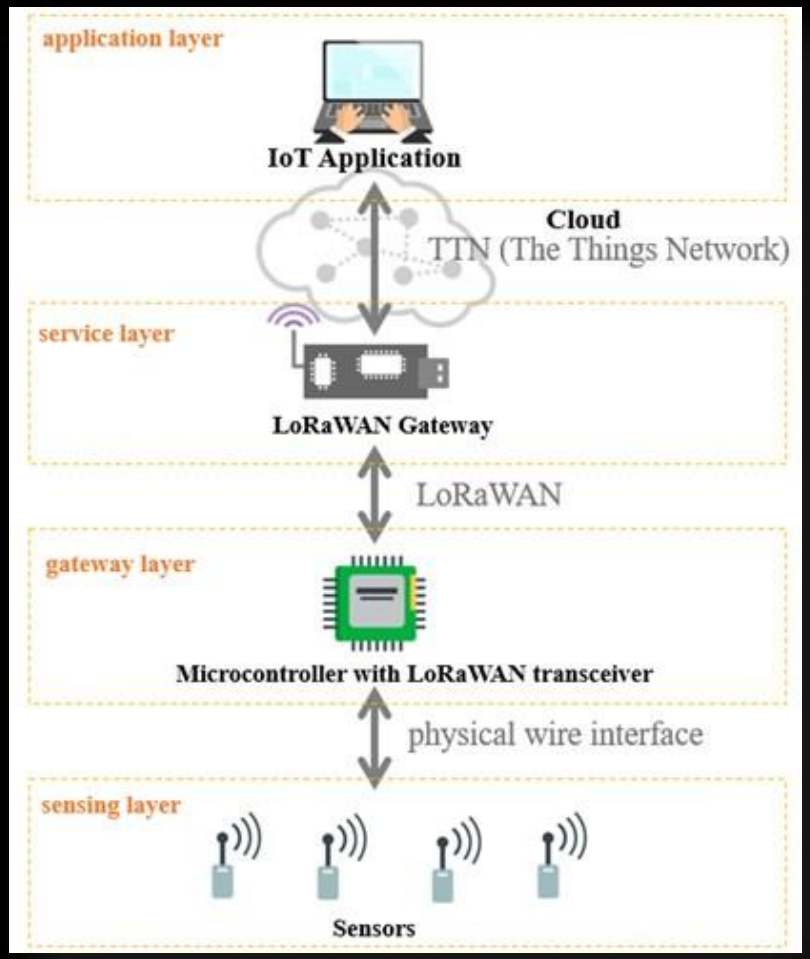


Noise pollution information platform

- A web-based platform and mobile app will be designed to monitor the noise level in a locality which can be accessed by the public.
- The app will display the data taken from the sound sensor.
- The app will have various features which includes reading of sound levels in dBA, the level of warning based on the reading of sound intensity.
- There will be different level of warnings which are “low”, “normal”, “high” and “very high”.

Integration Approach

- First layer is the sensing layer which consists of noise sensor (microphone) for receiving the noise level information and the microcontroller.
- Second is the gateway layer that is a local gateway device which is responsible for authentication of sensor nodes and transmission of encrypted data.
- The service layer as third, consists of a cloud server and data storage.
- The application layer provides the interface to the system. End users can monitor the obtained results and control the system on the user interface.



Conclusion

- A low-budget smart sensor unit for environmental noise level measurement is designed using IoT which consist of a microphone, Arduino Uno microcontroller, Lo-Ra click module and antenna for connection and cloud storage to the global TTN platform.
- In general, can be concluded that the system has shown good performance in terms of sustainability, acquisition, transmission and representation of the measured values for the noise level.