IOT BASED AIR POLLUTION MONITORING SYSTEM USING DRONES

Manjunath M N[1], Ali abbas[2], Gopinath U[3], Atith N[4]

[1-4]Department: Mechanical Engineering, College: A.T.M.E College of Engineering, Mysuru, India

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Abstract— Drone technology now been an research topic till now. The reason behind this is only Due to advantages at an effective cost in a seemingly wide range of operations. The measurement as well as monitoring of pollutants in air, in a certain locality at different altitudes with the help of drones and access the quality of air in real-time and get data and keeping the corresponding data updated. Drones are generally utilized in public as well as private sectors. Their applications, comes with a price as well as some disadvantages. Many proposals have been made to try and improve drones but they have been widely reliant on the actual and current cases. Drones can greatly limit the gap in the Wireless Sensor Network, due to their ability to fly at various heights. Drones can be a prolific research topic, there has been no interest in investigation of the advantages of deployment of this technology. It has been studied and observed that air pollutants in air change abruptly even at a comparatively short distance. The aim to provide a new tool to study and monitor air quality at different altitudes that even affluent people cannot afford. Looking at the current scenario, the project will be of low-cost drones and sensors. Generating reports daily as well as on a periodic basis and generate real-time notifications during high level of air pollution. To Understand the tough challenges related to drones and air pollution monitoring.

I. INTRODUCTION

Air is a vital element for human environment. The atmosphere of the earth is mainly filled with air and Comprises of various constituents which includes Nitrogen, Oxygen, Carbon Monoxide etc. Human beings require an atmosphere which does not contain any pollutants. It is quite important for the human's survival on this planet. Any changes in the composition of air can cause harm to life on earth. Air pollution is defined as the existence of pollutants in the atmosphere which can cause harm to humans as well as wildlife on earth. Pollutants are measured in Parts per Million. Primary pollutants are let into to the atmosphere directly. Secondary pollutants are a result of various pollutant reacting with different particles. The quality of air affects human beings. Pollutants in air cause problems such as difficulty in breathing, coughing, asthma. Polluted air can also result in smog and low visibility. Air pollution leads to the death around 7 million people each year or one in eight deaths every year. On an average, more than 5 lakh children at the age of five or below die each year due to illness related to pollutants in air. Children who get exposed to air pollution have a greater probability of contracting diseases such as asthma, etc. Many scientists across world have designed Wireless Network Systems to monitor air pollutants such as Sulphur Carbon Monoxide, Sulphur di oxide, Nitrogen Oxide, Carbon dioxide, smoke etc. The paper emphasizes on designing as well as implementing of an air pollution monitoring system. This highlights how the amount of pollutants in air can be checked using gas sensor, microcontroller as well as Wireless-Fidelity system. The basic idealization of the project is to design an air pollution detection as well as a monitoring system that can check, detect and provide information related to the quality of air to a server and maintain the updated information in the database.

II. METHODOLOGY

Methodology starts by developing the Drone model later procuring and assembling Arduino MC, using the wi-fi module and MQ135 and other sensors on to it. Then it is connected to a display.

Development of drone**:**

1. Construction of the frame
2. Assembly of drone motors
3. Mounting electronic speed controllers
4. Incorporation of flight controller

The first step is to study the environmental conditions when it has very low levels of pollutants which is obtained by experimentation. The second step is to study the behavioral characteristics of the sensors. The third step is to make decisions, sensing the pollutants, measurement of the pollutants, fixing the minimal value, timing of sensors. The fourth step is the collection of data. The sensor accumulates the required amount of information or data, this happens when the process is controlled by the controller and its forwards the same to the database using wi-fi module where the analysis takes place.

III. WORKING PRINCIPLE OF THE PROPOSED MODEL

As mentioned in flowchart, the database in micro controller will be loaded, the signal will be sent to the Display. The information data is accumulated using various gas sensors. The sensors which are already calibrated gives the output voltage which is proportional to the amount of polluting particle according to parts per million (PPM). The information will be sent to the display where it will be displayed and then forwarded to the module of wi-fi. The measured data value is forwarded by the wi-fi module. Data accumulated is converted and the information will be updated.

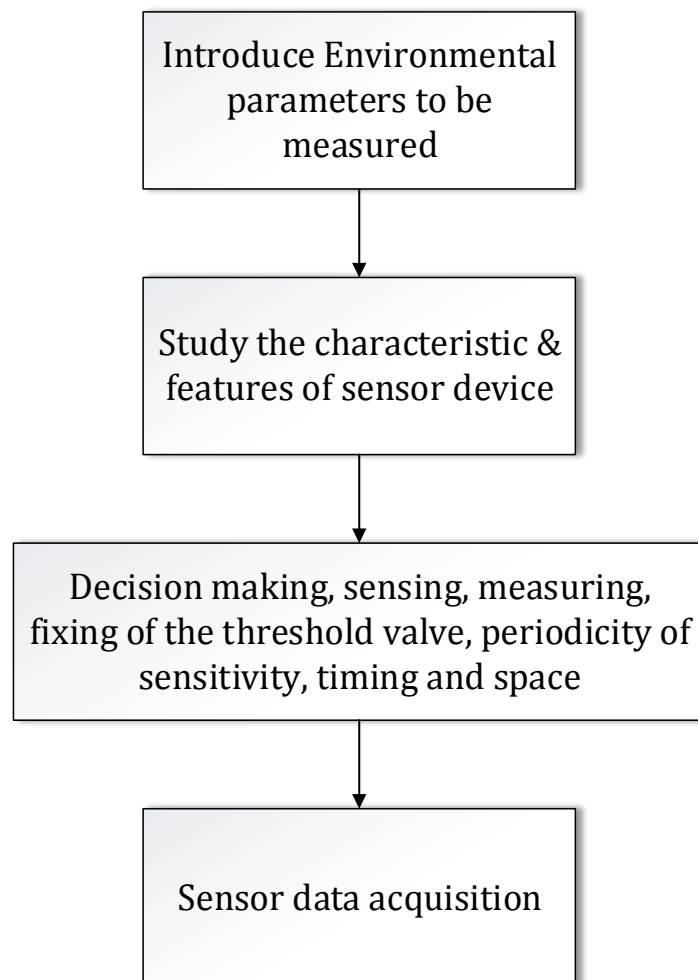Figure 1**:** Representation of the Proposed System:

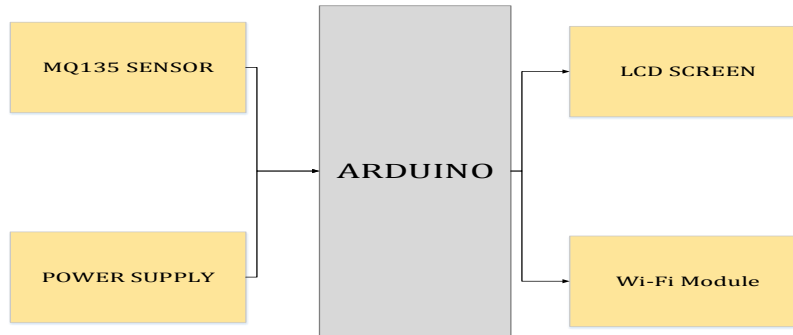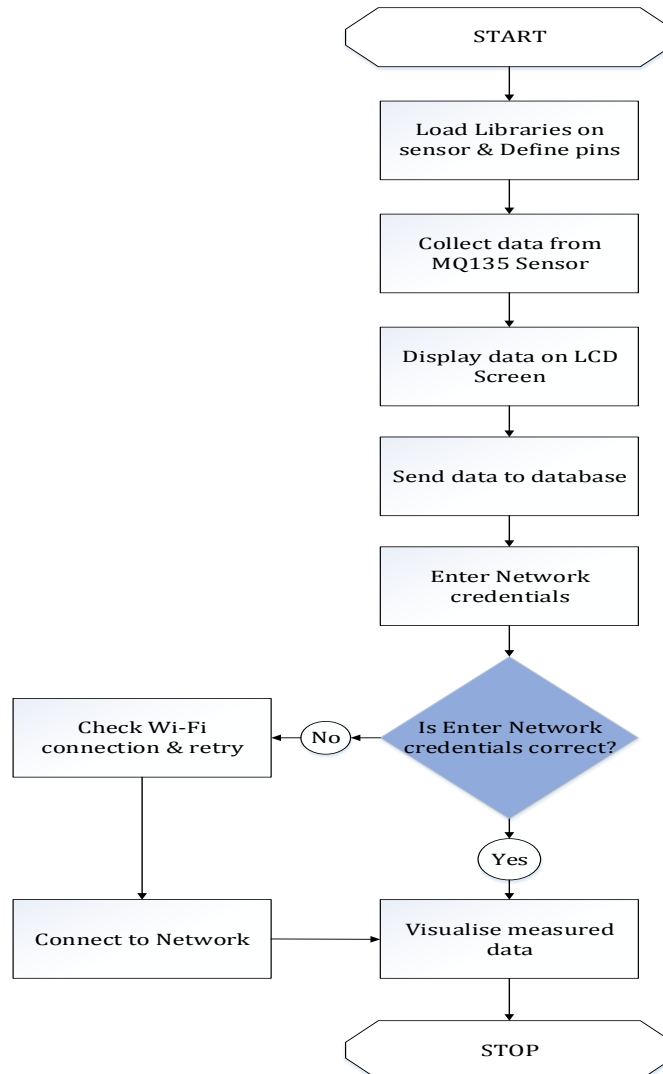Figure 2: Represents the Block Diagram of Air Pollution Monitoring System

Figure 3: Flow chart of a smart Air Pollution Monitoring System:

IV. Components specification of the system proposed is shown in the table below

Sl. No	Components required	Quantity
1	Arduino	1
2	MQ135 sensor	1
3	Drone	1
4	LCD Screen	1
5	220-ohm resistor	1
6	1k ohm resistor	1
7	Wi-Fi-module	1
8	10K potentiometer	1
9	Bread board	1
10	Connecting wires	Any amount

V. The Mathematical analysis for the proposed system

The amount of the pollutants present in atmosphere is indicated in percentage or parts per million (ppm).

Calculations: $1ppm = 1.145mr/m3$

$1mg/m3 = 0.873ppm$

We know that: $1\% = 1/100$ & $1ppm = 1/1000000$

Therefore: $1ppm = 0.0001\%$

Conversion from parts per million to percentage is shown in the table below:

Parts per million(ppm)	Percentage (%)
0	0
5	0.005
50	0.5
500	0.05
1000	0.1

VI. PROPOSED MODEL

VII. EXPECTED OUTCOME OF THE PROJECT

1. Effective measurement and monitoring of air pollution in a particular area at various altitudes with the help of drones and access air quality in real time and fetch data, keeping the data updated.
2. Categorizations of air pollution to different levels and represent it meaningfully with different colors associated to different levels of air pollution and indicate its intensity at that particular instant of time.
3. Report generation periodically i.e., daily, monthly, yearly etc and represent the intensity of air pollution at that particular place for the specified interval of time.

VIII. ACKNOWLEDGEMENT

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