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DEPARTMENT OF

ELECTRONICS AND COMMUNICATION ENGINEERING

IOT BASED AIR CONDITION SUPERVISING SYSTEM

Under the Guidance of:

Dr.Ch.VenugopalReddy,M.E,Ph.D.
Professor & HOD
Dept of ECE

Project Associates

K. Bhargavi Deepika (208A1A0462)

D. Sindhusha (208A1A0455)

P. Naaziya (208A1A0470)

D.V. Ashok Kumar Reddy (208A1A0483)

T. SriRam (208A1A04A1)

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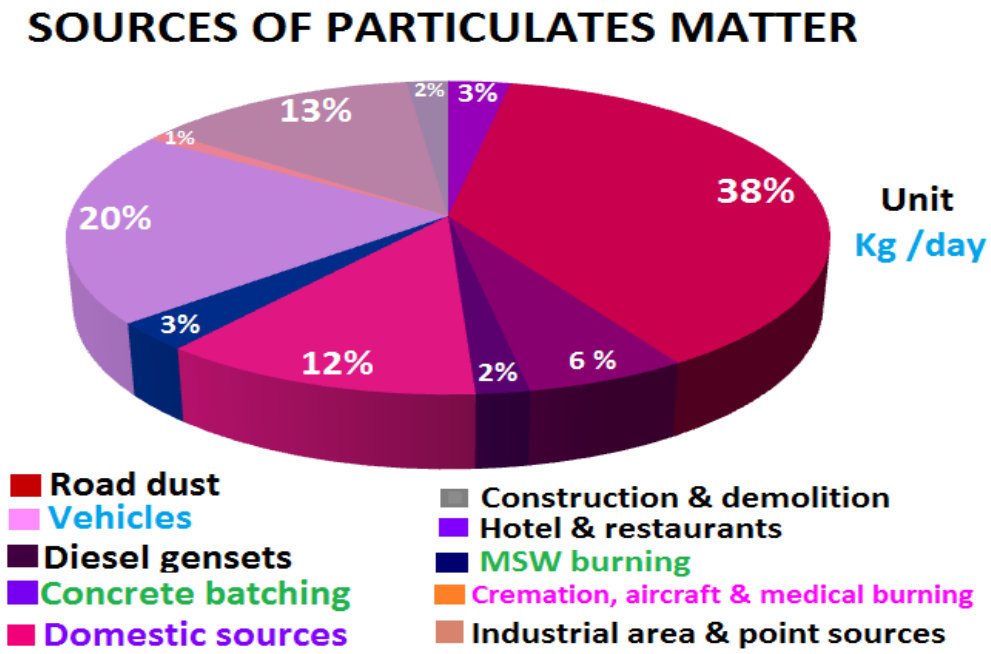
ABSTRACT

Airborne pollution is a major problem that the medical and healthcare department is currently addressing. For men's security, well-being, and safety, air purity is crucial. The primary contributor to pollution and the health problems is particulate matter (PM 2.5). A low-cost multimodality sensor-based system, like DHT 11 for air quality monitoring of temperature and humidity in the environment and MQ 6 for CO2,butane and LPG detection and LDR for sensing the ambient light levels. Buzzer is used for giving Alerts. These sensors will be connected to an Arduino UNO micro controller, and the output will be shown on an LCD display. GPS devices can be used to collect location data. Devices connected to the internet of things (IoT) are able to collect data, evaluate it. Thus, IOT-based gadgets and Arduino sensors can be used to monitor the air quality of a specific location.

INTRODUCTION

Air is getting polluted because of the release of toxic gases by industries, vehicle emissions and increased concentration of harmful gases and particulate matter in the atmosphere.

The level of pollution is increasing rapidly due to factors like industries, urbanization, increase in population, vehicle use which can affect human health.



Particulate matter is one of the most important parameters having a significant contribution to the increase in air pollution. This creates a need for measurement and analysis of real-time air quality monitoring so that appropriate decisions can be taken in a timely period.

Aims and Objectives

- An air quality monitoring system's goals and objectives are made to include a range of topics pertaining to the monitoring, evaluation, and control of air quality.
- To create a tool which will monitor the quality of air of our environment.
- The Aim is to measure the concentration of PM2.5 particles, humidity and temperature in the atmosphere with accuracy.
- Display the data on LCD.
- Objective is to raise awareness among the public about the importance of air quality and its impact on health.

Literature Survey

1. TITLE: Mobile environmental sensing system to manage transportation and urban air quality

AUTHOR: M. Cohen, North, R. Richards, J. Hose and N. Hassard

ABSTRACT : Mobile environmental sensing systems offer a pioneering solution by leveraging technological advancements to monitor and manage air quality associated with transportation. These systems, integrated with mobile platforms, sensors, and data analysis, provide a comprehensive approach to understanding and mitigating the environmental impact of urban transportation. This essay explores the critical role of mobile environmental sensing systems in managing urban air quality affected by transportation, shedding light on their significance, functionality, and potential for transforming our approach to sustainable urban living.

2. TITLE: Real- time Air Quality Monitoring Through Mobile Sensing in Metropolitan Areas

AUTHOR: Srinivas Devarakonda and Parveen Sevusu

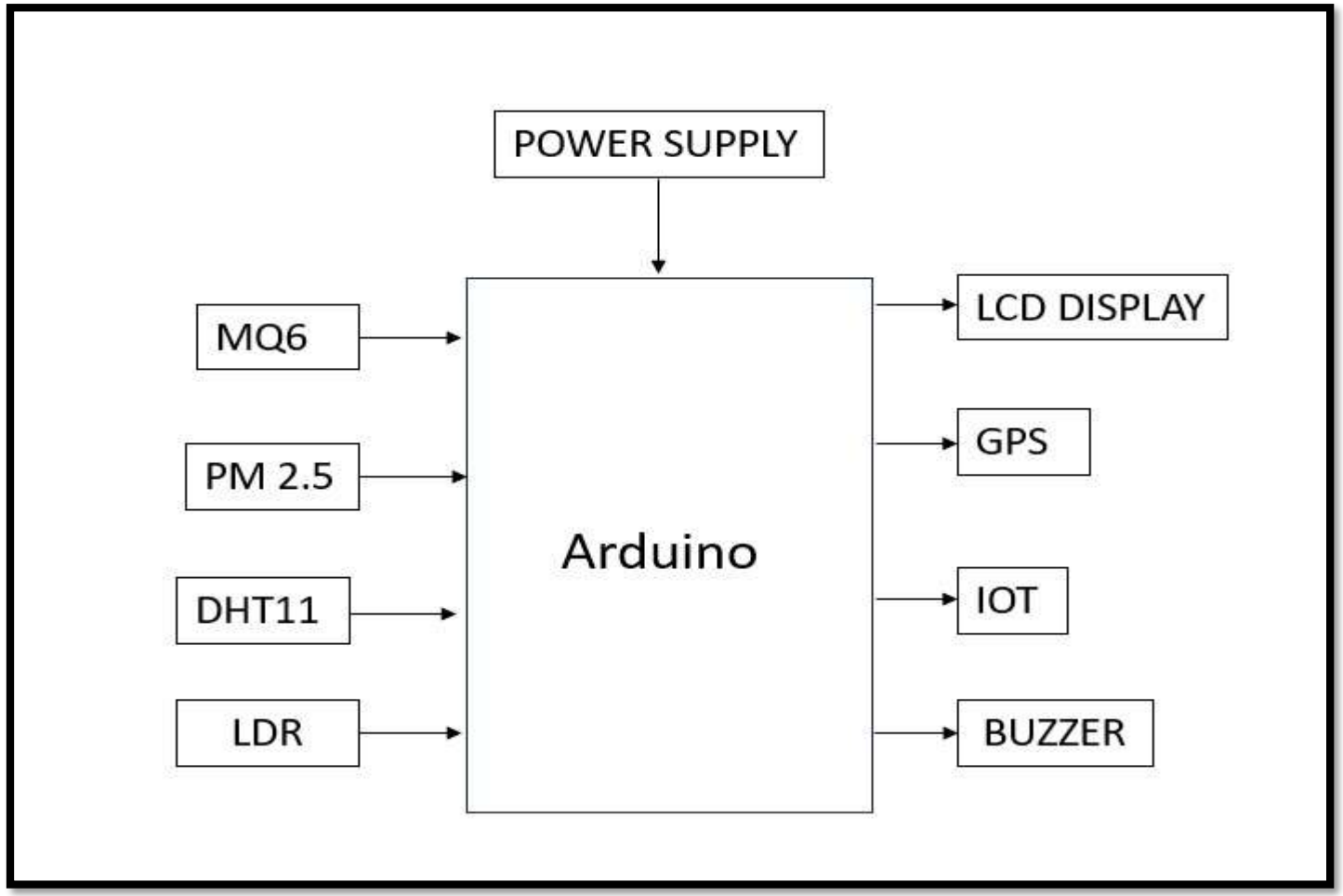
ABSTRACT : The quality of the air we breathe is a major concern in urban places. This offers a ground-breaking remedy for this problem. Given the widespread Through the use of mobile devices, gives detailed data on air quality, empowering individuals and authorities to make decisions that are best for their environment and health. This method provides a thorough and user-friendly way to track air quality, identify contaminants, and take preventative action to address environmental issues by utilizing the capabilities of these sensors. The introduction of mobile sensors for real-time air quality monitoring represents a significant breakthrough in our management of urban air pollution.

3. TITLE: Design, characterization and management of a wireless sensor network for smart gas monitoring

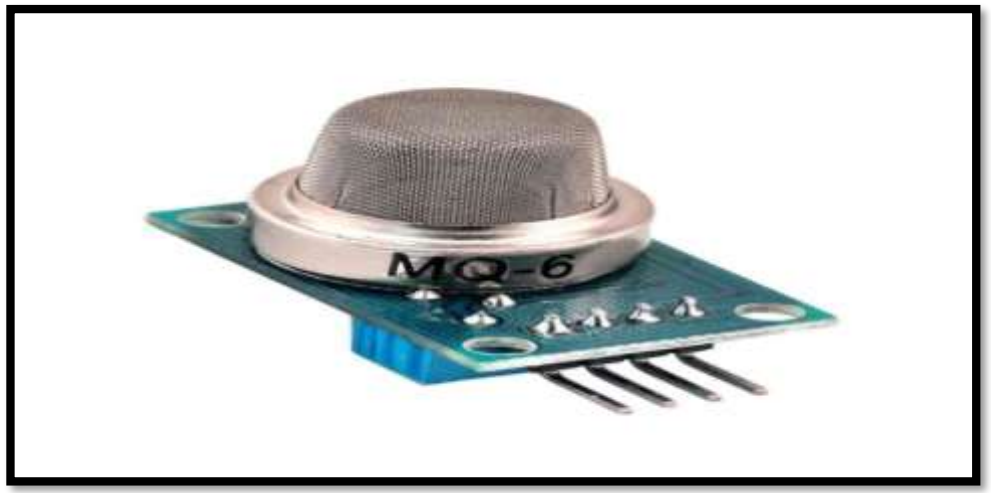
AUTHOR: Jelicic V., Magno M., Paci G. and Brunelli

ABSTRACT : Designing, characterizing, and managing a wireless sensor network for smart gas monitoring has advanced industrial safety and environmental protection. This technology use wireless sensors to continually monitor gas levels in a range of environments. It then provides real-time data and insights to revolutionize safety protocols and resource management. The design principles, data characterization, and all management techniques required for effective gas monitoring are examined in this work. This technology can increase resource efficiency, provide quick reaction times to potential hazards, and enhance industrial safety procedures.

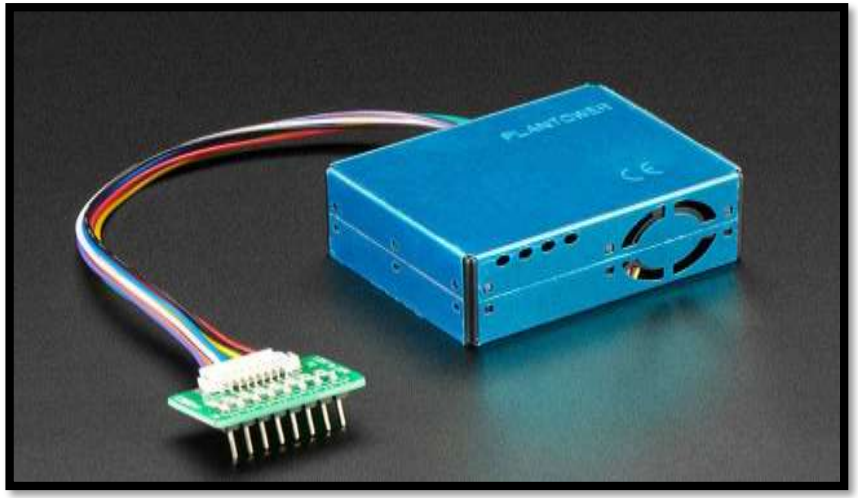
Proposed Block Diagram



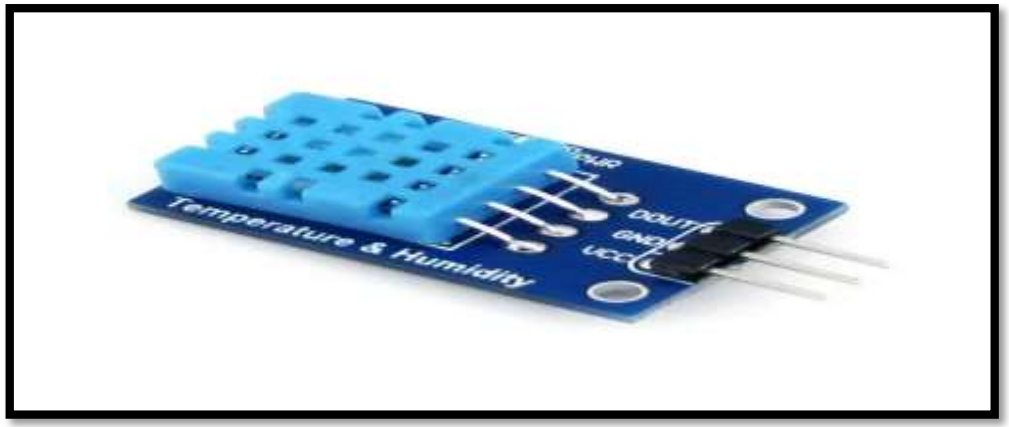
HARDWARE COMPONENTS



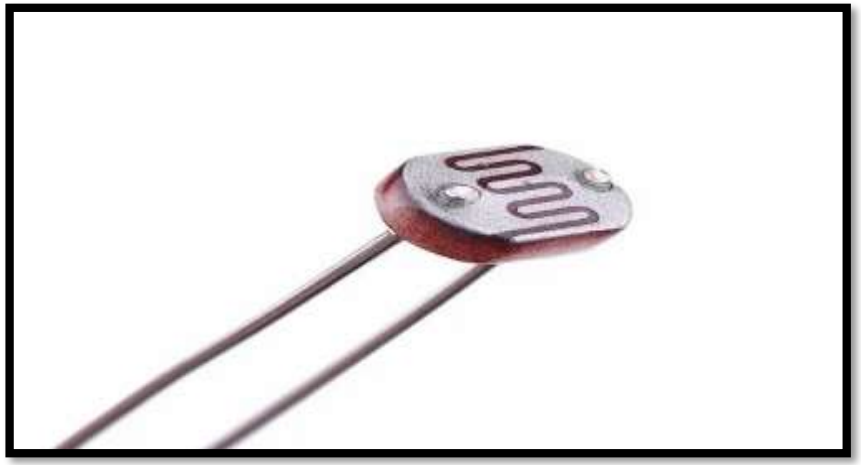
MQ6



PM2.5

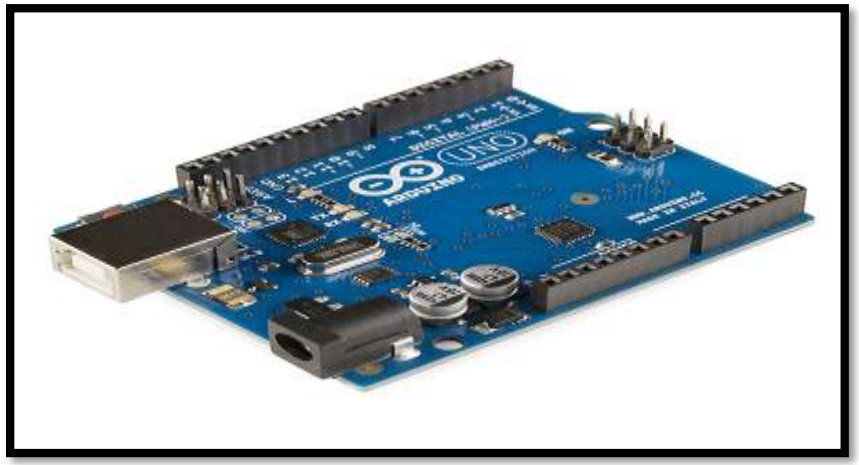


DHT11



LDR

LCD DISPLAY

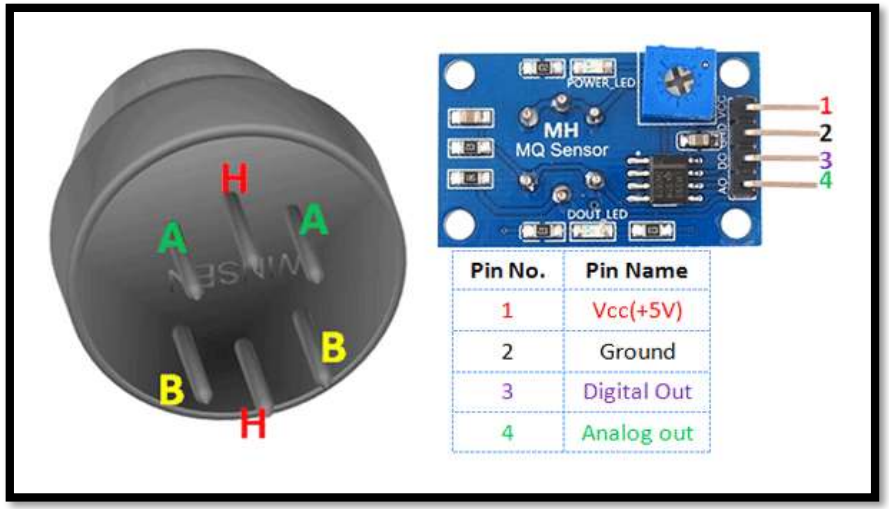


ARDUINO UNO

BUZZER

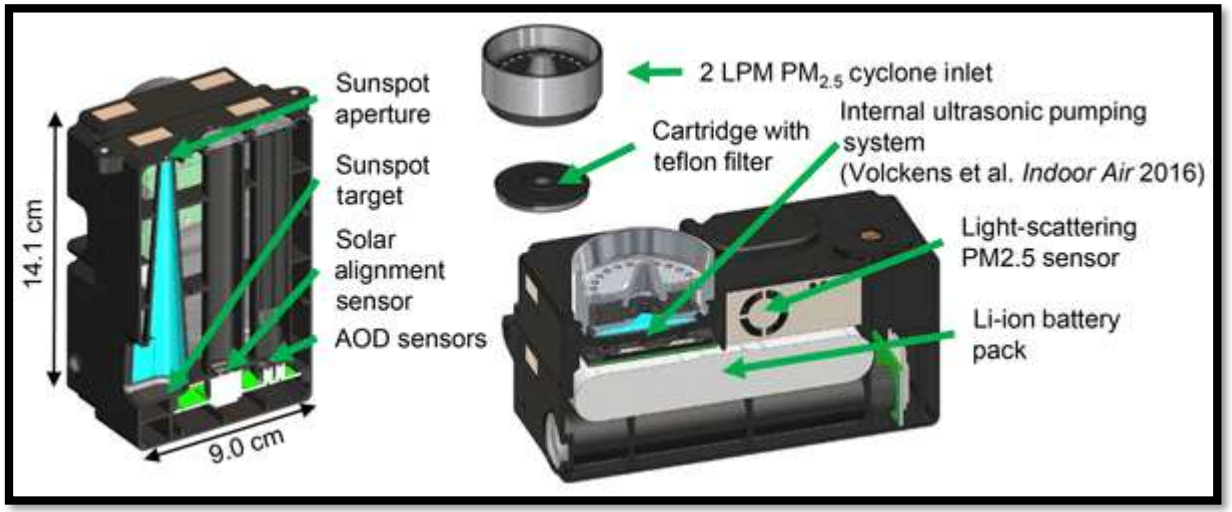
GPS

MQ6 SENSOR:



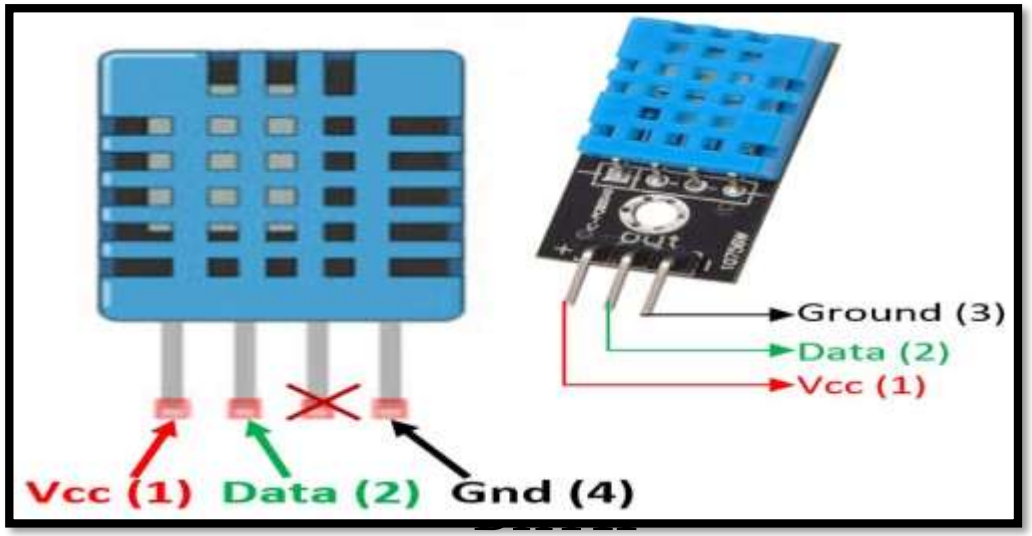
The MQ-6 sensor in an IoT air quality monitoring system operates on the principle of chemoresistance. During operation, the MQ-6 sensor's heating element raises the temperature of the sensing element, enhancing its sensitivity to target gases such as LPG, propane, methane, or alcohol. The output from the MQ-6 sensor is an analog voltage signal proportional to the concentration of the detected gas, suitable for integration into IoT systems for real-time air quality monitoring.

PM2.5 SENSOR:



The PM2.5 sensor operates on the principle of light scattering or absorption. It emits light onto suspended particles in air and measures the intensity of scattered or absorbed light, which correlates with concentration of PM2.5 particles. During operation, it detects PM2.5 particles, converts measured light intensity into digital data, and transmits it to a central server via IoT technology. The output includes real-time measurements of PM2.5 levels, enabling users to monitor and manage air quality for health and environmental purposes.

DHT11:

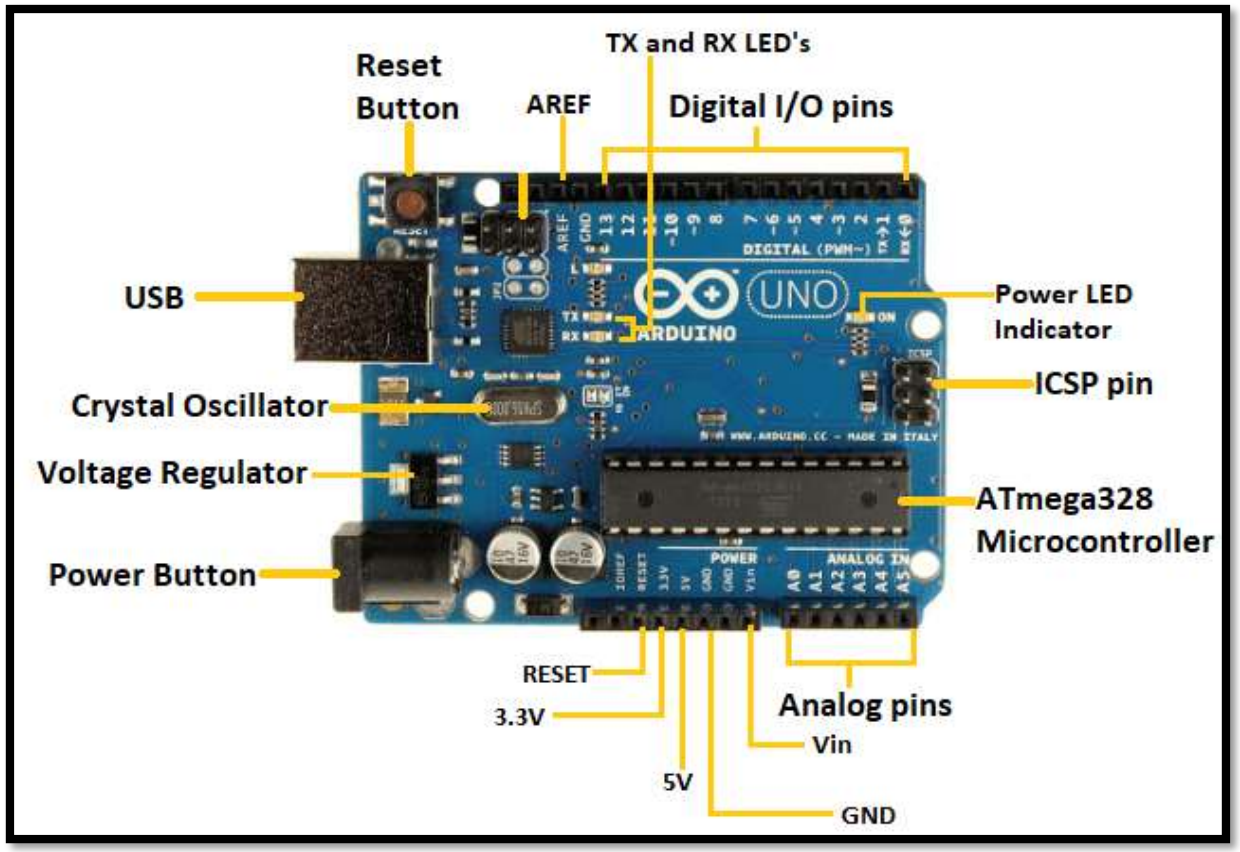


The DHT11 sensor operates on the principle of capacitive humidity sensing and thermistor-based temperature sensing. During operation, the sensor detects temperature and humidity levels in the environment. It converts these measurements into digital signals and transmits them to a central server using IoT technology. The output typically includes real-time data on temperature and humidity, providing users with insights into environmental conditions for effective air quality monitoring and management.

LCD DISPLAY:

The LCD display in an IoT air quality monitoring system serves as a visual interface for presenting real-time air quality data. Its principle involves displaying alphanumeric characters and symbols by manipulating liquid crystal cells controlled by electrical signals. During operation, the microcontroller processes data from various sensors and converts it into a format suitable for display. The output on the LCD includes information such as gas concentrations, particulate matter levels, temperature, and humidity.

ARDUINO UNO:



The Arduino Uno microcontroller in an IoT air quality monitoring system acts as the central processing unit, coordinating the collection, processing, and transmission of data from various sensors.

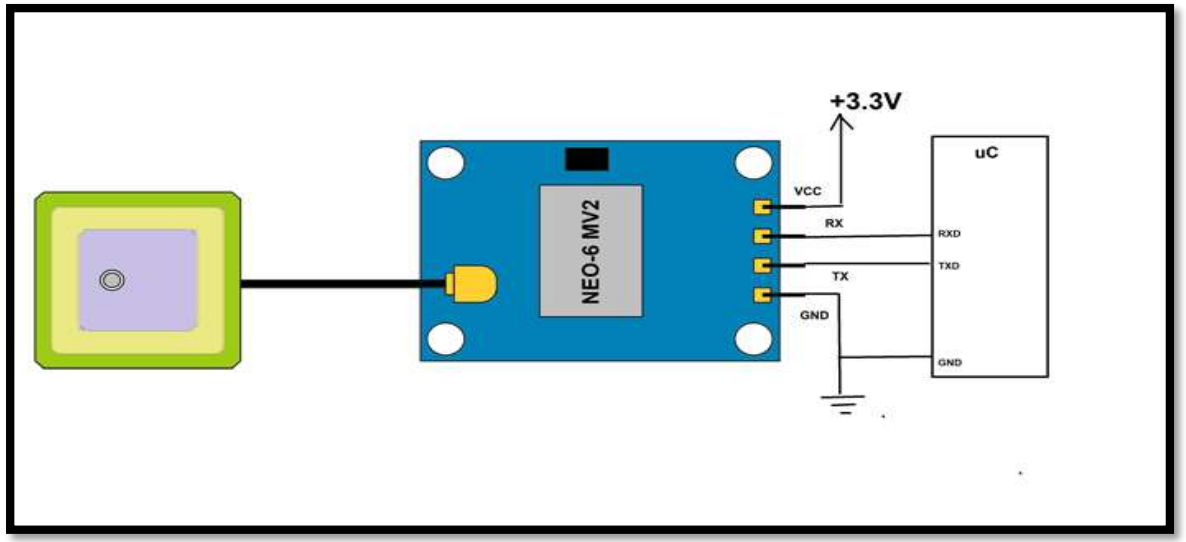
- Its principle involves executing programmed instructions to interact with sensors, process data, and communicate with IoT modules.

- During operation, the Arduino Uno interfaces with sensors such as gas sensors, PM2.5 sensors, and temperature/humidity sensors to collect environmental data.

- It then processes this data, performing calculations and implementing algorithms to interpret air quality parameters.

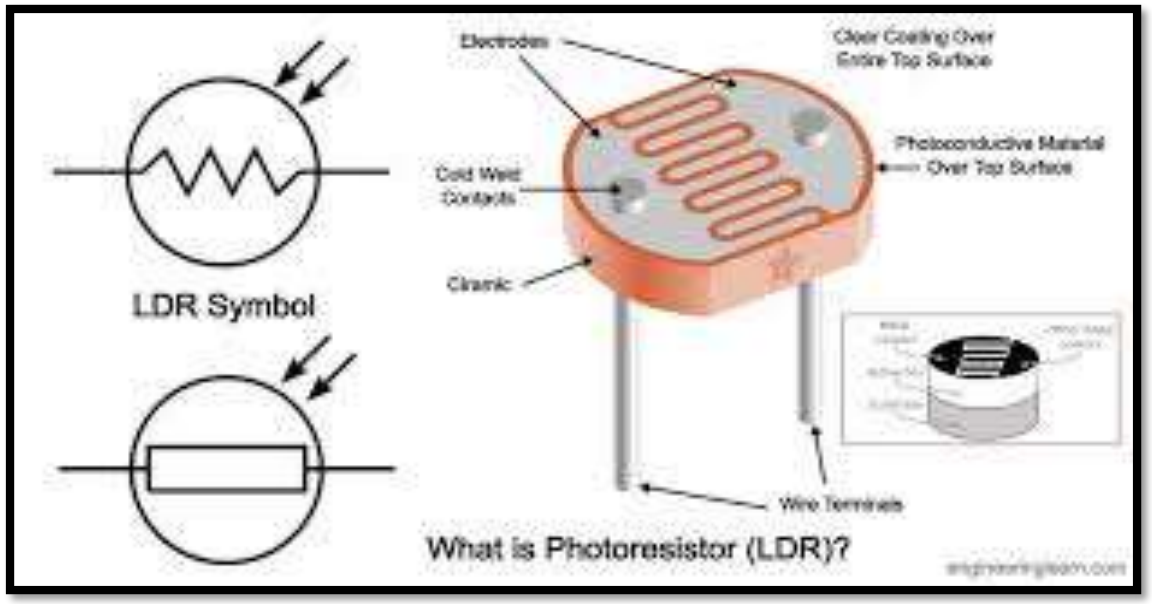
- The output includes formatted data ready for transmission to a central server, enabling real-time monitoring and analysis of air quality metrics via IoT technology.

GPS:



The GPS provides location data to identify the geographical coordinates of air quality measurement points. During operation, GPS module within the Iot receives signals from multiple satellites, determining its precise location. The output from GPS includes latitude and longitude coordinates, along with altitude and timestamp information. This data is crucial for spatially mapping air quality measurements, enabling users to visualize pollution hotspots and track environmental trends across different locations.

LDR SENSOR:



LDR (Light Dependent Resistor) sensors detect ambient light levels, indirectly indicating air quality. LDRs operate based on the principle of photoconductivity, where their resistance changes in response to incident light intensity. As air quality worsens due to pollutants like smoke or smog, light penetration decreases, causing a decrease in LDR resistance

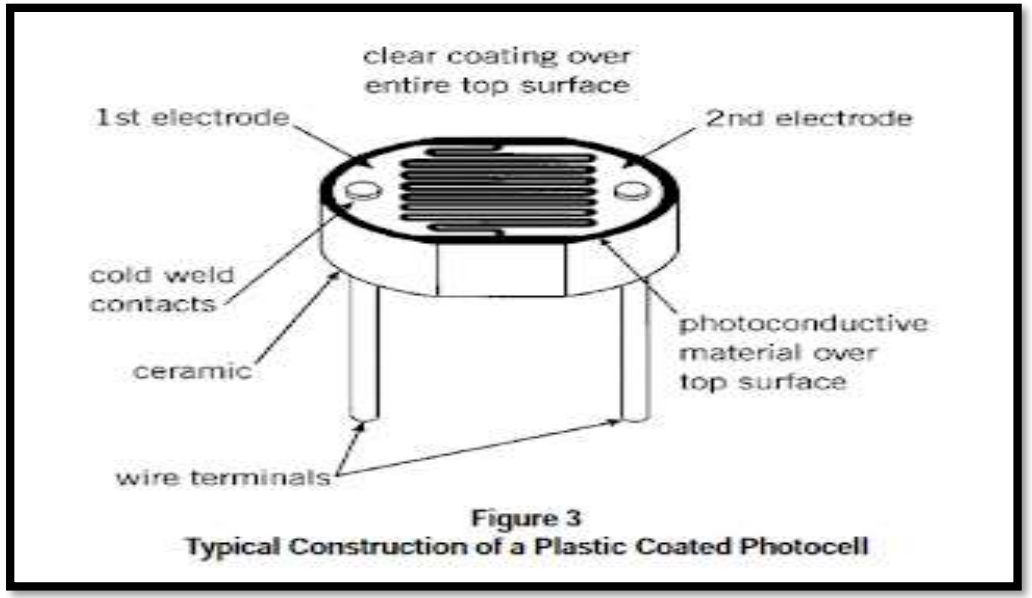
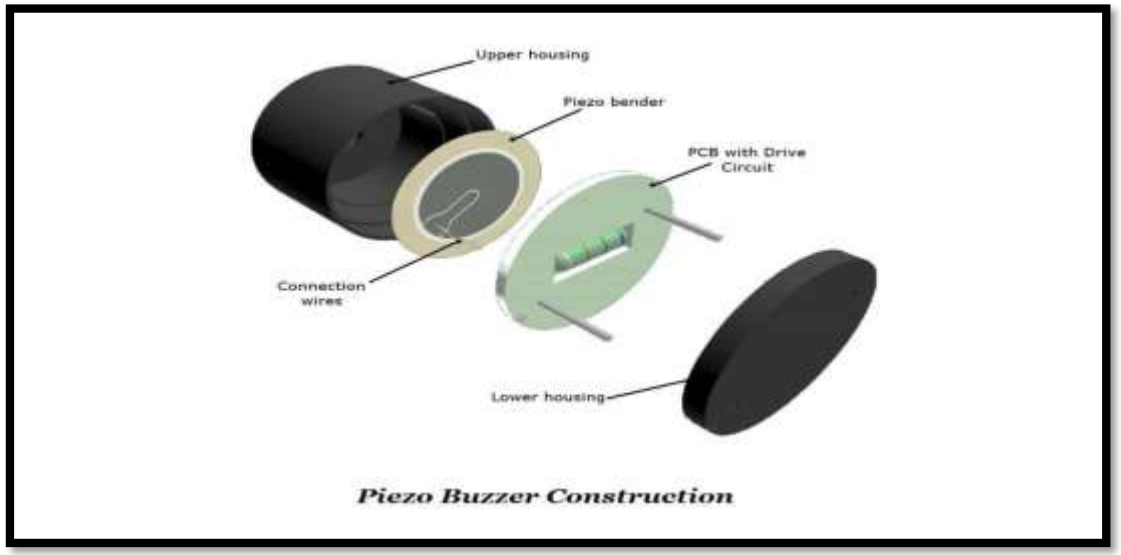


Figure 3
Typical Construction of a Plastic Coated Photocell

This change is measured and transmitted to an IoT system, alerting users to deteriorating air quality. Through continuous monitoring of LDR output, users can take timely actions to mitigate pollution levels, promoting healthier living environments and reducing health risks associated with poor air quality.

BUZZER:



Buzzers play a crucial role in providing audible alerts to users regarding changes in air quality levels. Buzzers operate based on the principle of electromagnetic or piezoelectric vibration, where an electric signal causes a diaphragm to vibrate, producing sound waves. When sensors detect hazardous levels of air pollutants, the buzzer emits a loud sound, signaling the need for immediate attention.

SOFTWARE COMPONENTS

ARDUINO IDE

TELEGRAM APPLICATION USING IOT MODULE

- IoT involves a symbiotic relationship between hardware and software. The software processes, analyzes, and presents this data to users in their Telegram app.
- The Arduino IDE (Integrated Development Environment) is a software application used for programming Arduino microcontroller boards.

ADVANTAGES

- Sensors are easily available.
- Detecting a wide range of gases, including NH3, NOx, alcohol, benzene, smoke and CO2,Co etc
- Simple, compact & Easy to handle.
- Sensors have long life time & less cost and simple Drive circuit.
- System is Real time.
- Quality of air can be checked indoor as well as outdoor.
- Visual output.
- Continuous update of change in percentage of quality.

APPLICATIONS

Fig: Roadside pollution Monitoring

Fig: Industrial Perimeter Monitoring

Fig: Site selection for reference monitoring stations

Fig: Indoor Air Quality Monitoring

RESULTS

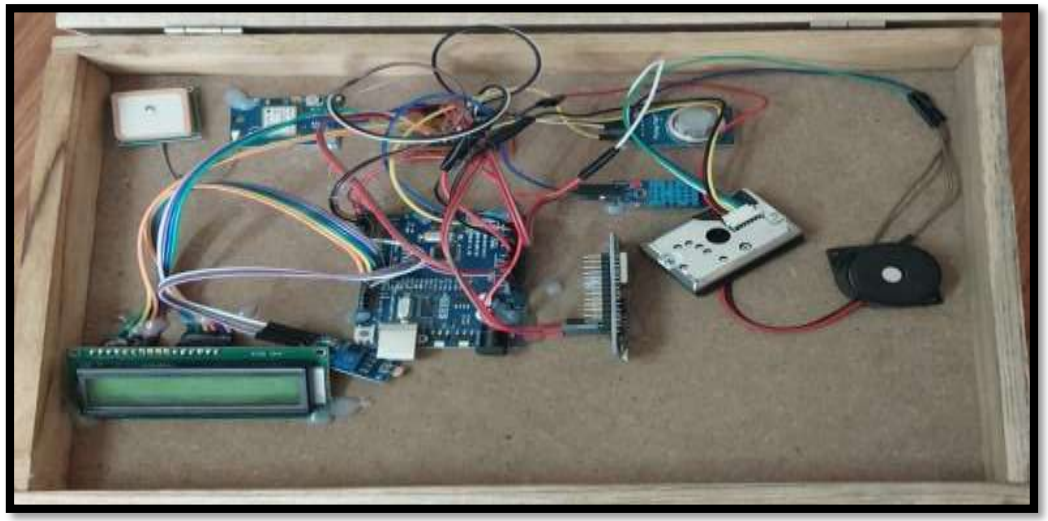


Fig: Overall Circuit Connection

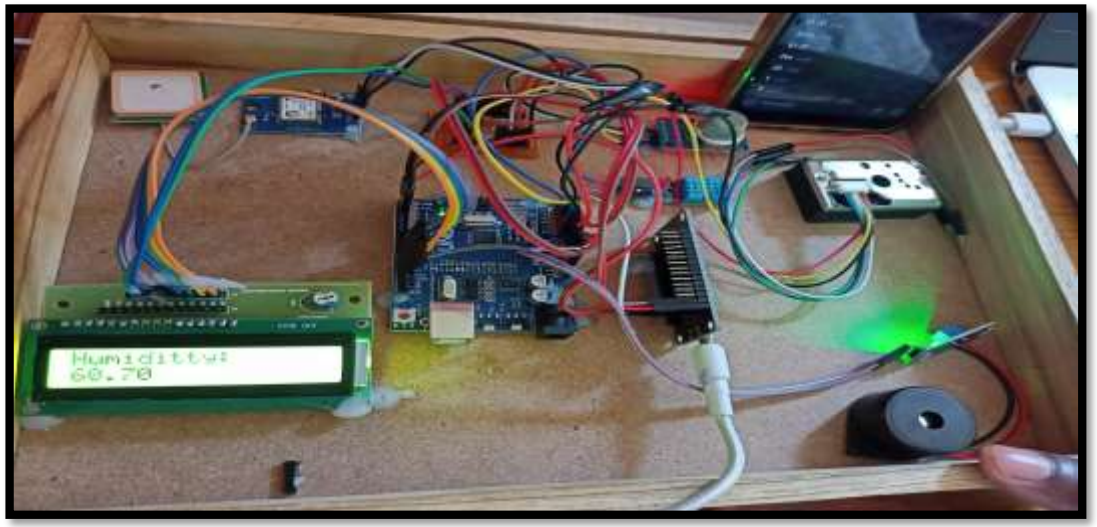


Fig: Display of Humidity Value on LCD

Fig: Display of PM2.5 Value on LCD

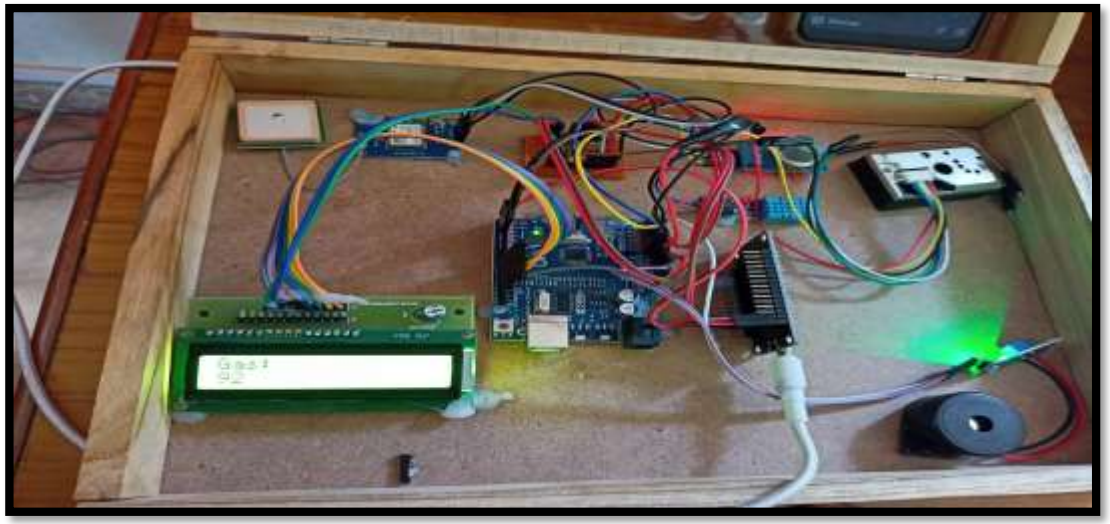


Fig: Display of Gas(CO2) Value on LCD

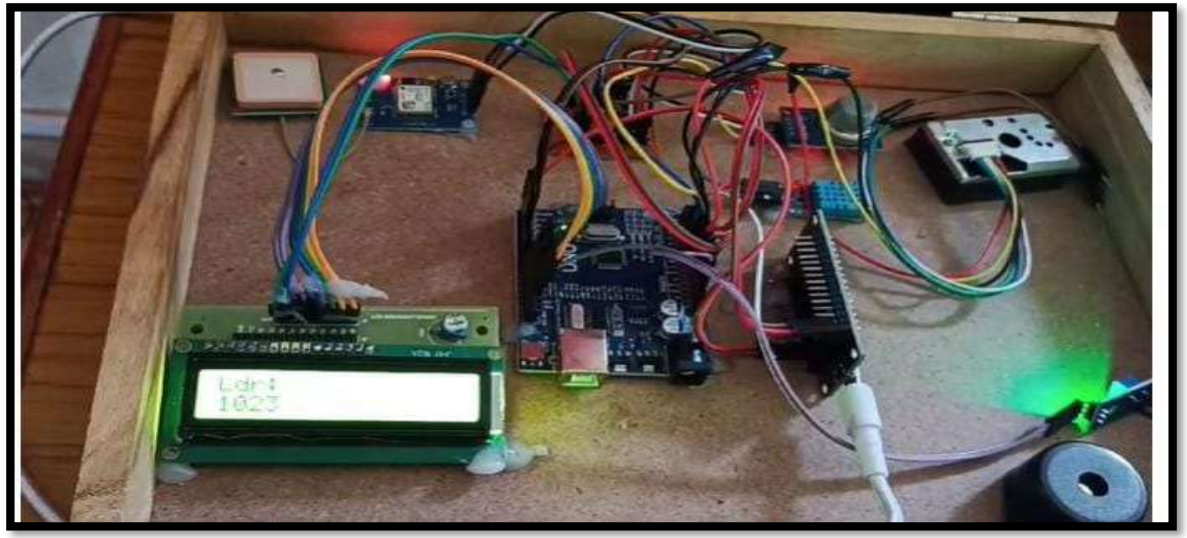
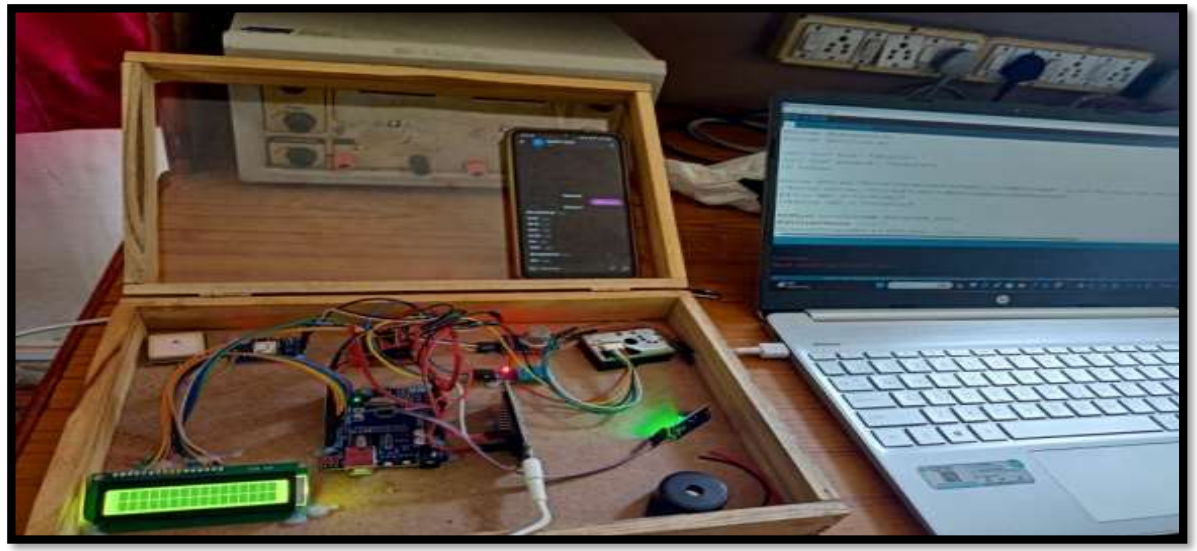


Fig: Display of LDR Value on LCD



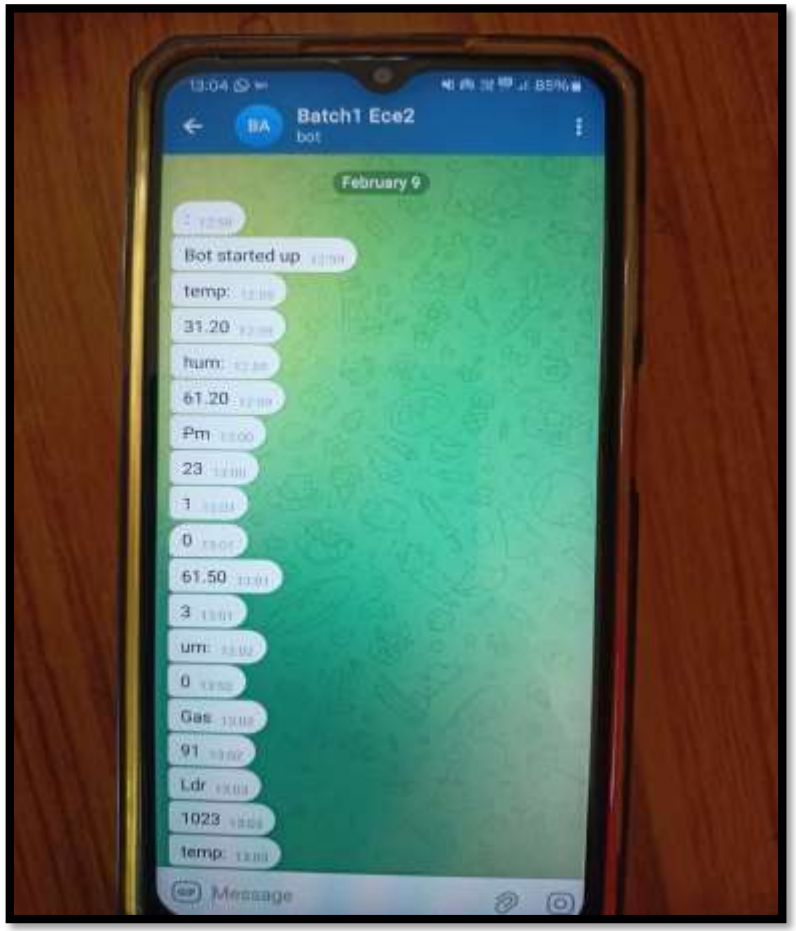


Fig: Values Shown in Telegram Application

Fig: Overall setup of circuit connection with code and telegram application

CONCLUSION

The products of this project are sensors such as MQ6, PM2.5,LDR and DHT11, which monitor temperature and humidity in the air as well as the concentration of LPG and butane gas and CO2 in the air as well as dangerous PM2.5 particles. We'll be using an LCD display to show the temperature, humidity, concentration of gases, and PM2.5 particle values. Our environment's air concentration will be updated via IOT and Arduino whenever it changes. The term GPS refers to the tracking of concentrations of air quality in specific areas. So in such a way we can see whether the environment is clean or not and if it is harmful air then buzzer rings and gives alert.

FUTURE SCOPE

- In future the project can be upgraded in more ways than one.
- Interface more number of sensors to know detail content of all gases present in air.
- Design Webpage and upload data on webpage with date and time.
- Interface SD Card to store data.
- Interface GPS module to monitor the pollution at exact location and upload on the webpage for the citizens.

REFERENCES

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[2] Ch.V.Saikumar,M.Reji,P.C.Kishoreraja., “IOT based air quality monitoring system”, International Journal of Pure & Applied Mathematics,Vol 117, No. 9, pp. 53- 57,2017

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Thank You...