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# IOT Based Pollution Tracker and Management

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**Abstract -** In the Present day scenario, many times we see that the garbage bins or Dust bin are placed at public places in the cities are overflowing due to increase in the waste every day. It creates unhygienic condition for the people and creates bad smell around the surrounding this leads in spreading some deadly diseases & human illness. And other pollution is the Air and Noise pollution is a growing issue these days. It is necessary to monitor air quality and keep it under control for abetter future and healthy living for all. The tracking level of the garbage bins and a unique ID will be provided for every dustbin in the city so that it is easy to identify which garbagebin is full. When the level reaches the Threshold level, the device will transmit the level along with the unique ID provided. These details can be accessed by the concern authorities from their place with the help of Internet and an immediate action can be made to clean the dustbins. System uses air sensors to sense presence of harmful gases/compounds in the air and constantly transmit this data to online server over IoT and take action against it. Also authorities can keep a watch on the air pollution and also noise pollution in different areas. And if system detects air quality and noise issues it alerts authorities so they can take measures to control the issue.

***Key Words***: Dustbin Garbage, Air Pollution, Sound Pollution, IOT web server, Temp Sensor, PIC Microcontroller, GSM.

## 1. INTRODUCTION

This project Pollution tracker and management system is a very innovative system which will help to keep the cities clean. This system monitors the temp of environment as well as air and sound pollution and garbage bins informs about the level of garbage collected in the garbage bins via a web page. For this the system uses ultrasonic sensors placed over the bins to detect the garbage level and compare it with the garbage bins depth. The system makes use of PIC family microcontroller, LCD screen, Wi-Fi modem for sending data and a buzzer. The system is powered by a 12V transformer. The LCD screen is used to display the status of the level of garbage collected in the bins. Whereas a web page is built to show the status of all parameter to the user can monitoring it. The web page gives a graphical view of the garbage bins in order to show the level of garbage collected. The LCD screen shows the status of the garbage level. The system puts on the buzzer when the level of garbage collected crosses the set limit. Thus this system helps to keep the city clean by informing about the garbage levels of the bins by providing graphical image of the bins via a webpage.

Pollution [1] is unwanted, harmful stuff contaminating an environment. The race to develop clean energy is motivated by high levels of pollution that people fear are permanently damaging the earth's environment Poor air quality increases respiratory ailments like asthma and bronchitis, heightens the risk of life- threatening conditions like cancer, and burdens our health care system with substantial medical costs. Particulate matter is singlehandedly responsible for upto 30,000 premature deaths each year. The immediate alterations that the world is witnessing are Global warming. With increased temperatures worldwide, increase in sea levels and melting of ice from colder regions and icebergs, displacement and loss of habitat have already signaled an impending disaster if actions for preservation and normalization aren't undertaken soon. Having an onsite carbon monoxide gas alarm in your RV, boat, plane or house is essential to mitigate risk. Being able to detect presence of carbon monoxide remotely, from wherever you are, alerts you to aproblem as it occurs and wherever you may be. This makes you aware of a situation before you arrive, and enables you to remedy the issue quickly. This paper is mainly interested in reducing pollution mainly from the vehicles using IOT.

### 1.2. LITERATURE REVIEW

This literature review explains about relevant past research and project development which is used the almost similar system for this project.

**[1]***OT Based Smart Garbage Monitoring And Air Pollution Control System:* This project IOT Garbage Monitoring system is a very innovative system which will help to keep the cities clean. This system monitors the garbage bins and informs about the level of garbage collected in the garbage bins via a web page. For this the system uses ultrasonic sensors placed over the bins to detect the garbage level and compare it with the garbage bins depth. This system also detects the harmful gases in the air with the help of gas sensors.

*[2]IOT Based Smart Garbage And Waste Collection Bin*:

Many times, in our city we see that the garbage bins or dustbins placed at public places are overloaded. It creates unhygienic conditions for people as well as ugliness to that place leaving bad smell. To avoid all such situations

we are going to implement a project called IoT Based Smart Garbage and Waste Collection bins. These dustbins are interfaced with microcontroller based system having IR wireless systems along with central system showing current status of garbage, on mobile web browser with htmlpage by Wi-Fi. Hence the status will be updated on to the html page. Major part of our project depends upon the working of the Wi-Fi module; essential for its implementation. The main aim of this project is to reduce human resources and efforts along with the enhancement of a smart city vision.

*[3]An IOT Based Approach To Minimize Air Pollution* In this paper we have used a new Digitalized approach to measure and control the pollution in the under developing country. We have use temperature sensor to sense temperature, Humidity sensor to sense humidity, Smoke sensor to collect data from the different gases (e.g. Carbon Di Oxide O2, Methane, Sulfur Dioxide etc.) and many more other sensors isused to collect data from dust and from atmosphere. Sensors are controlled by Microcontroller (MCU). Collected data is sent to the central server throughaccess point. Data is stored being displayed onLCD/LED. Analysis of collected data is done to analyze the rise in the pollution, temperature and variousparameters that causes the pollution.

*[4]An Efficient Cloud-based Management of IOT Devices for Air Quality Monitoring:* The Internet of Things paradigm originates from the proliferation of intelligent devices that can sense, compute and communicate data streams in a ubiquitous information and communication network. The great amounts of data coming from these devices introduce some challenges related to the storage and processing capabilities of the information. This strengthens the novel paradigm known as Big Data.

## 2. PROPOSED SYSTEM

Fig.1 shows block diagram of our system. All sensorsinterface with microcontroller. This system is made to fulfill the purpose and need of the society to monitor and check the live air quality, Sound pollution and solid waste pollution in an area through IOT. The system uses air sensors to check the presence of harmful and hazardous gases/ compounds which is generated by vehicles and also uses the ultrasonic sensor to keep measuring solid west level in the dust bin. Thesesensors interact with microcontroller which processes this data and then to send the data over remote location WIFI modem or GSM modem is also installed and whenever the air or sound pollution is detected, a buzzer immediately beeps. All parameter will be display on LCD display. Here Ultrasonic sensor sense level of dustbins. Here we also installed RFID card reader to identify vehicle which do pollution.

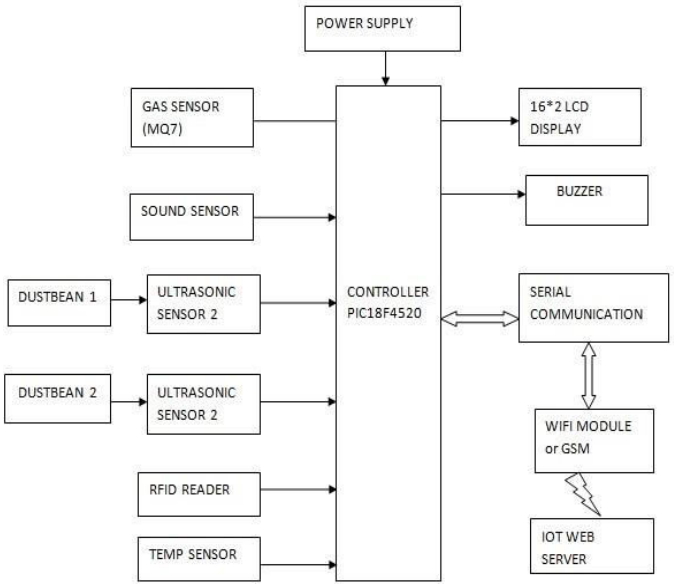


**Fig -1**: Block Diagram

### 2.1 PIC 18f4520:

Data Memory up to 4k bytesn Data register map - with 12-bit address bus 000-FFF

- Divided into 256-byte banks
- There are total of F banks
- Half of bank 0 and half ofbank 15 form a virtual (oraccess) bank that is accessibleno matter which bank isselected – this selection isdone via 8-bits
- Program memory is 16-bits wide accessed through a separate program data bus and address bus inside the PIC18.
- Program memory stores the program and also static data in the system.
- On-chip External
- On-chip program memory is either PROM or EEPROM.
- The PROM version is called OTP (one-time programmable) (PIC18C) The EEPROM version is called Flash memory (PIC18F).
- Maximum size for program memory is 2M n Program memory addresses are 21-bit address starting at location 0x000000


**Fig -2**: PIC18f4520

### 2.2 Ultrasonic Sensor:

The ultrasonic sensor is success is due to its high reliability. Versatile in for object detection and level measurement, these sensors operate with extreme precision due to their high reliable sound wave technology. Ultrasonic HC-SR04 is an ultrasonic ranging module that provides 2 cm to 400 cm non-contact measurement function. The ranging accuracy can reach to 3mm and effectual angle is < $15^0$ It can be powered from a 5V power supply. The HC-SR04 ultrasonic sensor uses SONAR to determine the distance of an object just like the bats do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package from 2 cm to 400 cm or 1" to 13 feet.

**Fig -3**: Ultrasonic Sensor

### 2.3 Gas Sensor (MQ7):

This is a simple-to-use Carbon Monoxide (CO) sensor, suitable for sensing CO concentrations in the air. The MQ-7 can detect CO-gas concentrations anywhere from 10 to 500ppm.This sensor has a high sensitivity and fast response time. The sensor's output is an analog resistance. The drive circuit is very simple.To do is power the heater coil with 5V, add a load resistance, and connect the output to an ADC.


**Fig -4**: Gas Sensor

### 2.4. GSM module:

This GSM modem has a SIM800A chip and RS232 interface while enables easy connection with the computer or laptop using the USB to Serial connector or to the microcontroller using the RS232 to TTL converter. Once you connect the SIM800 modem using the USB to RS232 connector, you need to find the correct COM port from the Device Manger of the USB to Serial Adapter. Then you can open Putty or any other terminal software and open a connection to that COM port at 9600 baud rate, which is the default baud rate of this modem. Once a serial connection is open through the computer or your microcontroller you can start sending the AT commands.

**Fig -5**: GSM Module

### 2.5. LCD display:

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD.

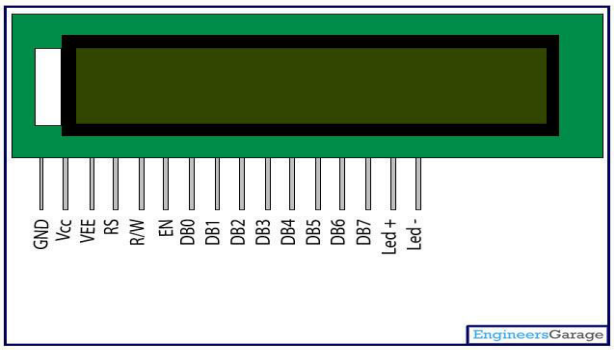


**Fig -6**: LCD Display

**2.6. RFID Reader**:

RF ID is Radio Frequency Identification which is used to make track of every physical object. The frequency of operation widely used at present are LF –Low Frequency 125 KHz & UHF (Mifare) 13.5MHz.The main components of the RF ID system are :1) The RF ID Reader – EM-18 type of RFID reader is used for demo in this post.2) RF ID tag – The Tag contains an Integrated circuit for memory & an Antenna coil.

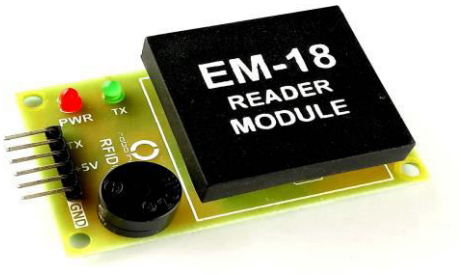


**Fig -7**: RFID Reader

**2.7 Sound Sensor:**

Noise sound sensor detection module is a sensor module based on MIS sound sensing element. sound sensor isparticularly sensitive to sound intensity, and it can be used to detect ambient sound level .Louder noise brings bigger outputsine wave amplitude.

**Fig -8**: Sound Sensor

## 3. CONCLUSIONS

The proposed system proposes, an effective implementation for IOT is used for monitoring atmospheric condition of environment like Air pollution due to vehicle, sound pollution and solid waste pollution. This paper presents conceptual architectures for a versatile, flexible and cost efficient for monitoring the air pollution. The proposed method for the management of wastes is efficient and time saving process. This automation of waste also reduces the human effort and consequently the cost of the whole process. This system can be implemented at any place with ease and within reasonable amount of time. The implementation costs for the automation is also affordable. The use of Internet in this automation makes this system efficient and reliable with long distance coverage.

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