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An IoT Based Air and Sound Pollution Monitoring System

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Abstract: In infrastructure and industrial plants the rapid growth creating environmental issues like pollution (Air, Water, Noise), climate change, malfunctioning and has greatly consequence for the requirement of an, operationally adaptable, efficient, cheap and smart monitoring systems. In this context where combination of many challenges of computer science, wireless communication and electronics, the smart sensor networks are an emerging field of research. In this paper a solution to monitor the air and noise pollution levels in industrial environment or by using wireless embedded computing system a particular area of interest is proposed. The technology like Internet of Things (IOT) is included in the form of solution which is outcome of merged field of computer science and electronics. For monitoring the fluctuation of parameters like noise and air pollution and also humidity and temperature levels from their normal levels in this case the sensing devices are connected to the embedded computing system.

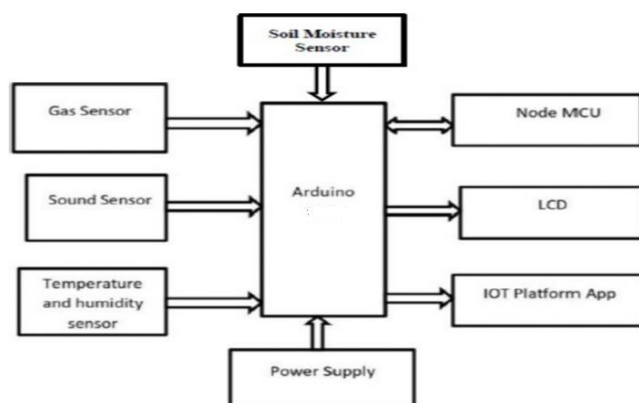
Keywords: MQ7 sensor, LM393 sound sensor, DHT11 sensor, MQ135 gas Sensor.

I. INTRODUCTION

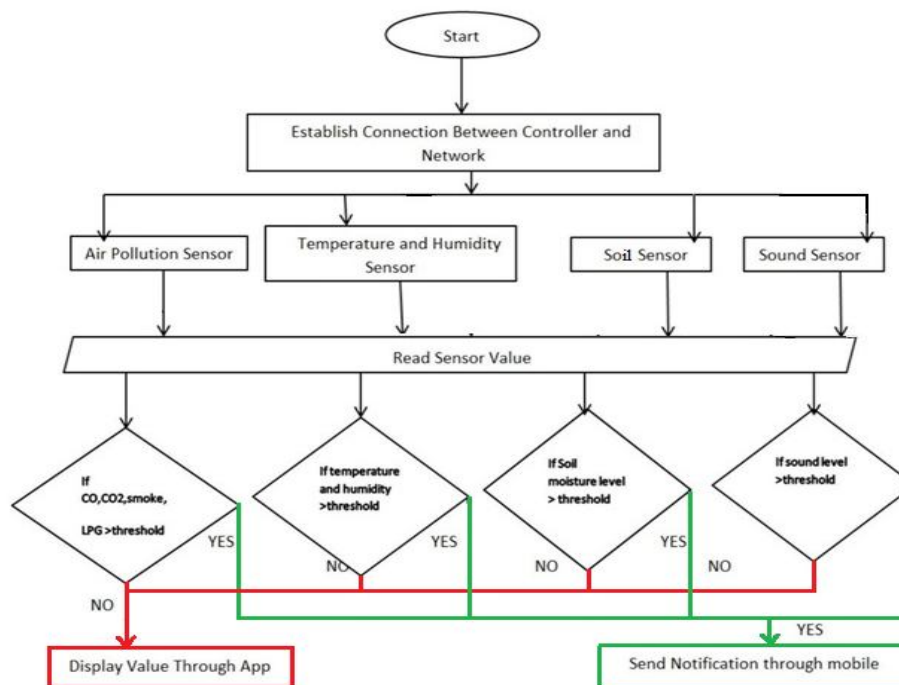
Nowadays, in Metropolitan cities air and noise pollution have become a serious issue, due to high decibels and toxic gases present in the environment which directly affect human health and thus needs special attention. Therefore, it has now become necessary to control pollution (air and noise), Temperature, and humidity to ensure healthy livelihood and a better future. In this paper, an effective implementation for the Internet of Things is used for monitoring atmospheric conditions of the environment like air pollution and sound pollution [3]. And also we Monitor the Soil moisture monitoring system that helps the government authorities to know the information about dry soil areas in the agricultural lands within a village, town, or maybe a state in order that the required precautionary steps will be taken to create such lands fertile. Currently, Air contains harmful gases, such as CO, Smoke, LPG, which cause harm to the environment and human health such as asthma [6][7], detecting these gases using MQ135, MQ7 sensor. Soil contains different moisture levels which may harm crops we need to determine the moisture level that is suitable for agriculture detecting with Soil moisture sensor Various kinds of environmental pollution cause major problems to mankind. Temperature and humidity sensor control the evaporation releases from the industry. Sound sensor detects the high levels of sound plays an important role in Traffic. Air contains harmful gases which harm human health. The above problems motivated us to implement this project [5].

II. METHODOLOGY

Proposing the combination of air & sound pollution, temperature, humidity, soil monitoring and notification systems using IOT. Detection of harmful gases such as CO, CO₂ etc. using MQ7 gas sensor. Detection of sound level using LM393 sound sensor. Implementation of temperature and humidity by using DHT11 sensor and detection of soil moisture level by using high sensitivity moisture sensor. Usage of Arduino to get the required parameter values as a message to the mobile phone & when it crosses the threshold there will be notification to the concerned user.



III. FLOW DESIGN



IV. LITERATURE REVIEW

Cynthia Jaypal's[1] proposed a real time monitoring of air pollution at various locations and zones in Coimbatore city. The IoT system designed measures pollution in real time at any desirable location and hence is cost effective when compared to the existing system of stationary monitoring. It also avoids the problem of inconsistent pollution value. The user interface helps the people to know the pollution level at a certain area and the health hazard associated with it. People with specific allergies can refrain from visiting the place and hence be free from air prone health hazards. The system is scalable and supports any number of IoT devices that may be deployed since it's based on cloud platform. The interface supports all operating systems too. It is found that traffic pollution in Coimbatore city is relatively low. Due to the large number of foundries, brick kilns and textile mills the industrial pollution is found to be more. There is also considerable level of pollution in residential zones where textile mills were present. This system may be enhanced to measure more air pollutants. The data acquired may be used to predict pollution in similar zones depending on the location and vicinity of the type of industry in that location. This is expected to reduce the cost of pollution monitoring as well as it helps the people to choose their residential area depending on the associated health hazard.

Anand Jayakumar Arumugham [2] designed to help a person to detect, monitor, and test air pollution in a given area. The kit has been integrated with a mobile application that helps the user in predicting the pollution level of their entire route. This proposed air pollution monitoring kit along with the integrated mobile application can be helpful to people to identify their exposure level to air pollutants. The app had following features, indices of air quality using real-time computation, air quality daily reports based on users travel distance, specific reports for air quality measures based on locations. Air Pollution is the major affecting factor to our environment. Not only affecting the environment and also affects the human health. The mobile application is developed to monitoring system it tracking the how much the human has exposed in a day. The gas sensors was used for identifying the Leakage Gas, Carbon Monoxide, Smoke, and Propene. The sensor senses the gases and convert from analog to digital and displays in the application. The exposed level is calculated in PPM (Parts per Million).

Lalbihari Barik[3] developed an IoT based temperature and humidity detecting device provides an efficient and definitive system for monitoring agricultural parameters. The system also provides a corrective movement or decision-making system. IoT based monitoring of area is a handiest, but it also allows the consumers to research the correct modifications within the surroundings and for taking possible action. It is inexpensive and consumes much less electricity. The Gross Domestic Product (GDP) per capitals in agriculture can be multiplied and helps to add our need parameters. This set up can also control the DC fan, motor, and water

levels for supporting farmers. Then the measured values of humidity and temperature values from the Arduino MCU are uploaded to the cloud. Then the collected data are transferred to the farmers live through the GSM to their cell phones. Based on the water level measuring system, the collected data are sending to the farmers cell phone continuously. They can switch on or off their motor based on the collected data from the water level measuring system. It is beneficial for the farmers to control the motors as well as can watch their plants from their house. Moreover, also it will help the plants from the overwatering. This system is beneficial for water scarcity problems. IoT based system can be extended for controlling extraordinary electronic and electric devices from remote locations. Moreover, the system also can be extended for finding the moisture of soil and the farm monitoring for animals growth.

Rajat Sankhe[4] proposed a design of the air and sound quality monitoring Network basically involves determining the number of stations and their locations, with a view of the objectives, costs and available resources. To assist an industrialist, an expert system should be developed to fix the exact number and distribution of monitoring locations of a sensor. The expert to energy efficient continuous air and sound pollution monitoring sensor network.

PV Hari Prasad[5] proposed a system to observe various parameters of environment Using Arduino microcontroller, WSN and GSM Technology is proposed to enhance quality of air. With the utilization of technologies like WSN and GSM enhances the method of monitoring various aspects of environment like air quality monitoring issue proposed during this paper. so that the required action could also be taken. It is estimated that this technique will have an excellent acceptance within the market because it may be a centralized system for an entire monitoring function. The smart thanks to monitor the environment and an efficient, low cost embedded system is presented with different models during this paper. In the proposed architecture function of various modules were discussed. The noise and air pollution monitoring system with Internet of Things concept experimentally tested for monitoring two parameters. This model are often further expanded to watch the developing cities and industrial zones for pollution monitoring. To guard the general public health from pollution, this model provides an efficient and low cost solution for continuous monitoring of environment and soil moisture monitoring. The flexibility of the sensor node and transceiver node to integrate to other sort of sensor was tested and implemented on this work. The characteristic curve proved the accuracy of the sensor in determining the soil moisture content. Monitoring of Turbidity, PH & Temperature of Water makes use of water detection sensor with unique advantage and existing GSM network.

Md. Zahidul Islam[6] proposed system in this paper has been carried out to monitor real-time condition (Humidity an Temperature) through internet. This does not require physical presence and can save and will be a very effective way of monitoring environment during the COVID-19 pandemic situation. The system can retrieve temperature and humidity data on the server room and the temperature and humidity data that has been taken can be displayed on the website in graphical form. The advantages of this research work are that this system can also regulate the humidity in the server room and use one of the tools as sensors and actuators. The system also can send notifications the respective stakeholders.

Devika Sonawane [7] proposed a system by using this project each and every variation we can analyse and inform nearby people in time. We can also analyse data form home using thing speak. The most important factor of this system is that it is small, cost efficient and portable. Sensors are available easily anywhere. This system fully helpful to save the lives and overcome all the problem related to environment.

Palaghat Yaswanth Sai[8] developed a model by keeping the embedded devices in the environment for monitoring enables self-protection (i.e., smart environment) to the environment. To implement this need to deploy the sensor devices in the environment for collecting the data and analysis. By deploying sensor devices in the environment, we can bring the environment into real life i.e. it can interact with other objects through the network. Then the collected data and analysis results will be available to the end user through the Wi-Fi. The smart way to monitor environment and an efficient, low cost embedded system is presented with different models in this paper. In the proposed architecture functions of different modules were discussed.

The noise and air pollution monitoring system with Internet of Things (IoT) concept experimentally tested for monitoring two parameters. It also sent the sensor parameters to the cloud (Google Spread Sheets). This data will be helpful for future analysis and it can be easily shared to other end users. This model can be further expanded to monitor the developing cities and industrial zones for pollution monitoring. To protect the public health from pollution, this model provides an efficient and low cost solution for continuous monitoring of environment.

Prof. Kaushik Vipul R[9] proposed a model which explains the basic structure and system design for IOT based air and sound pollution monitoring system. The article also explains the basic blocks and components used in this system. It's a complete case study for the proposed system design. The system is very much helpful for real time air and sound pollution monitoring. The System can be applied at remote areas and can be used to control pollution. The proposed system is cheaper in cost and smaller in size and it can be applied in industries as well as public sectors.

Arushi Singh[10] developed a system that proposes the Automatic Air & Sound management system is a step forward to contribute a solution to the biggest threat. The air & sound monitoring system overcomes the problem of the highly-polluted areas which is a major issue.

It supports the new technology and effectively supports the healthy life concept. This system has features for the people to monitor the amount of pollution on their mobile phones using the application. So, it becomes very reliable and efficient for the Municipal officials along with the Civilians to monitor environment. Letting civilians also involved in this process adds an extra value to it. As civilians are now equally aware and curious about their environment, this concept of IOT is beneficial for the welfare of the society. And it is implemented using the latest technology.

Pattar Sunil Mahesh[11] developed a low-cost, high-fidelity air quality monitoring device was designed, built and tested. The device can gather data at every second and transmit data via Wi-Fi and notify the organization depending on the threshold level. The device is low cost.

The device provides a big humanitarian needs near schools near playgrounds in monitoring the quality of air the children breath, in factories or high traffic area where the emission is higher and affect many people, in developing countries and in places where the air quality is very poor and can be a health hazard by alerting the people to threatening levels of these realized pollutants. Also, this prototype can be continued as low cost mobile device that anyone can use and it monitors the air along once path.

V. CONCLUSION

The system to observe various parameters of environment using Arduino microcontroller, WSN and GSM Technology is proposed to enhance quality of air. With the utilization of technologies like WSN and GSM enhances the method of monitoring various aspects of environment like air quality monitoring issue proposed during this paper. so that the required action could also be taken. It is estimated that this technique will have an excellent acceptance within the market because it may be a centralized system for an entire monitoring function. The smart thanks to monitor the environment and an efficient, low cost embedded system is presented with different models during this paper. In the proposed architecture function of various modules were discussed. The noise and air pollution monitoring system with Internet of Things concept experimentally tested for monitoring two parameters. This model are often further expanded to watch the developing cities and industrial zones for pollution monitoring. To guard the general public health from pollution, this model provides an efficient and low cost solution for continuous monitoring of environment and soil moisture monitoring. The flexibility of the sensor node and transceiver node to integrate to other sort of sensor was tested and implemented on this work. The characteristic curve proved the accuracy of the sensor in determining the soil moisture content. Monitoring of Turbidity, PH & Temperature of Water makes use of water detection sensor with unique advantage and existing GSM network.

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