# DESIGN AND DEVELOPMENT OF SOLAR POWERED AIR POLLUTION AND ENVIRONMENTAL MONITORING SYSTEM IN SMART CITIES

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**Abstract** - IOT is the network connectivity between devices and the cloud which establishes communication to perform certain advanced tasks. The physical device which are able to sense, collect, analyses and process the data are interconnected along with the internet connectivity makes a proper IOT project. In this project we are monitoring the weather conditions of a particular area. Sensors like temperature, light, humidity, moisture, gas, and particulate matter sensors collect the data of a certain area and then processes the data which is then made available in the website.

*Key Words***:**  IOT, Sensor, message queuing telemetry transport, cloud, microcontroller, LM 35, HR 202, MQ135.

## 1.INTRODUCTION

Air is polluting due to emission of poisonous gases by industries and emission of gases from vehicle. Which will increase the concentration of toxic gases and ash in the environment. It is affecting the living organism such as animals, crops and environment. Due to this many diseases and allergies are coming.

The Internet of things is leading the technology. Cloud is facilitating for storing the data. The physical devices are interfaced with the software establishing a network with the internet. The satellite is used for monitoring the weather condition of earth. The sensor mounted satellite scans the earth with the help of infrared radiation and reflected light. The measured parameters are then digitalized and sent back to the earth and then images are formed. The satellite analyses the parameter of sum total geographical area to give the weather report.

Particulate matter is a small particle in the of ash which are present in air. This particulate matter in the environment continually affecting the human health. So far lot of research has been done on environment monitoring system. These researches only give the information about the humidity, temperature, pressure, carbon monoxide but they did not pay any attention towards measuring size of the ash particles. Without measuring the size of ash particle in the air it is impossible to know the pollution level. Hence to overcome with this we are giving a project which consisting of a sensor i.e., Temperature sensor, Humidity sensor, and Moisture sensor with DSM501A which is particulate matter sensor using microcontroller as control unit.

In this project we are analyzing the variation in the climate at a place where our system is placed. Data collected from the atmospheric stored in the cloud which is made available to the website. The temperature, humidity, light intensity, particulate matter size, gas parameters data are collected and analyzed. The sensors are connected to the control module and then the collected data is stored in the cloud with the technique of MQTT. The entire setup is powered with solar energy. Our system gives the accurate climatic information of a particular place and the system's installation is economically flexible and the maintenance cost is too low.
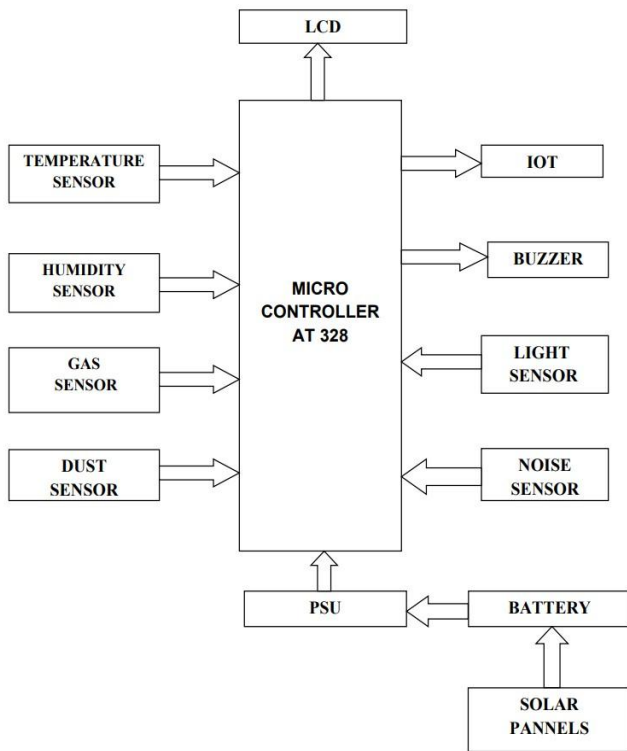
## 2. METHODOLOGY



Fig: Block Diagram

The software requirements are as follows-

- Blynk - It is an Internet of things (IOT) company. It provides platform for developing mobile IOS and android applications. It helps to connect electronic devices to the internet to control and monitor the devices.

- Cloud think speak - It is IOT cloud platform to which you can send sensor data to the cloud and this data is stored for either public or private.

### WORKING

The IoT concept extends to Internet of everything for developing our project. The four-layer architectural framework is developed. The gas sensor detects the amount of gas present in atmosphere, the particulate matter sensor detects the particulate pollutants present in the air, the noise sensor detects the noise pollution, LDR sensor is used to detect the light intensity, the temperature and humidity sensors are used to determine the temperature and humidity of the atmosphere. These sensors sense and send the data to the cloud through the technique called MQ Telemetry Transport. The updated data and the analysis result is then made accessible globally through the website.

## 3.COMPONENTS AND REQUIREMENTS

- AT MEGA 328 microcontroller
- DSM501A Sensor
- MIC CONDENSOR
- LM 35
- HR 202
- LDR sensor
- MQ 135 sensor
- ESP 8266
- Transformer
- 7805 IC
- Rectifier Circuit

### 3.1 AT MEGA 328 MICROCONTROLLER

AT MEGA 328 microcontroller is a high performance and low powered controller It is Automatic Voltage Regulator (AVR) Reduced Instruction Set Computer (RISC) architecture based 8-bit microcontroller Which has 32KB program memory 1.8 to 5.5 Volt, 28 pinned microcontrollers.

### 3.2 DSM501A Sensor

It is low cost and compact sized used as particle density sensor. It works on the principal of particulate count it can sense the particulate pollutants.

### 3.3 MIC CONDENSOR

This component is used to detect the sound or noise. This convert sound into electric signals.

### 3.4 LM 35

LM 35 is a temperature sensor It provides the analog output voltage which will be dependent on the temperature.

### 3.5 HR 202

HR 202 is a humidity sensitive resistor made of organic macromolecule material. They work by detecting change in temperature in the air.

### 3.6 LDR sensor

Light Dependent Resistor works on the principal of photoconductivity. This is used to detect the light intensity.

## 3.7 STEP DOWN TRANSFORMER

A step-down transformer is a type of transformer that converts high voltage (HV) and low current values from the primary side of the transformer into low voltage (LV) and high current values on the secondary side of the transformer.

## 3.8 MQ 135 sensor

It is an electronic sensor used for detecting the concentration of gases in air. It detects CO2, smoke, nitrogen oxide, and other harmful gases.

## 3.9 ESP 8266

It is a Wi-Fi module used for enabling the internet connectivity to various applications for embedded systems.

## 3.9 7805 IC

7805 is voltage Regulator used for voltage regulation. It gives constant 5V output for any input voltage which can be less than or equal to 35V.

## 3.10 Rectifier Circuit

Rectifier Circuit is used to convert AC to DC by using one or more p-n junction diodes.

## 4. ADVATNTAGES

As this system gives the atmospheric data of a particular place, henceforth this can be implemented globally or at the required places in order to have accurate information of the surrounding climate. The industry can maintain the pollution and also for industrial safety. Institutions also maintain the level of climatic conditions like temperature, light intensity, atmospheric gases, and humidity. Implementing this system helps the institutions to maintain the environment status. Traffic is one of the major factors that influence the rise in pollutants. This can be controlled by installing this device at a certain location and also helps to analyse the traffic density with respect to time, day, date etc. This can also be used to alert the end user if any variation in any of the climatic parameters.

## 5.EXPECTED OUTCOME

The installation of our device in the environment helps us to monitor and analyse the environment status. This can also be used in industry, institution and over any specified geographical area. By positioning the sensors devices into the environment, it can interact with other devices through the network. Then the collected information and analysis result is made available to the end users through Wi-Fi network. The light intensity, noise, particulate matter size, humidity, temperature, atmospheric gases

parameter results are experimentally tested. The data accessibility is global.

## REFERENCES

[1] Girija.C, Andreanna Grace Shires, Harshalatha H, Pushpalatha H P., "Internet Of Thing based weather monitoring system"

[2] Anita M.Bhagat, Ashwini G.Thakare, kajal A.Molke, Neha s. Muneshwar, Prof.V.Choudhary " IOT Based Weather Monitoring and Reporting System Project "Published in International journal of Trend in Scientific Research and Development,ISSN:24566470,Volume-3, April 2019.

[3] Somansh Kumar, Ashish Jasuja, " Air Quality Monitoring System Based on IOT Using Raspberry Pi ",International Conference on Computing And Automation, 2017.

[4] A.Subhadra, R.Ganesh, K.Maheshbabu, K.Sai Sandeep, J.Maheshkumar, " IOT Based Real Time Weather

Monitoring System" International Journal of Engineering Applied Science and Technology , ISSN: 2455-2143, Vol.4, Issue 11,March 2020.

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