NOISE POLLUTION MONITORING

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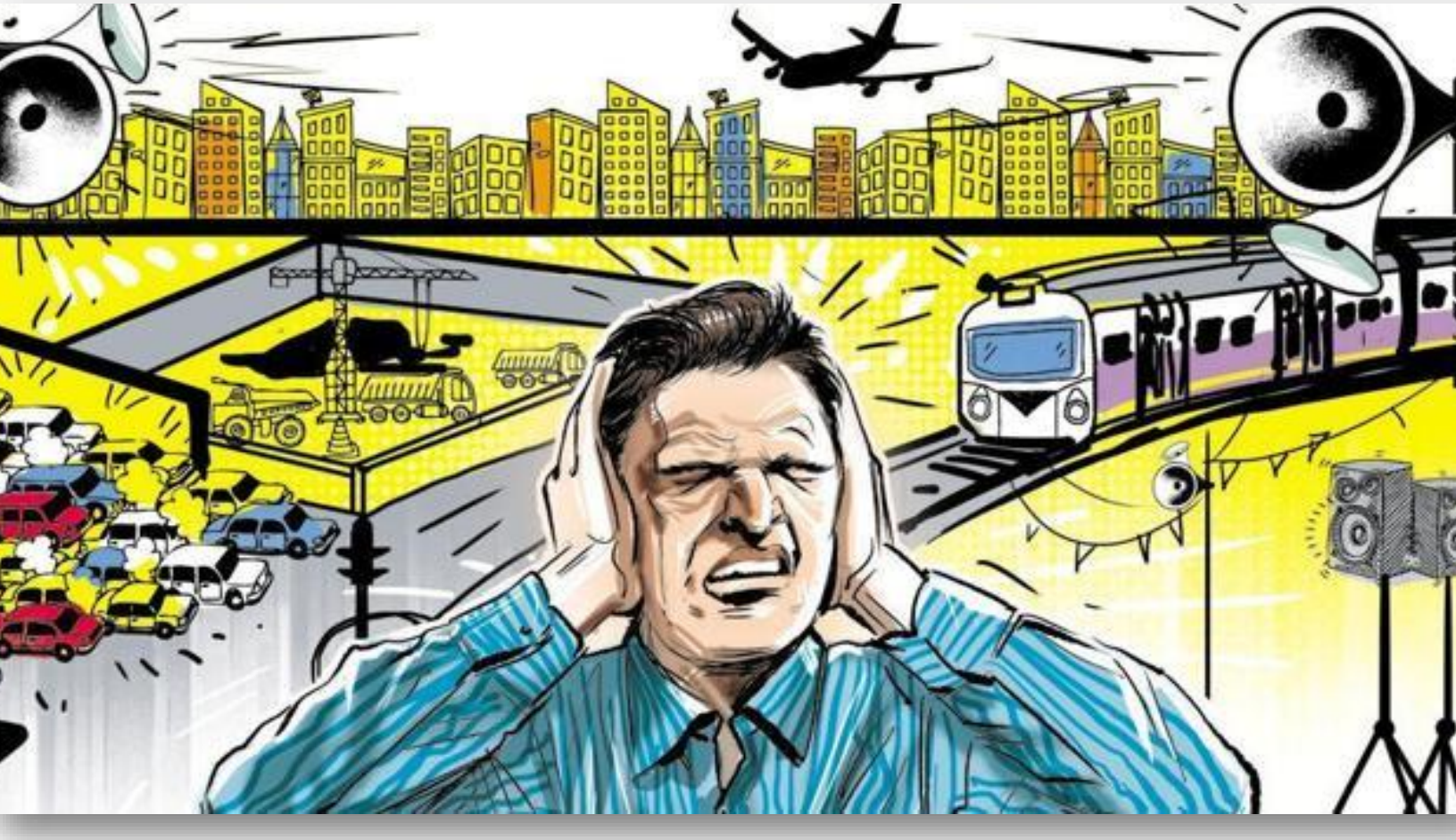
PHASE -1 Documentation Submission

Project : ***Noise Pollution Monitoring***



PROJECT DEFINITION

Sound pollution is a growing issue these days. It is necessary to monitor air quality and keep it under control for a better future and healthy living for all. Here we propose an air quality as well as sound pollution monitoring system that allows us to monitor and check live air quality as well as sound pollution in particular areas through IOT. System uses air sensors to sense presence of harmful gases/compounds in the air and constantly transmit this data to microcontroller. Also system keeps measuring sound level and reports it to the online server over IOT. The sensors interact with microcontroller which processes this data and transmits it over internet. This allows authorities to monitor air pollution in different areas and take action against it. Also authorities can keep a watch on the noise pollution near schools, hospitals and no honking areas, and if system detects air quality and noise issues it alerts authorities so they can take measures to control the issue. Some future consumer applications envisioned for IoT sound like science fiction, but some of the more practical and realistic sounding possibilities for the technology include: Receiving warnings on your phone or wearable device when IoT networks detect some physical danger is detected nearby. Self-parking automobiles. Automatic ordering of groceries and other home. Automatic tracking of exercise habits and other day-to-day personal activity including goal tracking and regular progress reports.Network Devices and the Internet of Things All kinds of ordinary household gadgets can be modified to working an IoT system. Wi-Fi network adapters, motion sensors, cameras, microphones and other instrumentation can be embedded in these devices to enable them for work in the Internet of Things. Home automation systems already implement primitive versions of this concept for things like light bulbs, plus other devices like wireless scales and wireless blood pressure monitors that each represent early examples of IoT gadgets.

OBJECTIVE

The pollution of sound is increasing abruptly. To bring it under control its monitoring is majorly recommended. To overcome this issue, we are introducing a system through which the level of sound and the existence of the harmful gases in the surroundings can be detected. The growing pollution at such an alarming rate has started creating trouble for the living beings, may it be high decibels or toxic gases present in the environment leaves a harmful effect on human’s health and thus needs a special attention. This monitored data can be obtained from remote location without actually visiting it due to the access of internet. The framework of

this monitoring system is based on combination or collaboration of affective distributed sensing units and information system for data composition. The role of IoT is the new concept used in air and sound pollution measurement, which allows data access from remote locations.

METHODOLOGY

[1]. IOT based and Sound Pollution Monitoring System.It uses Sound level, Gases, IOT, Sensor. System uses air sensors to sense presence of harmful gases/compounds in the air and constantly transmit this data. Also, system keeps measuring sound level and reports it. It shows the digital value of air and sound pollution and user can analyze it with a graph. It supports the new technology and effectively supports the healthy life concept.

[2]. Sound Pollution Monitoring System using IoT.Is a real-time monitoring system for the monitoring of concentration of air pollution and sound pollution in the environment. For this purpose, a hardware system is designed to detect the carbon monoxide, carbon dioxide and smoke concentration. The output of the system obtained from the sensor and processor collaboration is in digital form. A network using Wi-Fi technology can transmit the information of sensor modules to the another location. The proposed system is supposed to measure the pollution levels of various places or sites.

[3]. Implementation of an Efficient Noise Pollution Monitoring System Using Internet of Things (IoT).System includes Internet of Things (IoT); Embedded Computing System; Arduino UNO; MATLAB Software; Smart Environment.Here the sensing devices are connected to the embedded computing system to monitor the fluctuation of parameters like noise and air pollution levels from their normal levels. This model is adaptable and distributive for any infrastructural environment that needs continuous monitoring, controlling and behavior analysis. The working performance of the proposed model is evaluated using prototype implementation, consisting of Arduino UNO board, sensor devices and MATLAB with Arduino hardware support package. The implementation is tested for two or three parameters like noise, CO and radiation levels with respect to the normal behavior levels or given specifications which provide a control over the pollution monitoring to make the environment smart.

[4]. A smart environment monitoring system using Internet Of Things. This is a community-led air quality sensing network that allows anyone to collect very high resolution readings of NO2 and CO concentrations outside of their home.1T 1TSensor networks are also being deployed in tunnels to monitor air flow, visibility, and a range of gases (CO, CO2, NO2, O2, SH2 and PM-10).1T 1TOther

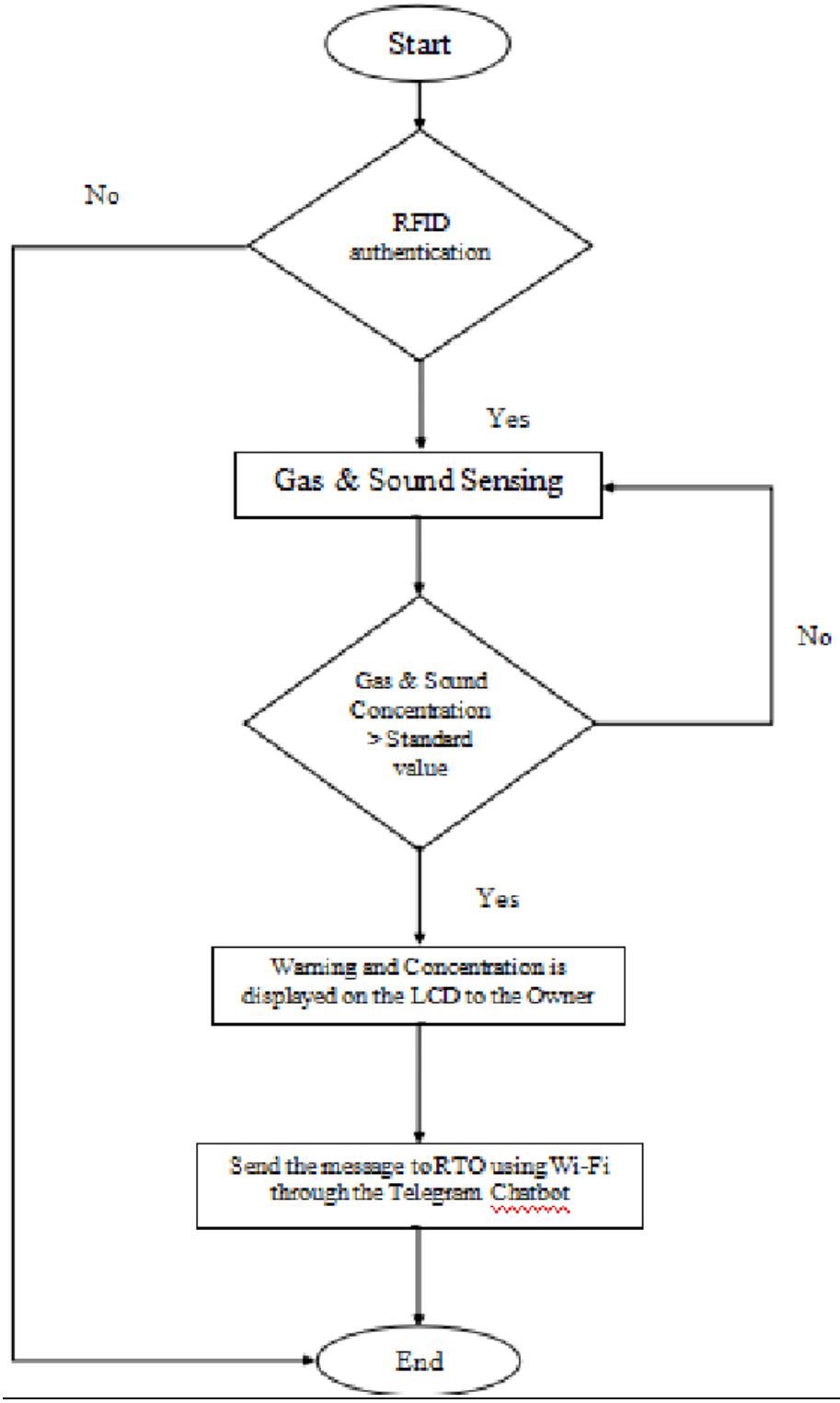
sensor networks measure temperature, humidity and similar parameters on highways to qualify them as ‘smart roads’.Due to the vast technological developments in the field of wireless communication technology it has led to the emergence of many Pollution monitoring sensors and wireless networks for monitoring and reporting pollution.

[5]. An IoT Based Automated Noise and Air Pollution Monitoring System. Proposed an air quality as well as sound pollution monitoring system that allows us to monitor and check live air quality as well as sound pollution in a particular areas through IOT. System uses air sensors to sense presence of harmful gases/compounds in the air and constantly transmit this data to microcontroller. Also system keeps measuring sound level and reports it to the online server over IOT. The sensors interact with microcontroller which processes this data and transmits it over internet.

PROPOSED SYSTEM

As modernization is growing rapidly internet technologies and wireless sensor networks are advanced, a new trend in the era of omnipresence is being realized. The increase in the number of internet users and application on the internetworking technologies enable networking of everyday objects requiring human-to-human or human-tocomputer communication. Internet of Things allows an exchange of information to and from a device or thing. It can be anything such as refrigerators, watches, fans, air conditioner, automobiles, or anything. It is a communication between human and machine or machine and machine. Due to flexibility and low cost Internet of things (IoT) is getting popular day by day. With the urbanization and with the increase in the vehicles on road the atmospheric conditions have considerably affected. Also, there has been the growth of industries and infrastructure which has caused increase in pollution in atmosphere like air and sound pollution. Air pollution and sound pollution are major constituents for having adverse and harmful effects on environment as well on human beings. To monitor this pollution is a very difficult task. Traditionally, authorities like data loggers were used to collect the data of the site to be analyzed. They had to visit the site to be analyzed every time they wanted the data. This was a lengthy, time consuming and expensive task. Due the use of sensors collaborated with internet can make pollution monitoring less complex, less time consuming and flexible. The data can be obtained from remote location without having to visit the location due the internet. Also, an accurate data with indexing capabilities will be able to obtain. Monitoring gives measurements of air pollutant and sound pollution concentrations, which can then be analyzed interpreted and presented.

BLOCK DIAGRAM



COMPONENTS

1. **Microphones or Sensors**:
    - These are the primary devices used to capture sound waves and convert them into electrical signals. Microphones or sensors designed for noise monitoring are calibrated to accurately measure sound pressure levels.
2. **Preamplifier**:
    - In some systems, a preamplifier is used to boost the low-level electrical signals generated by the microphone. This helps improve the signal-to-noise ratio and ensures accurate measurements, especially in low-noise environments.
3. **Signal Conditioning and Amplification**:
    - The electrical signals from the microphone are further processed to remove unwanted interference and amplify the desired signal. This ensures that the measurements accurately represent the actual sound levels.
4. **Analog-to-Digital Converter (ADC)**:
    - The analog signal from the microphone is converted into a digital format that can be processed and analyzed by electronic devices and software.
5. **Processor and Data Logger**:
    - This component handles the digital data, processes it, and logs it for further analysis. It may include a microcontroller or a dedicated data logger to manage the data stream.
6. **Data Storage and Memory**:
    - The system includes storage components to save the collected data. This could be in the form of internal memory, removable storage devices (e.g., SD cards), or cloud-based storage solutions.
7. **Power Supply**:
    - Noise monitoring systems require a reliable power source. This could be provided by mains electricity, batteries, or a combination of both. Some systems may also incorporate solar panels for remote or environmentally sensitive installations.
8. **Communication Module**:
    - This allows for data transmission to a central monitoring station or a remote server. It can use various communication methods, including wired (e.g., Ethernet) or wireless (e.g., Wi-Fi, cellular) connections.
9. **GPS or Location Tracking**:
    - Many noise monitoring systems include GPS or similar technology to accurately record the location of measurement points. This is crucial for spatial analysis and mapping of noise levels.

10. **Weather Protection and Enclosure**:
    - The monitoring components are typically housed in a protective enclosure to shield them from environmental factors like rain, dust, and extreme temperatures. The enclosure should be designed to prevent interference with microphone measurements.
11. **User Interface**:
    - A user interface provides a way to interact with the monitoring system. This could include a display screen, buttons, and indicators to view real-time data, configure settings, and perform diagnostics.
12. **Software and Data Analysis Tools**:
    - Specialized software is used to process, analyze, and visualize the collected data. This may include features for generating reports, trend analysis, and identifying sources of noise pollution.
13. **Regulatory Compliance and Calibration**:
    - Components for regulatory compliance ensure that the monitoring system meets relevant standards and regulations. Regular calibration of the equipment is essential to maintain accuracy and reliability.

FUTURE SCOPE

1. **Smart Sensor Networks**: Deploying a network of smart sensors that can continuously monitor noise levels in real-time across various locations. These sensors can transmit data to a centralized system for analysis.
2. **IoT Integration**: Integrating noise monitoring systems with the Internet of Things (IoT) can allow for seamless data collection, transmission, and analysis. This could lead to more efficient and timely responses to noise pollution events.
3. **Machine Learning and AI**: Implementing machine learning algorithms and artificial intelligence for data analysis can help in identifying patterns, trends, and anomalies in noise pollution data. This could lead to more accurate assessments and predictions.
4. **Acoustic Analytics**: Utilizing advanced analytics to not only measure noise levels but also analyze the nature of the noise (e.g., traffic noise, industrial noise, etc.) and its impact on different environments.
5. **Noise Mapping**: Creating detailed noise maps of urban areas to identify hotspots and trends, allowing for targeted interventions and urban planning strategies.

6. **Integration with Urban Planning**: Integrate noise pollution data into urban planning processes to make informed decisions about zoning, infrastructure, and building designs to mitigate noise pollution.
7. **Community Engagement and Citizen Science**: Engaging communities in noise monitoring through citizen science initiatives can provide valuable data and increase awareness about noise pollution issues.
8. **Predictive Modeling**: Developing models that can predict future noise levels based on factors like urban growth, transportation patterns, and industrial development.
9. **Real-time Feedback Systems**: Implementing systems that provide real-time feedback to individuals and communities about noise levels, allowing them to take immediate action or make adjustments to their activities.
10. **Cross-domain Integration**: Integrating noise monitoring with other environmental monitoring systems (such as air quality, water quality, etc.) to get a comprehensive view of the overall environmental health of an area.
11. **Noise Reduction Technologies**: Research and development of technologies aimed at reducing noise at the source, such as quieter transportation systems, noise-reducing materials, and sound barriers.
12. **Regulatory Compliance Monitoring**: Creating systems that can monitor and report on compliance with noise regulations, helping authorities enforce noise pollution policies.
13. **Mobile Apps and Wearable Devices**: Developing mobile applications and wearable devices that allow individuals to monitor their personal noise exposure and contribute to larger data collection efforts.
14. **Satellite and Aerial Monitoring**: Leveraging satellite and aerial technology to monitor noise levels over large geographic areas, especially in regions with diverse sources of noise pollution.