LOW COST AIR MONITORING

Dr. Shamsundar Kulkarni[1], Aditi Sitaphale[2], Hanmabai Chintale[3], Aditya Rupnar[4]

[1] *Head Of Department, Electronics and Telecommunications, Padmabhooshan Vasantdada Patil Institute of Technology , Maharashtra, India*
[2]*Student, Electronics and Telecommunications, Padmabhooshan Vasantdada Patil Institute of Technology , Maharashtra, India*
[3] *Student, Electronics and Telecommunications, Padmabhooshan Vasantdada Patil Institute of Technology , Maharashtra, India*
[4] *Student, Electronics and Telecommunications, Padmabhooshan Vasantdada Patil Institute of Technology , Maharashtra, India*

ABSTRACT

In this article, challenges and undesirable factors which affect performance of air monitoring system are discussed. The contributions of recent works and different methodologies are described in this paper. In the proposed method region of interest are extracted by using connected component and signs are successfully classified using AQI Algorithm.

Keyword : - *Air Monitoring System, AQI, IoT,Electronics, Circuit, Microcontroller, Telegram Bot, Bot*

1. INTRODUCTION:

In recent years, the escalating concerns surrounding air quality have prompted a growing need for effective air monitoring systems. As urbanization and industrialization progress, the impact on air quality becomes increasingly significant, leading to adverse effects on public health and the environment.Recognizing the urgency of this issue, there is a pressing demand for affordable and accessible air monitoring solutions.This introduction sets the stage for the design and development of a low-cost air monitoring system, a crucial endeavor aimed at democratizing access to real-time air quality data. Traditional air monitoring systems are often expensive, limiting their widespread deployment and accessibility, particularly in resource-constrained regions.

1.1 Technical Challenges

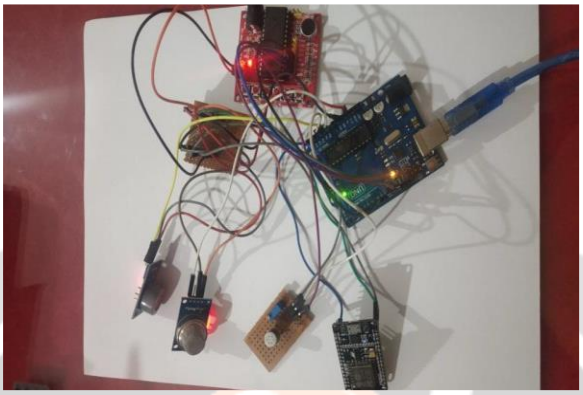
Developing a low-cost air monitoring system presents several technical challenges, including ensuring accurate sensor calibration despite the use of lower-cost components. Environmental factors like temperature and humidity must also be considered to maintain data reliability. Additionally, the system must efficiently process large datasets in real time, requiring strong computational power and sophisticated error-handling algorithms. Power management is another major challenge, demanding innovative solutions such as solar power integration and low-power operation to maximize battery life and minimize maintenance.

1.2 Design and Development

Designing a compact, portable, and rugged low-cost air monitoring system is crucial for easy deployment across various environments. It requires smart component selection, innovative manufacturing methods like modular designs or 3D printing, and rigorous testing. A user-friendly interface, whether through a mobile app, web dashboard, or voice assistant, is vital to make air quality data easily understandable. Additionally, careful cost optimization ensures the system remains affordable and accessible to a broad range of users.

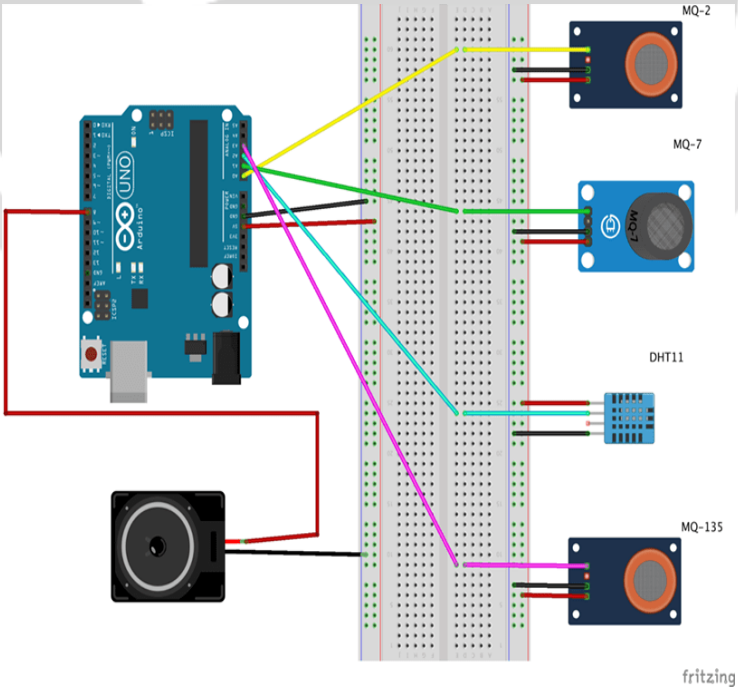
2. SYSTEM DESIGN

The design process for a low-cost air monitoring system involves selecting suitable sensors, designing a system architecture, implementing data acquisition and transmission methods, developing data processing algorithms, and validating the system for accuracy. Additionally, community engagement and deployment strategies are essential for effective implementation.



2.1 Hardware Design

The hardware design of the Low-Cost Air Monitoring System revolves around a microcontroller unit (MCU) that reads data from various low-cost, high-accuracy sensors measuring air quality parameters like PM2.5, NO_2, O_3, and CO. The MCU processes and transmits this data to the cloud or a local server for analysis. To ensure efficiency, the system includes a power management module for optimized energy use and extended battery life, all housed in a compact, rugged enclosure for protection against harsh environments.



2.2 . Software Design

The software design of the Low-Cost Air Monitoring System follows a modular architecture, ensuring flexibility, scalability, and easy maintenance. It uses a real-time operating system (RTOS) to reliably manage sensor

data collection, processing, and transmission to the cloud or a local server. Developed in high-level languages like C or Python, the system features a data analytics module for trend analysis and a user-friendly interface for real-time monitoring, configuration, and alert notifications.

4. CONCLUSIONS

Low-Cost Air Monitoring System offers an affordable, scalable, and reliable solution to address air quality challenges. Through innovative hardware and software design, the system ensures real-time data collection, efficient data processing, and user-friendly visualization. By integrating IoT and smart communication techniques, it empowers communities and policymakers with actionable insights. With ongoing advancements in AI and miniaturization, the future of air monitoring holds great promise for achieving cleaner and healthier environments worldwide.

5. ACKNOWLEDGEMENT

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