Design of An Air And Sound Pollution Monitoring System Using IoT

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Abstract- *Air and Sound pollution is a growing issue these days. It is necessary to monitor air quality and keep it under control for a better future. Here we propose a low cost air quality as well as sound pollution in particular areas through IOT.*

Keywords- Monitoring, MQ135, MIC, IOT.

I. INTRODUCTION

Internet of Things represents a general concept for the ability of network devices to sense and collect data from the world around us, and then share that data across the Internet where it can be processed and utilized for various interesting purposes.

An Embedded system is a combination of computer hardware and software, and perhaps additional or other parts, designed to perform a specific function. An embedded system is a microcontroller-based, software driven, reliable, real-time control system, autonomous or human or network interactive, and sold into a competitive and cost conscious market.

ATMEGA 328P is a 32k 8-bit microcontroller based on AVR architecture. Many instructions are executed in a single clock cycle providing a throughput of almost 20 MIPS at 20MHZ.The ATMEGA 328-PU comes in an PDIP 28 pin package and is suitable for use on our 28pin AVR Development Board.

Basically this paper is based on the concept of sensing the Air and Sound pollution using sensors like MQ135 & MIC and connected to the microcontroller which consists of inbuilt A to D converter, processes the output to WIFI module.

II. PROPOSED SYSTEM

2.1 TRANSFORMER:

Electrical device that transfers electrical energy between two or more circuits through electromagnetic induction.

2.2 RECTIFIER:

The circuit uses standard power supply comprising of a step-down transformer from 230Vto 12V and 4 diodes forming a bridge rectifier that delivers pulsating dc which is then filtered by an electrolytic capacitor of about 470µF to 1000µF.

2.3 REGULATOR:

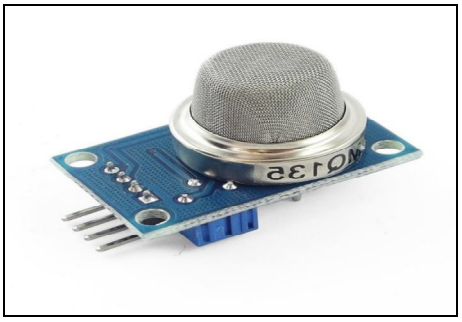
The filtered dc being unregulated, IC LM7805 is used to get 5V DC constant at its pin no 3 irrespective of input DC varying from 7V to 15V. The input dc shall be varying in the event of input ac at 230volts section varies from 160V to 270V in the ratio of the transformer primary voltage V1 to secondary voltage V2 governed by the formula V1/V2=N1/N2. As N1/N2 i.e. no. of turns in the primary to the no. of turns in the secondary remains unchanged V2 is directly proportional to V1.Thus if the transformer delivers 12V at 220V input it will give 8.72V at 160V.Similarly at 270V it will give 14.72V.Thus the dc voltage at the input of the regulator changes from about 8V to 15V because of A.C voltage variation from 160V to 270V the regulator output will remain constant at 5V.

2.4 SENSORS:

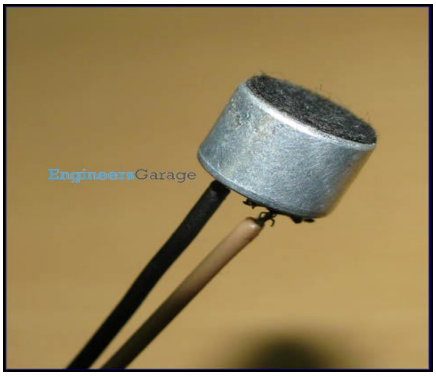
The Air and sound pollution detection sensors we used here are MQ135 and MIC.

- SNS-MQ 135 is sensitive air quality sensor that detects NH3, NOx, alcohol, benzene, smoke, CO2, etc.
- Heater voltage 5V, 31ohm (40mA consumption)
- Port explanation: AO for analog o/p, AO for digital o/p, GND for ground, VCC for 5V voltage input.
- This sensor has lower conductivity in clean air, when the combustible gas exist, the sensor's conductivity increases

and it converts the change in conductivity to output signal of gas concentration.



- Sensor-MIC is sound detection sensor module.
- It is an analog input sensor and able to detect noise levels based on air vibrations.
- Low power and high sensitive component.

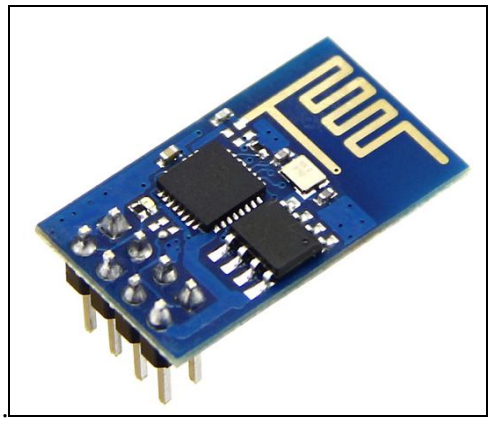


2.5 ATMEGA328:

- High performance , low power AVR 8-bit mc.
- Advanced RISC architecture.
- Flash program Architecture: 32k bytes
- EEPROM Data Memory: 1k bytes
- SRAM Data Memory: 2k bytes
- I/O Pins: 23
- Full static operation

2.6 WIFIMODULE:

- The ESP8266 Wi-Fi Module is SOC with integrated TCP/IP protocol stack that can give any microcontroller access to our Wi-Fi network



- Each ESP8266 module comes pre-programmed with an AT command set firmware.
- The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

2.7 LCD DISPLAY:

- Most common LCDs connected to the microcontrollers are 16x2 and 20x2 displays.
- This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively.
- The standard is referred to as HD44780U, which refers to the controller chip which receives data from an external source (and communicates directly with the LCD).

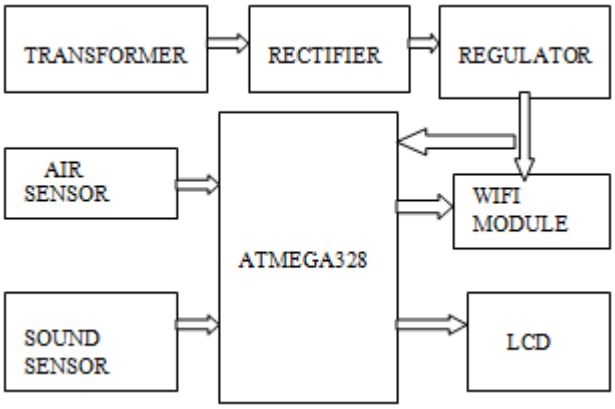
2.8Arduino Compiler:

It contains IDE (Integrated Development Environment) Software- a text editor for writing code, message area and toolbar with buttons for common functions. It connects arduino and our systems (PC) to upload programs and communicate with them.

2.9 IOT Gecko:

It is a browser or webpage designed to develop our own IOT based system to read sensor values and operate motorized machines with API support over Arduino.

III. BLOCK DIAGRAM



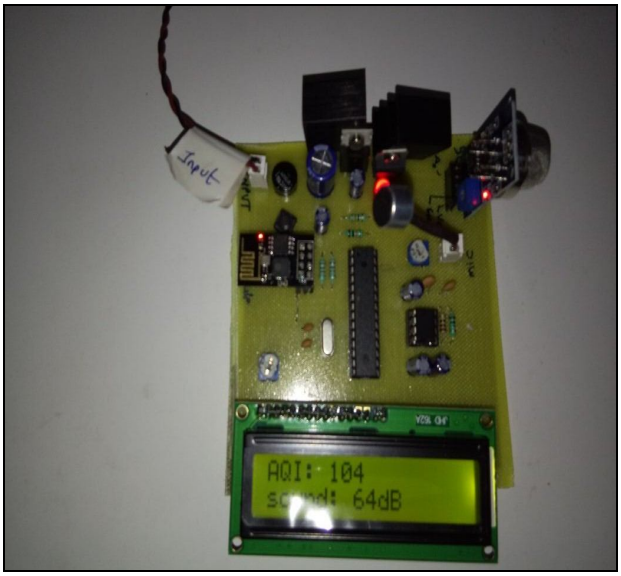
IV. DESCRIPTION

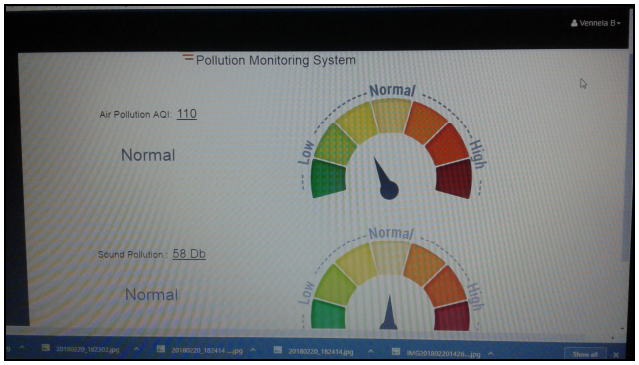
When power supply input of 5V is given to the microcontroller it will be energised and receives the input from the sensors and process the data according to program written in its memory and gives the output.

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.

V. RESULT AND SIMULATION

The project is tested in Arduino software and is working properly. It has lots of applications like we can use this project in more polluted traffic areas and monitor the level of pollutants in air and sound. In this we have used very less components which make it cost efficient and handy.





VI. APPLICATIONS

- Immediate action can be taken by authorities
- Continuous monitoring
- Cost efficient
- Easy to handle

VII. CONCLUSION

By using this system Air pollution in dbs and Sound pollution in ppms can be calibrated by using the sensors, microcontroller and can be transferred or monitored in real time by the authorities on their smart phone or computer.

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