



DETECTION OF AIR CONTAMINATION

USING NODEMCU

A PROJECT REPORT

Submitted by

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in partial fulfillment for the award of

degree of

BACHELOR OF ENGINEERING

in

**ELECTRONICS AND COMMUNICATION
ENGINEERING**

M. KUMARASAMY COLLEGE OF ENGINEERING

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JUNE 2020

BONAFIDE CERTIFICATE

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This project report has been submitted for the **16BEC811-Project Work II** Viva Voice Examination held at M Kumarasamy College of Engineering, Karur on_____.

INTERNAL EXAMINER

EXTERNAL EXAMINER

ACKNOWLEDGEMENT

Behind every achievement lies an unfathomable sea of gratitude to those who actuated it, without them it would have never come into existence, to them we lay the word of gratitude imprinted within us.

Our sincere thanks to **Thiru.M.Kumarasamy, Chairman** and **Dr.K.Ramakrishnan, Secretary** of M.Kumarasamy College of Engineering for providing extra ordinary infrastructure, which helped us to complete the project in time.

It is a great privilege for us to express our gratitude to our **Principal, Dr.N.Ramesh Babu, M.E., Ph.D.**, for providing us right ambiance for carrying out the project work.

We would like to thank our **Head of the Department, Dr.C.Vivek, M.Tech., Ph.D.**, Department of Electronics and Communication Engineering, for their unwavering moral support throughout the evolution of the project.

We offer our whole hearted thanks to our **Project guide, Mr.L.Ramesh, M.E**, Assistant Professor, Department of Electronics and Communication Engineering, for his constant encouragement, kind co-operation, valuable suggestions and support rendered in making our project a success.

We would like to thank our **Project Co-ordinator, Mr.K.Kaarthik, M.E, Assistant Professor,,** Assistant Professor, Department of Electronics and Communication Engineering for her kind cooperation and culminating in the successful completion of project work.

We glad to thank all the **Faculty Members of Department of Electronics and Communication Engineering** of our institution for extending a warm helping hand and valuable suggestions throughout the project. Words are boundless to thank **Our Parents and Friends** for their constant encouragement to complete this project successfully.

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Abstract	Matching with POs, PSOs
WiFi, IoT, Wireless, Cloud Storage, Sensors	PO1, PO2, PO3, PO5, PO6, PO8, PO9, PO10, PO11, PO12, PSO1, PSO2

ABSTRACT

Where pollution has become a major problem around the world, air pollution is the most dangerous, shocking and severe pollution among other pollutions e.g. water pollution, soil pollution, noise pollution, light pollution, thermal pollution etc. Air pollution is the major cause of diseases like asthma, cancer, bronchitis, birth defects and immune system like diseases. This system implements the combination of an android app, server, gas sensors (CO_2 , CO , LPG , and CH_4) to sense the air quality of the environment and shows the real condition of air. Solving the draw backs of existing air quality sensors this device can be used to monitor various gasses at a time. The most demanding thing would be this system will give the real time data and will show the quality of the air based on the standard air quality. The system will give the user the indication of the air quality and based on given parameters it will let the user know how much the environmental air is polluted or safe. This system will do everything on behalf of human in such a way that for a smart city when people will have less time for spending and there will be more industry and air will be more polluted this device will let people know how safe the air is. Internet of Things is nowadays finding profound use in each and every sector, plays a key role in our air quality monitoring system too. Detection of air contamination using nodemcu is used to monitor the Air Quality over a web server using Internet. It will trigger an alarm via mobile app when the air goes beyond a certain level, means when there are sufficient amount of harmful gases present in air like CO_2 , smoke, benzene, NH_3 and NO_x . The system uses a MQ135 sensor as it detects most harmful gases and can measure their amount accurately.

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LIST OF ABBREVIATIONS

ABBREVIATION	EXPANSION
IOT	Internet of Things
NRDC	National Research Development Corporation
GUI	Graphical User Interface
HTML	Hyper Text Markup Language
PAH	Polycyclic Aromatic Hydrocarbons
ADHD	Attention Deficit Hyperactivity Disorder
HFC	Hydrofluorocarbons
RBC	Red Blood Cells
MQTT	Message Queuing Telemetry Transport
LoRa	LongRange
HVAC	Heating, Ventilation, and Air Conditioning
EPA	Environmental Protection Agency
PHP	Personal Home Page
CCS	Cascading Style Sheets
SQL	Structured Query Language
API	Application Programming Interface

CHAPTER 1

INTRODUCTION

Considering the daily newspapers and any other electronic or print media, a devastating news which is spreading day by day is people is becoming sick and the climate is changing such a way that it has become miserable for living of people. From the aspect from top to bottom, every people are suffering the curse of climate change. The main reason for the climate change and people health is air pollution. It has brought changes in climate like global warming, global dimming, over raining, drought, storms, acid rain, foggy weather etc. The living things on earth and under water are suffering many problems like change in life due to lack of proper facilities of life.

Air is the most useful thing for each and every living thing. Researching on this serious issue this system's main purpose was to estimate the quality of air for people and any other living thing which exist on earth. Very important to know for our living is that how much safe we are now and how the weather and climate has changed for air pollution and it will sustain sound. This system will ease to know the answers for airquality.

Four major gas sensors which are responsible for the most airpollution mostly are being used in the system to know the best result of the whole condition of the air. CO₂, CO, LPG, Humidity are declared to be the most responsible for air pollution and in the system all are used. A server and an android app have been made to know the statistics because now days almost everyone has an android operating device and access to internet.

1.1 AIR POLLUTION

Air pollution refers to the release of pollutants into the air that are detrimental to human health and the planet as a whole.

The Clean Air Act authorizes the U.S. Environmental Protection Agency (EPA) to protect public health by regulating the emissions of these harmful air pollutants. The NRDC has been a leading authority on this law since it was established in 1970.

What Causes Air Pollution?

“Most air pollution comes from energy use and production,” says John Walke, director of the Clean Air Project, part of the Climate and Clean Air program at NRDC. “Burning fossil fuels releases gases and chemicals into the air.” And in an especially destructive feedback loop, air pollution not only contributes to climate change but is also exacerbated by it. “Air pollution in the form of carbon dioxide and methane raises the earth’s temperature,” Walke says. “Another type of air pollution is then worsened by that increased heat: Smog forms when the weather is warmer and there’s more ultraviolet radiation.” Climate change also increases the production of allergenic air pollutants including mold (thanks to damp conditions caused by extreme weather and increased flooding) and pollen (due to a longer pollen season and more pollen production).

1.2 EFFECTS OF AIR POLLUTION

The two are most prevalent types of air pollution. Smog, or “ground-level ozone,” as it is more wonkily called, occurs when emissions from combusting fossil fuels react with sunlight. Soot, or “particulate matter,” is made up of tiny particles of chemicals, soil, smoke, dust, or allergens, in the

form of gas or solids, that are carried in the air. The EPA's "Plain English Guide to the Clean Air Act" states, "In many parts of the United States, pollution has reduced the distance and clarity of what we see by 70 percent." The sources of smog and soot are similar. "Both come from cars and trucks, factories, power plants, incinerators, engines—anything that combusts fossil fuels such as coal, gas, or natural gas," Walke says. The tiniest airborne particles in soot—whether they're in the form of gas or solids—are especially dangerous because they can penetrate the lungs and bloodstream and worsen bronchitis, lead to heart attacks, and even hasten death.

Smog can irritate the eyes and throat and also damage the lungs—especially of people who work or exercise outside, children, and senior citizens. It's even worse for people who have asthma or allergies—these extra pollutants only intensify their symptoms and can trigger asthma attacks.

1.3 HAZARDOUS AIR POLLUTANTS

These are either deadly or have severe health risks even in small amounts. Almost 200 are regulated by law; some of the most common are mercury, lead, dioxins, and benzene. "These are also most often emitted during gas or coal combustion, incinerating, or in the case of benzene, found in gasoline," Walke says. Benzene, classified as a carcinogen by the EPA, can cause eye, skin, and lung irritation in the short term and blood disorders in the long term. Dioxins, more typically found in food but also present in small amounts in the air, can affect the liver in the short term and harm the immune, nervous, and endocrine systems, as well as reproductive functions. Lead in large amounts can damage children's brains and kidneys, and even in small amounts it can affect children's IQ and ability to learn. Mercury affects the central nervous system.

Polycyclic aromatic hydrocarbons, or PAHs, are toxic components of traffic exhaust and wildfire smoke. In large amounts, they have been linked to eye and lung irritation, blood and liver issues, and even cancer. In one recent study, the children of mothers who'd had higher PAH exposure during pregnancy had slower brain processing speeds and worse symptoms of ADHD.

1.3.1 GREENHOUSE GASES

By trapping the earth's heat in the atmosphere, greenhouse gases lead to warmer temperatures and all the hallmarks of climate change: rising sea levels, more extreme weather, heat-related deaths, and increasing transmission of infectious diseases like Lyme. According to a 2014 EPA study, carbon dioxide was responsible for 81 percent of the country's total greenhouse gas emissions, and methane made up 11 percent. "Carbon dioxide comes from combusting fossil fuels, and methane comes from natural and industrial sources, including the large amounts that are released during oil and gas drilling," Walke says. Another class of greenhouse gases, hydrofluorocarbons (HFCs), are thousands of times more powerful than carbon dioxide in their ability to trap heat.

1.3.2 POLLEN AND MOLD

Mold and allergens from trees, weeds, and grass are also carried in the air, are exacerbated by climate change, and can be hazardous to health. They are not regulated by the government and are less directly connected to human actions, but they can be considered as air pollution.

Table 1.1 Gases Present In Air

Name	Molecular formula	Composition
Nitrogen	N ₂	78.084
Oxygen	O ₂	20.947
Argon	Ar	0.934
Carbon dioxide	CO ₂	0.0350
Neon	Ne	0.001818
Helium	He	0.000524
Methane	CH ₄	0.00017
Krypton	Kr	0.000114
Hydrogen	H ₂	0.000053
Nitrous oxide	N ₂ O	0.000031
Xenon	Xe	0.0000087
Ozone	O ₃	trace to 0.0008
Carbon monoxide	CO	trace to 0.000025
Sulfur dioxide	SO ₂	trace to 0.00001
Nitrogen dioxide	NO ₂	trace to 0.000002
Ammonia	NH ₃	trace to 0.0000003

1.4 CAUSES OF AIR POLLUTION

Air pollution can result from both human and natural actions. Natural events that pollute the air include forest fires, volcanic eruptions, wind erosion, pollen dispersal, evaporation of organic compounds and natural radioactivity. Sources of air pollution refer to the various locations, activities or factors which are responsible for the releasing of pollutants into the atmosphere. Man-made sources mostly related to burning different kinds of fuel. "Stationary Sources" include smoke stacks of power plants, manufacturing facilities (factories) and waste incinerators, as well as furnaces and other types of fuel-burning heating devices. In developing and poor countries, traditional biomass burning is the major source of air pollutants; traditional biomass includes wood, crop waste and dung. "Mobile Sources" include motor vehicles, marine vessels, aircraft and the effect of sound etc. Chemicals, dust and controlled burn practices in agriculture and forestry management. Controlled or prescribed burning is a technique sometimes used in forest management, farming, prairie restoration or greenhouse gas abatement. Fire is a natural part of both forest and grassland ecology and controlled fire can be a tool for foresters. Controlled burning stimulates the germination of some desirable forest trees, thus renewing the forest. Fumes from paint, hair spray, varnish, aerosol sprays and other solvents. Waste deposition in landfills, which generate methane. Methane is highly flammable and may form explosive mixtures with air. Military, such as nuclear weapons, toxic gases, germ warfare and rocketry. Natural sources Dust from natural sources, usually large areas of land with few or no vegetation.

Table 1.2 Air Pollutants, their sources and effects

Name of the pollutants	Sources	Health effects
Nitrogen oxides	Industries, vehicles and power plants	Problems in the lungs, respiratory systems and causes asthma and bronchitis.
Carbon monoxide	Emission and burning of fossil fuels	Severe headache, irritation to mucous membrane, unconsciousness and death.
Carbon dioxide	Burning of fossil fuels	Vision problem, severe headache and heart strain.
Suspended particulate matter	Vehicular emission and burning of fossil fuels.	Lung irritation reduces development of RBC and pulmonary malfunctioning.
Sulphur oxide	Industries and power plant	Irritation in eyes and throat, allergies, cough etc.
Smog	Industries and vehicular pollution	Respiratory and eye problems
Hydrocarbons	Burning of fossil fuels	Kidney problems, irritation in eyes, nose and throat, asthma, hypertension and carcinogenic effects on lungs.
Chlorofluorocarbons	Refrigerators, emission from jets	Depletion of ozone layer, global warming

1.5 BASIS OF IOT

The Internet of Things (IoT) is a network of 'smart' devices that connect and communicate via the Internet. The key to the IoT is the interconnectivity of devices, which collect and exchange information through embedded software, cameras and sensors which sense things like light, sound, distance and movement. Smart devices operate automatically, or are controlled and monitored remotely.

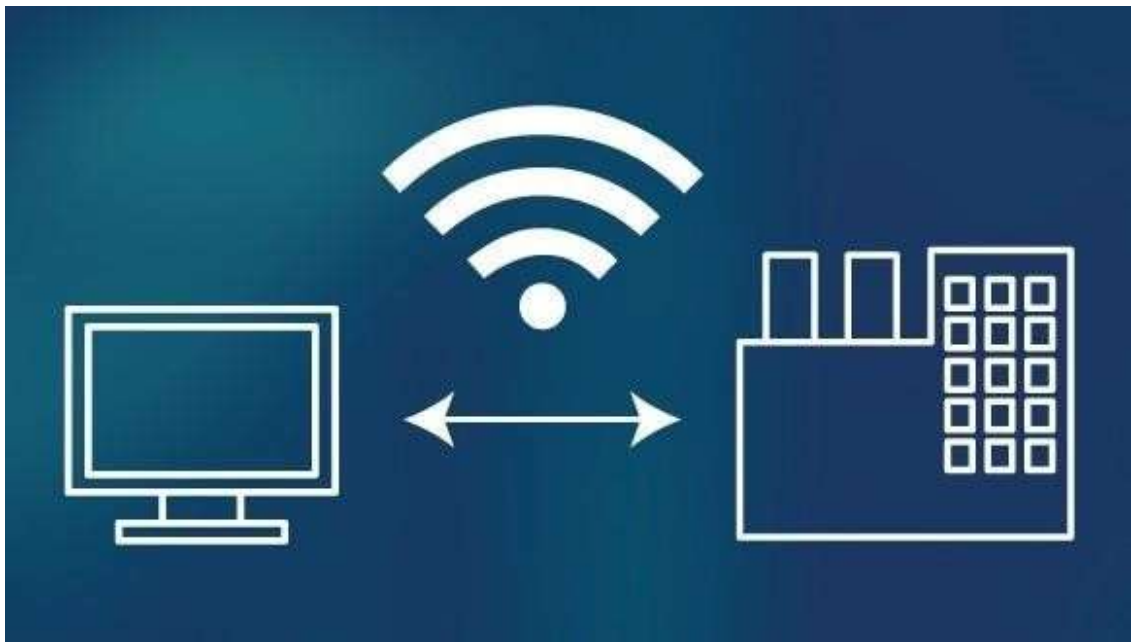


Figure 1.1 Basis of IoT

The Internet of Things is used in a variety of business sectors, from agriculture to healthcare to manufacturing. Developments like automated checkout, connected, self-driving vehicles, and asset management are helping to increase efficiency and productivity, and lower costs across several industries. The consumer is seeing the benefits too, with advancements in healthcare products and monitoring, and personal health and fitness products.

1.6 EVOLUTION OF IOT

During recent years, one of the most familiar name scaling new heights and creating a benchmark is Internet of Things (IoT). It is indeed the future of communication that has transformed Things (Objects) of the real world into smarter devices. The functional aspect of IoT is to unite every object of the world in such a manner that humans have the ability to control them via Internet. Furthermore, these objects also provide regular as well as timely updates on their current status to its end user. Although IoT concepts were proposed a couple of years ago, it may not be incorrect to quote that this term has become a benchmark for establishing communication among objects.

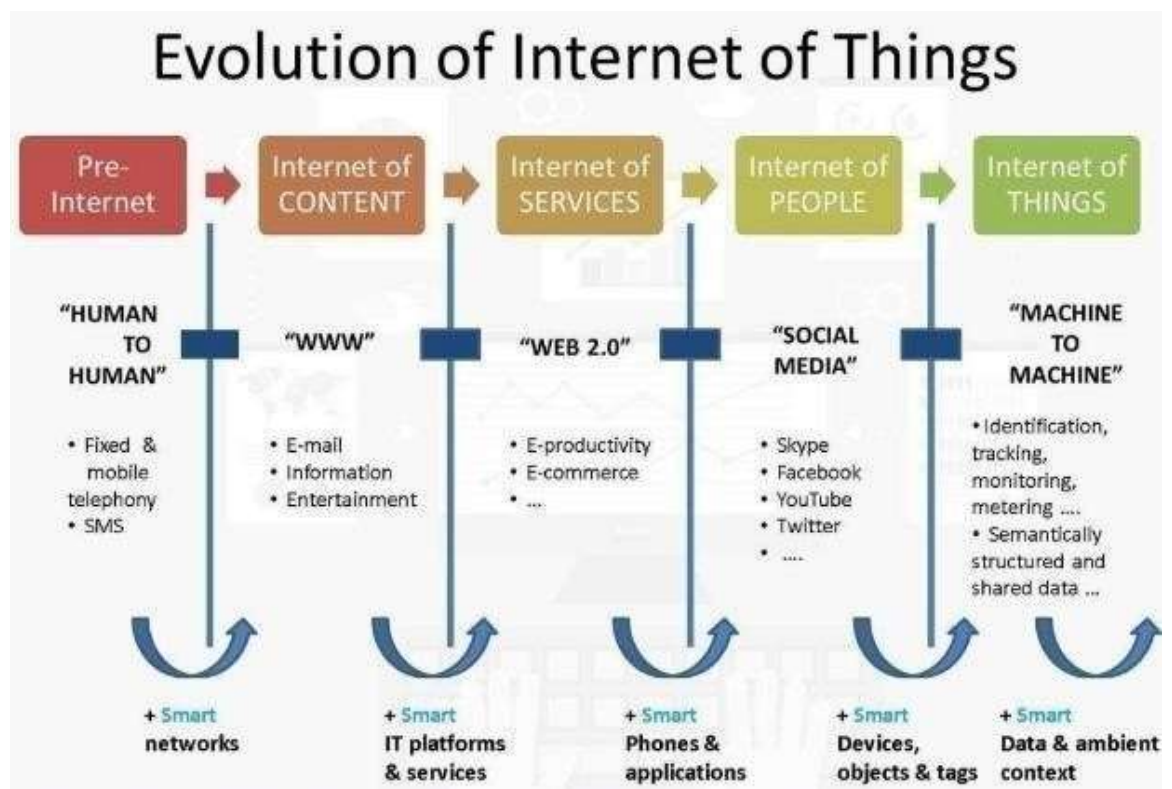


Figure 1.2 Evolution of IoT

CHAPTER 2

LITERATURE REVIEW

2.1 A WIFI-ENABLED INDOOR AIR QUALITY MONITORING AND CONTROLLING SYSTEM

Published in: Control & Automation (ICCA), 2017 13th
IEEE International Conference

Authors: Xiaoke Yang, Lingyu Yang, Jing Zhang(School of
Automation Science and Electrical Engineering, Beihang
University, Beijing, 100191, China)

This paper proposes an open platform of a WiFi-enabled indoor air quality monitoring and control system, which could be incorporated into such a ‘smart building’ structure. The complete software and hardware design of this system is presented, along with a series of control experiments. The proposed system operates over an existing WiFi wireless network utilizing the MQTT protocol. It is capable of monitoring the indoor air quality as well as controlling an air purifier to regulate the particulate matters concentration. Experiment results under a real world office environment demonstrate the effectiveness of the proposed design.

2.2 A LOW-POWER REAL-TIME AIR QUALITY MONITORING SYSTEM USING LPWAN BASED ON LORA

Published in: Solid-State and Integrated Circuit Technology
(ICSICT), 2016 13th IEEE International Conference

Authors: Sujuan Liu, Chuyu Xia, Zhenzhen Zhao

(College of Electronic Information and Control Engineering, Beijing University of Technology, 100124, China)

This paper presents a low-power real-time air quality monitoring system based on the LoRa Wireless Communication technology. The proposed system can be laid out in a large number in the monitoring area to form sensor network. The system integrates a single-chip microcontroller, several air pollution sensors (NO₂, SO₂, O₃, CO, PM₁, PM₁₀, PM_{2.5}), LongRange (LoRa) - Modem, a solar PV-battery part and graphical user interface (GUI). As communication module LoRa sends the data to the central monitoring unit and then the data would be saved in the cloud. The range tests at an outdoor area show that LoRa is able to reach to approximately 2Km. The TX power is only about 110mA which is lower compared with other used wireless technology. An easy to use GUI was designed in the system. Based on LoRa technology, GUI, and Solar PV- battery part the system has several progressive features such as low cost, long distance, high coverage, long device battery life, easy to operate.

2.3 IOT ENABLED PROACTIVE INDOOR AIR QUALITY MONITORING SYSTEM FOR SUSTAINABLE HEALTH MANAGEMENT

Published in: Computing and Communications Technologies (ICCCT), 2017 2nd International Conference

Authors: M.F.M Firdhous, B.H Sudantha, P.M Karunaratne (Dept. of Information Technology, University of Moratuwa, Sri Lanka)

This paper proposes an IoT based indoor air quality monitoring system for tracking the ozone concentrations near a photocopy machine. The experimental system with a semiconductor sensor capable of monitoring ozone concentrations was installed near a high volume photocopier. The IoT device has been programmed to collect and transmit data at an interval of five minutes over blue tooth connection to a gateway node that in turn communicates with the processing node via the Wi-Fi local area network. The sensor was calibrated using the standard calibration methods. As an additional capability, the proposed air pollution monitoring system can generate warnings when the pollution level exceeds beyond a predetermined threshold value.

2.4 A WIRELESS SYSTEM FOR INDOOR AIR QUALITY MONITORING

Published in: Industrial Electronics Society , IECON 2016 - 42nd Annual Conference of the IEEE

Authors: R du Plessis, A Kumar, GP Hancke

(Department of Electrical, Electronic and Computer Engineering, University of Pretoria, South Africa)

This paper describes the development of a wireless monitoring system which can be deployed in a building. The system measures

carbon dioxide, carbon monoxide and temperature. The system developed in this paper can serve as the monitoring component of a HVAC control system and function as an indoor air quality monitor independently.

2.5 POLLUINO: AN EFFICIENT CLOUD-BASED MANAGEMENT OF IOT DEVICES FOR AIR QUALITY MONITORING

Published in: Research and Technologies for Society and Industry Leveraging a better tomorrow (RTSI), 2016 IEEE 2nd International Forum

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. In such a complex scenario, the Cloud computing is an efficient solution for the managing of sensor data. This paper presents Polluino, a system for monitoring the air pollution via Arduino. Moreover, a Cloud-based platform that manages data coming from air quality sensors is developed.

2.6 AN EMBEDDED SYSTEM MODEL FOR AIR QUALITY MONITORING

Published in: Computing for Sustainable Global Development (INDIACom), 2016 3rd International Conference

Authors: Sneha Jangid, Sandeep Sharma (School of ICT, Gautam Buddha University, Greater Noida, India)

Objective of the paper is to present a system model which can facilitate the assessment of health impacts caused due to indoor air pollutant as well as outdoor and can intimate the human prior about the risk he/she going to have, here we are focusing our work in context to allergic patients as they will be informed by this tool such that they can secure themselves without actually experiencing the risk factors, here a sensing network based microcontroller equipped with gas sensors, optical dust particle sensor, humidity and temperature sensor has been used for air quality monitoring. The design included various units mainly: sensing unit, processing unit, power unit, display unit, communication unit. This work will apply the techniques of electrical engineering with the knowledge of environmental engineering by using sensor networks to measure Air Quality Parameters.

2.7 A REAL-TIME AMBIENT AIR QUALITY MONITORING WIRELESS SENSOR NETWORK FOR SCHOOLS IN SMART CITIES

Published in: Smart Cities Conference (ISC2), 2015 IEEE First International

Authors: H. Ali, J. K. Soe, Steven. R. Wel

(School of Electrical Engineering & Computer Science, The University of Newcastle, Callaghan, NSW 2308, Australia)

In this paper, a low-cost solar-powered air quality monitoring system based on ZigBee wireless network system technology is presented. The solar powered network sensor nodes can be deployed by schools to collect and report real-time data on carbon monoxide (CO), nitrogen dioxide (NO₂), dust particles, temperature, and relative humidity. The proposed system allows schools to monitor air quality conditions on a desktop/laptop computer through an application designed using LabVIEW and provides an alert if the air quality characteristics exceed acceptable levels. They tested the sensor network successfully at the Singapore campus of the University of Newcastle, Australia. The experimental results obtained by them demonstrated that the sensor network can provide high-quality air quality measurements over a wide range of CO, NO₂ and dust concentrations.

2.8 A SMART SENSOR SYSTEM FOR AIR QUALITY MONITORING AND MASSIVE DATA COLLECTION

Published in: Information and Communication Technology
Convergence (ICTC), 2015 International Conference

Authors: Yonggao Yang, Lin Li

(Department of Computer Science, Prairie View A&M University,
Prairie View, TX 77446, U.S.A)

Air pollution has been a global challenge for environment protection.
Effectively collecting and scientifically visualizing the air quality
data can better help us monitor the environment and address related
issues.

CHAPTER 3

EXISTING SYSTEM

IOT Based Air Pollution Monitoring System in which we will monitor the Air Quality over a webserver using internet and will trigger a alarm when the air quality goes down beyond a certain level, means when there are sufficient amount of harmful gases are present in the air like CO₂, smoke, alcohol, benzene and NH₃. It will show the air quality in PPM on the LCD and as well as on webpage so that we can monitor it very easily.

3.1 COMPONENTS OF THE DEVICE

- MQ135 Gas sensor
- Arduino Uno
- Wi-Fi module ESP8266
- 16X2 LCD
- Breadboard
- 10K potentiometer
- 1K ohm resistors
- 220 ohm resistor
- Buzzer

3.3 COMPONENTS DESCRIPTION

3.3.1 Air Quality Sensor (MQ135)

Product Description:

Air quality sensor is suitable for detecting ammonia (NH_3), nitrogen oxides (NO_x) benzene, smoke, CO_2 and other harmful or poisonous gases that impact air quality. The MQ-135 sensor unit has a sensor layer made of tin dioxide (SnO_2), an inorganic compound which has lower conductivity in clean air than when polluting gases are present. To calibrate Air quality, use the on-board potentiometer to adjust the load resistance on the sensor circuit.



Figure 3.1 MQ135 Sensor

Pin Description:

- 1, the VDD power supply 5V DC

- 2, GND, used to connect the module to system ground
- 3, DIGITAL OUT, You can also use this sensor to get digital output from this pin, by setting a threshold value using the potentiometer
- 4, ANALOG OUT, This pin outputs 0-5V analog voltage based on the intensity of the gas.

3.3.2 ARDUINO UNO

Product Description:

Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world.

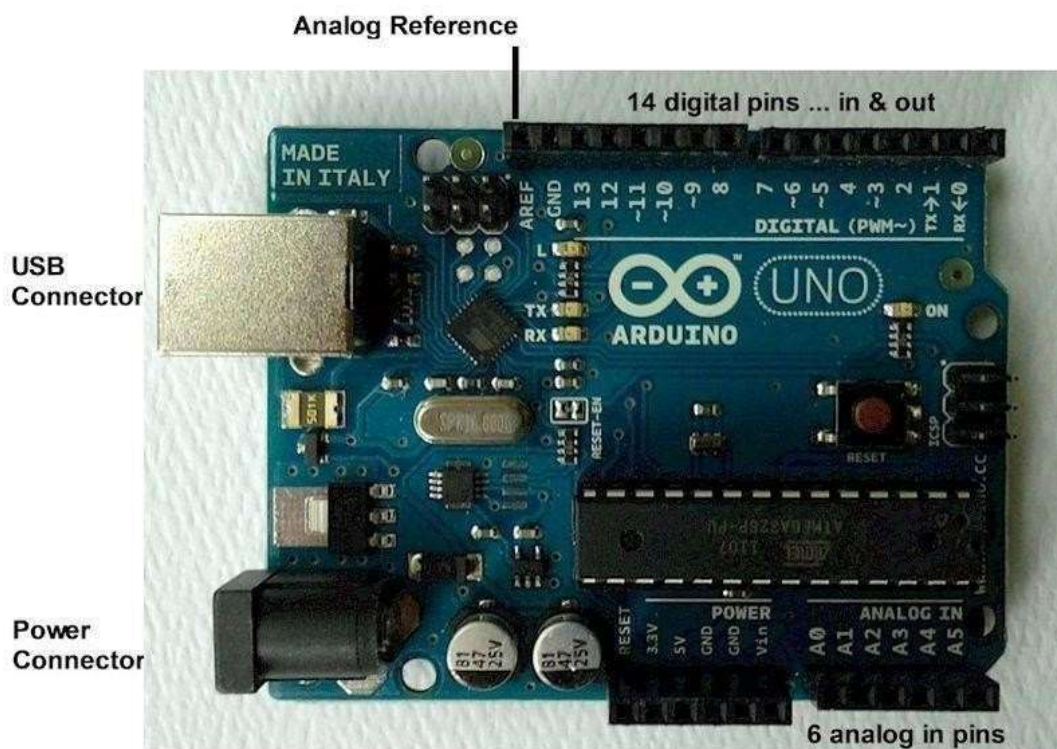


Figure 3.2 Arduino Uno

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (*shields*) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler tool chains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

Technical Specification:

Microcontroller	ATmega328P – 8 bit AVR family microcontroller
Operating Voltage	5V
Recommended Input Voltage	7-12V
Input Voltage Limits	6-20V
Analog Input Pins	6 (A0 – A5)
Digital I/O Pins	14 (Out of which 6 provide PWM output)
DC Current on I/O Pins	40 mA
DC Current on 3.3V Pin	50 mA
Flash Memory	32 KB (0.5 KB is used for Bootloader)
SRAM	2 KB
EEPROM	1 KB
Frequency (Clock Speed)	16 MHz

Table 3.1 Technical Specification of Arduino Uno

Pin Description:

Pin Category	Pin Name	Details
Power	Vin, 3.3V, 5V, GND	Vin: Input voltage to Arduino when using an external power source. 5V: Regulated power supply used to power microcontroller and other components on the board. 3.3V: 3.3V supply generated by on-board voltage regulator. Maximum current draw is 50mA. GND: ground pins.
Reset	Reset	Resets the microcontroller.
Analog Pins	A0 – A5	Used to provide analog input in the range of 0-5V
Input/Output Pins	Digital Pins 0 - 13	Can be used as input or output pins.
Serial	0(Rx), 1(Tx)	Used to receive and transmit TTL serial data.
External Interrupts	2, 3	To trigger an interrupt.
PWM	3, 5, 6, 9, 11	Provides 8-bit PWM output.
SPI	10 (SS), 11 (MOSI), 12 (MISO) and 13 (SCK)	Used for SPI communication.
Inbuilt LED	13	To turn on the inbuilt LED.
TWI	A4 (SDA), A5 (SCA)	Used for TWI communication.
AREF	AREF	To provide reference voltage for input voltage.

Table 3.2 Pin Description of Arduino Uno

3.4 CIRCUIT DIAGRAM

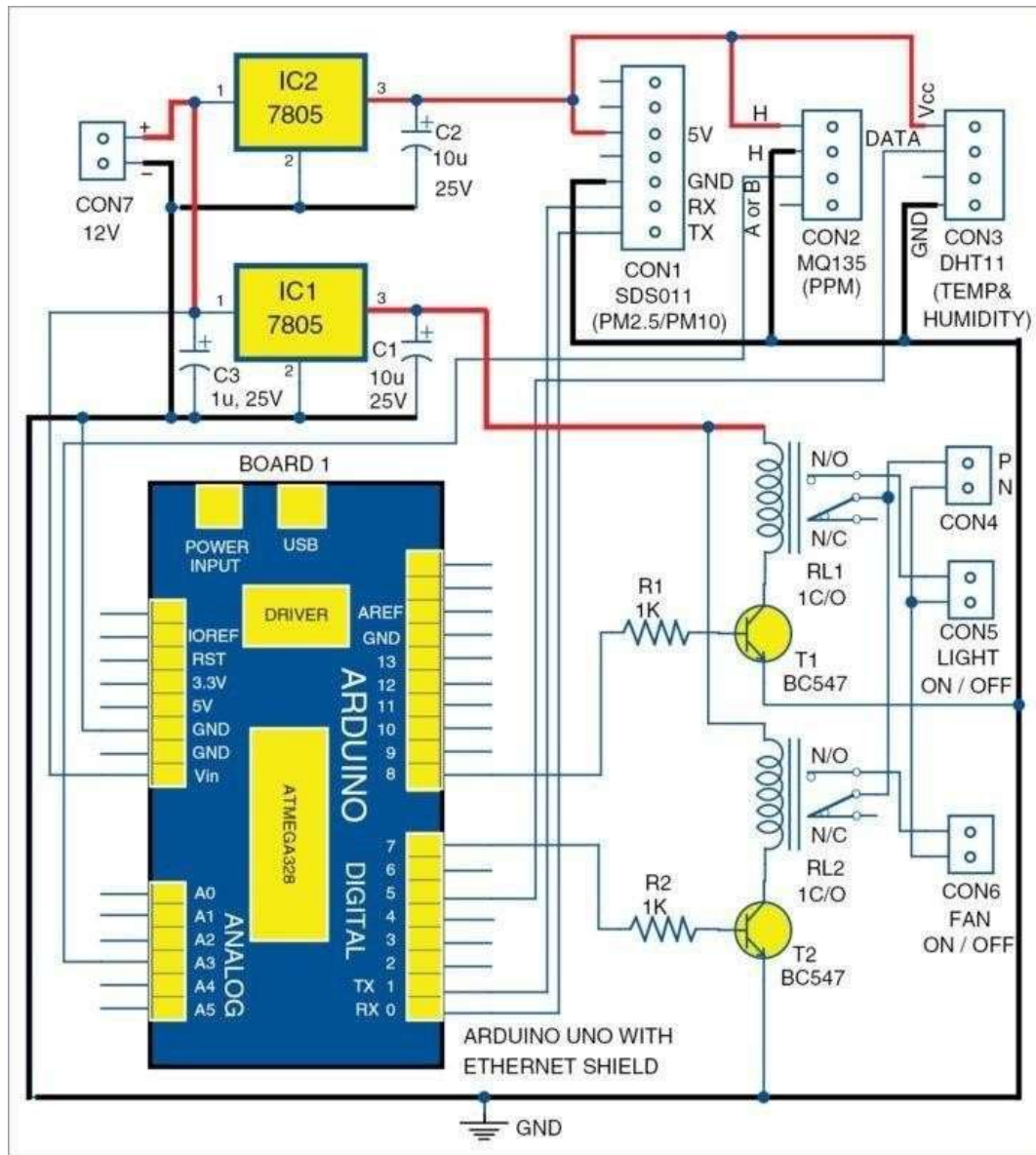


Figure 3.1 Arduino Based Air Monitoring System

CHAPTER 4

PROPOSED SYSTEM

Detection of Air Contamination using NodeMCU is to detect the Air pollutants with the MQ-135 sensor which measures the harmful gases such as CO, smoke, benzene and NH₃. It will trigger an alarm via mobile app when the air around the person is contaminated. Since using NodeMCU which have an built-in Wi-Fi, unlike Arduino.

4.1 COMPONENTS OF THE DEVICE

- MQ135 Gas sensor
- Wi-Fi module ESP8266
- Breadboard
- 10K potentiometer
- 1K ohm resistors
- 220 ohm resistor
- Cloud Storage
- Mobile App

4.2 COMPONENTS DESCRIPTION

4.2.1 NodeMCU

Product Description:

NodeMCU is an open source IoT platform. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware rather than the development kits. The firmware uses the Lua scripting language. It is

based on the eLua project, and built on the Espressif Non- OS SDK for ESP8266.

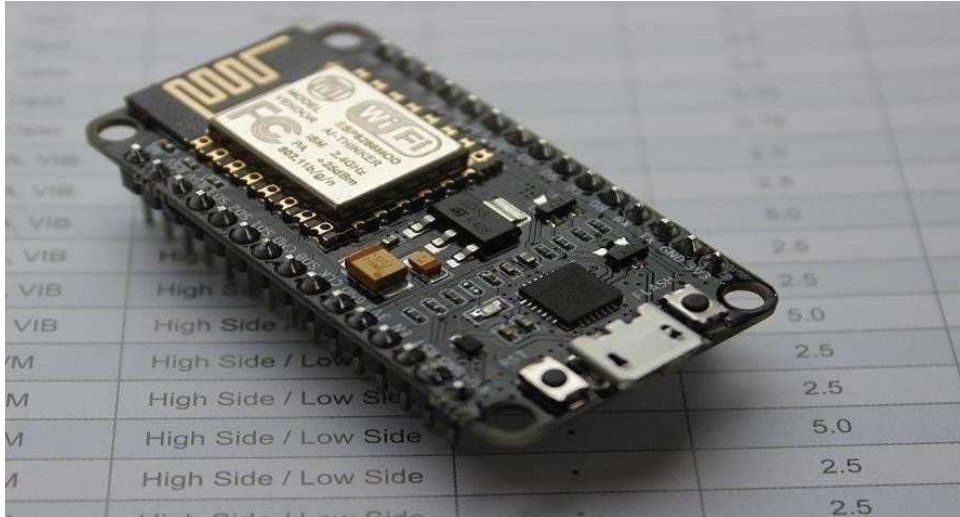


Figure 4.1 NodeMCU

4.2.2 FEATURES

- Low cost, compact and powerful Wi-Fi Module
- Power Supply: +3.3V only
- Current Consumption: 100mA
- I/O Voltage: 3.6V (max)
- I/O source current: 12mA (max)
- Built-in low power 32-bit MCU @ 80MHz
- 512kB Flash Memory
- Can be used as Station or Access Point or both combined
- Supports Deep sleep (<10uA)
- Supports serial communication hence compatible with many development platform like Arduino
- Can be programmed using Arduino IDE or AT-commands or Lua Script

4.3 BLOCK DIAGRAM

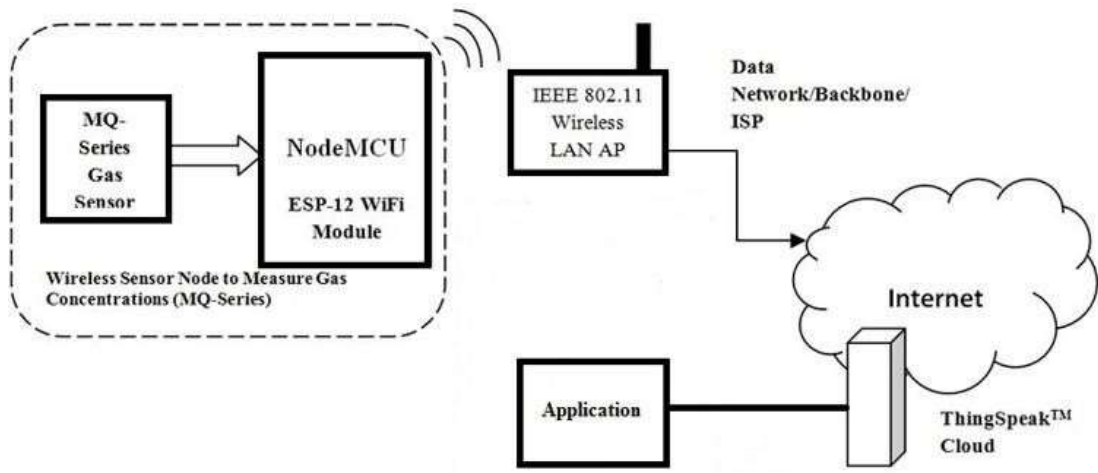


Figure 4.1 Block Diagram of Proposed System

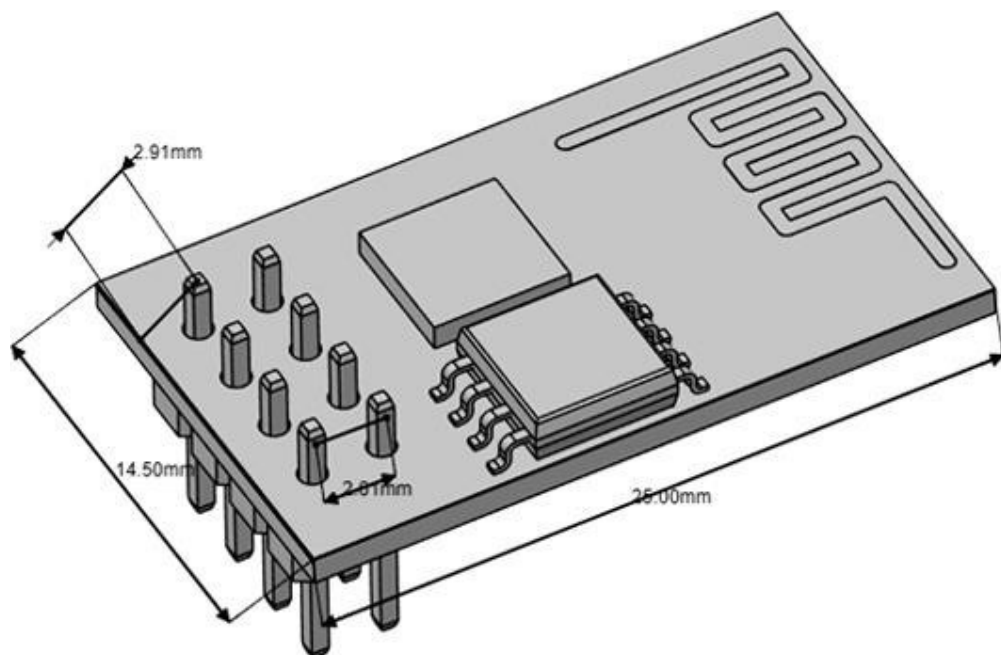


Figure 4.2 2-D Model of NodeMCU

CHAPTER 5

PROGRAMMING FOR WEBSITE AND MOBILE APP

5.1 WEB PROGRAMMING

Two key portions of internet programming are Front-End and Back-End. Front end programming is about design portion of a web page where all the design works and layout of the page contains properly. Front end is all about user interface and what are visible to the user. In the front page here actually appears the content design of the page that shows how the webpage would look like properly. In the front end side, on the other hand back end programming is all about programming that is done on background side of the webpage completely. On backside of the webpage there contains all the language that is thought to use for programming to make a webpage efficient and useful. Back-end programming is the structure of the webpage and is the core part of a webpage. At first, we had to count both side of the programming. At the very beginning we had to consider front end portion and then back end portion for the webpage.

5.1.1 IMPLEMENTATION OF LANGUAGE

Two core languages to take initiative for implementation of the back-end codes are HTML and then PHP in addition with CSS and JavaScript. HTML is the standard markup language for creating web pages that stands for “Hypertext Markup Language”. The structure of the web page stands with the support of HTML basically. HTML elements are building blocks and are represented by tags. The CSS part

is for the design only and outlook of the website that is visible to a user. CSS (Cascading Style Sheets) describes exactly how html elements are described on the screen. CSS defines the look and layout of the webpage. The browser receives HTML documents from web server and then sends the documents into webpages. HTML elements are the building blocks of HTML pages. HTML provides semantics for test like chart, table, image and also diagram. HTML can be written in scripting language called JavaScript. JavaScript is a client side script that is executed before the webpage appears visible after the client receives the returned information from the server. Another one is known as server-side script that is PHP. PHP code may be embedded into HTML code.

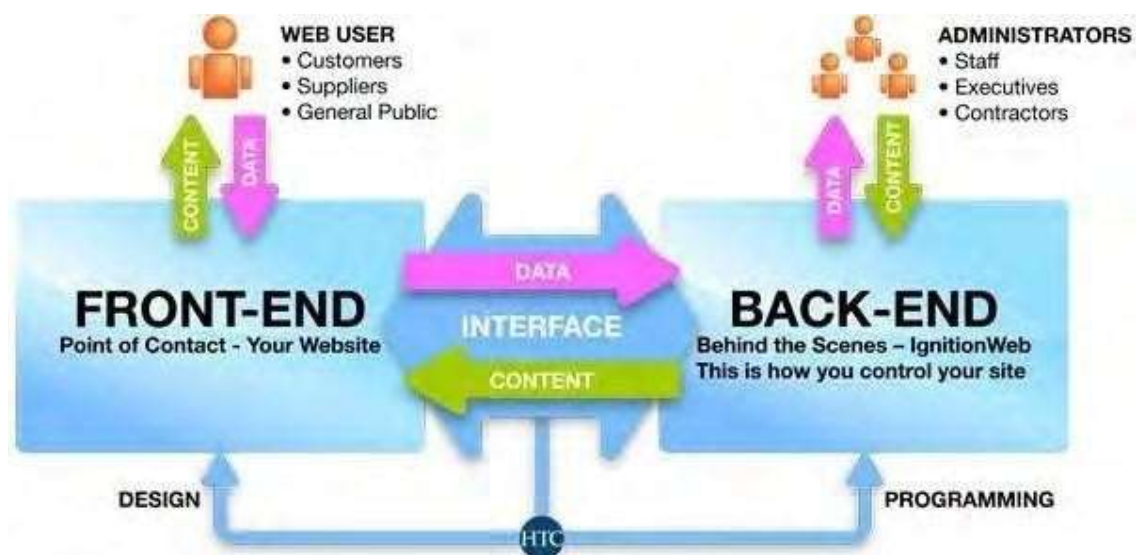


Figure 5.1 Two way programming deployment

5.1.2 SERVER-SIDE SCRIPT

Server side scripting language runs on the server that is embedded in

the code of the particular webpage. This is responsible for the transfer of information from server to browser. It plays a big rule to access database and connects with the server that will send to browser next. This builds dynamic webpages that is powerful than static webpages. It builds application programming interfaces (APIs) that controls what application is shared by the webpage.

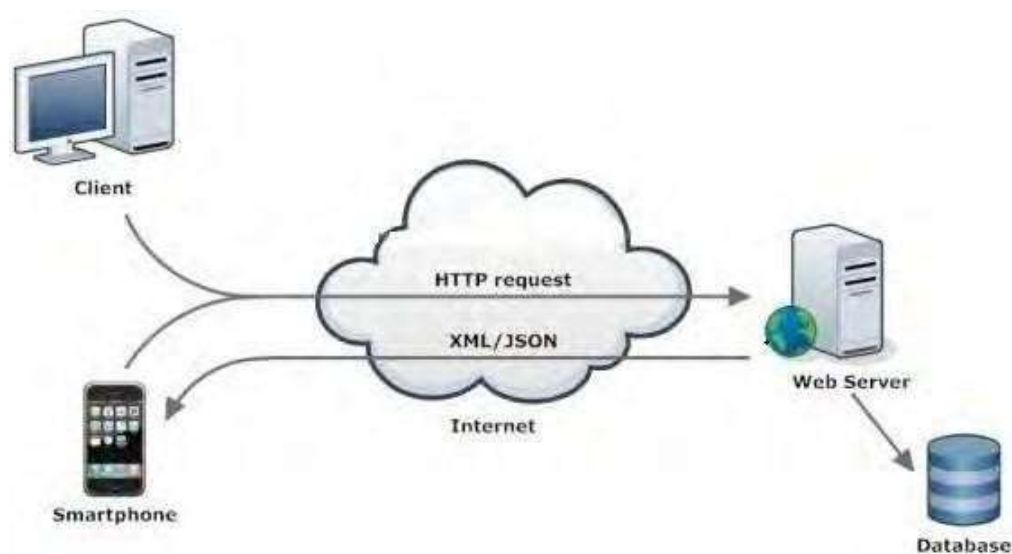


Figure 5.2 Server-side scripting transfer process

The popular server-side languages are PHP, Python, Ruby, C#, C++, Java and their server-side frameworks are Ruby on Rails, ASP.NET, Django, Node.js, Express.js & Koa. PHP is the most popular server-side language that is designed to pull, edit and change data in the database. This is written in the SQL language that keeps connection with databases. PHP is the most common scripting language that is used by the developers. This language is compatible with all of the modern frameworks.

5.1.3 CLIENT-SIDE SCRIPT

Client side scripting is all about user level access. The language that

we've used for client side script is JavaScript. JavaScript is run on the browser when there is existence of client side scripting after server side script execution.

We have worked on and experienced with PHP coding so that in near future we can work in different fields. In addition to, PHP developer cost vary with location, quality and hourly rates. While talk about the costs for PHP development, it can be divided into three levels according to one's budget.

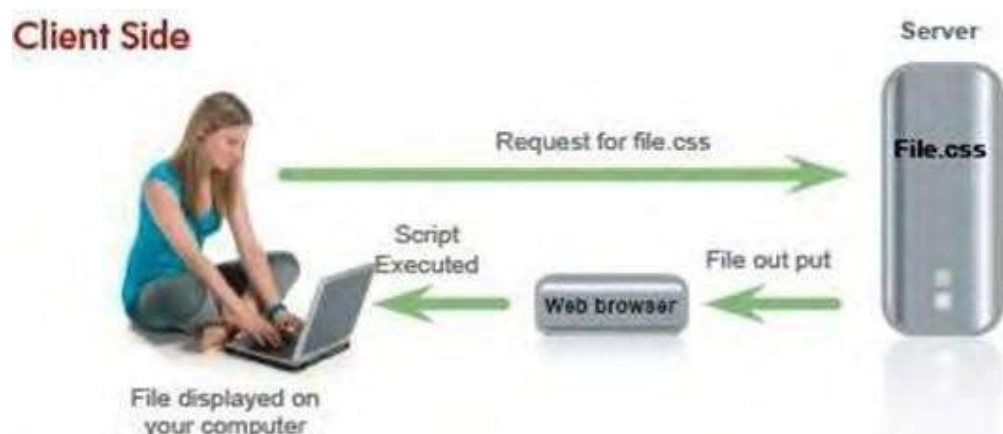


Figure 5.3 Client-Side Scripting process

5.1.4 DATABASE AND SERVER CONSTRUCTION

Database is collection of information that is organized in one place and that can be efficiently used. Database is broadly effective and important data source of the web page. One who administrates data can submit information and edit that information according to necessity any time from the database directly. Database is a core part of a website which includes all the information of the webpage to show in static way.

We have taken data from the field to our server with our device. We

have taken values for CO₂, CO, CH₄, and LPG. We have randomly taken data that is comparable with the rates that we considered as standard value. We have taken values from the environment that is shown in the real time figure for our system. We can compare these achieved values with our table which values we taken as standard. That is, like for CO₂ 250 to 350 ppm and 350-1000 is at low risk according to the table. Then, 1000 to 2000 and 2000 to 5000 range is at moderate level. For 5000 it is at high level and at last above 40,000 ppm it is at very high level.

After that we have an option that is by the server it sends a message that how the level is varying on everyday basis and at which level such as low, moderate, high to the mobile app.

In the server there is a real-time graph that shows data form morning to night continuously. In addition to that, we have whole graph that represents data from the very first day when we had been started and till the last date.

5.2 ANDROID APPLICATION

The main idea behind Android existence is to provide developers with the freedom and power to formulate pioneer mobile applications along with the capability of using all the abilities that are provided by the mobile handset. Thus, the development of mobile applications was made free to all users and anyone can get benefitted from these capabilities since it is open source. In addition to that, it is rather easy to incorporate the use of the GPS location system that is present in the mobile handset. The application can also use the Internet to transfer data from the cellular phone to certain servers online. For the development

of mobile application this is necessary to take into consideration about certain constraints and features. Mobile application development requires the use of integrated development environments. For mobile application design user interface (UI) is essential. This user interface considers screen size (for wide length array), constraints and other circumstances. Mobile front-end is completely dependent on back- end. The mobile back-end provides security, data routing, authentication and also authorization.

There are two parts in the Android application. They are:

- i. Administrative application.
- ii. User application.

5.2.1 ADMINISTRATIVE APPLICATION

After getting all the measurements of gases, sounds, temperature and humidity, those values will go to the device, and then through device the data will go to the application and from application it will go the server.

5.2.2 USER APPLICATION

After sending all the values and measurements to server, the application will show the Android app UI.

5.3 THINKSPEAK: A IoT WEB SERVICE

ThingSpeak is a web based open API IoT source information platform that comprehensive in storing the sensor data of varied 'IoT applications' and conspire the sensed data output in graphical form at the web level. ThingSpeak communicate with the help of internet connection which acts as a 'data packet 'carrier between the connected 'things' and the ThingSpeak cloud retrieve, save/store, analyze, observe and work on the

sensed data from the connected sensor to the host microcontroller such as ‘Arduino, TI CC3200 module, Raspberry-pi etc.

The ThingSpeak helps to form a captivate sensor based logging applications, location/place tracing application and ‘social network’ of objects/things with updated status and alternatively we can have a control over ‘Home automation’ products that were connected to the public domain network (via Internet) from the location of existence and The most primary feature of ThingSpeak functionality is the term ‘Channel’ that have field for data, field for location, field for status for varied sensed data. Once channels are created in the ‘ThingSpeak’ the data can be implemented and alternately one can process and visualize the information using the MATLAB and respond to the data with tweets and other forms of alerts. ThingSpeak also provide a feature to create a public based channel to analyze and estimate it through public.

To Engage the ‘Things/objects’ in sensing the respective data and transmitting across the Internet and one involves to go further just connecting data from a PC, objects to collect (sensors) And to do so the data require to network uploaded that are in the form of servers (that runs applications) and such types are considered as Cloud .

The ‘Cloud’ utilizes the operations of Graphical visualization and available in the form of Virtual server for the users and the objects are communicated with the cloud via possible ‘wireless internet connections’ available to the users and majority objects uses the sensors/actuator to tell regarding our environmental analogue data. The IoT Helps to bring all things together and permits us to communicate with our very own things and even more curiously allows objects/things to interact with other ‘things’.

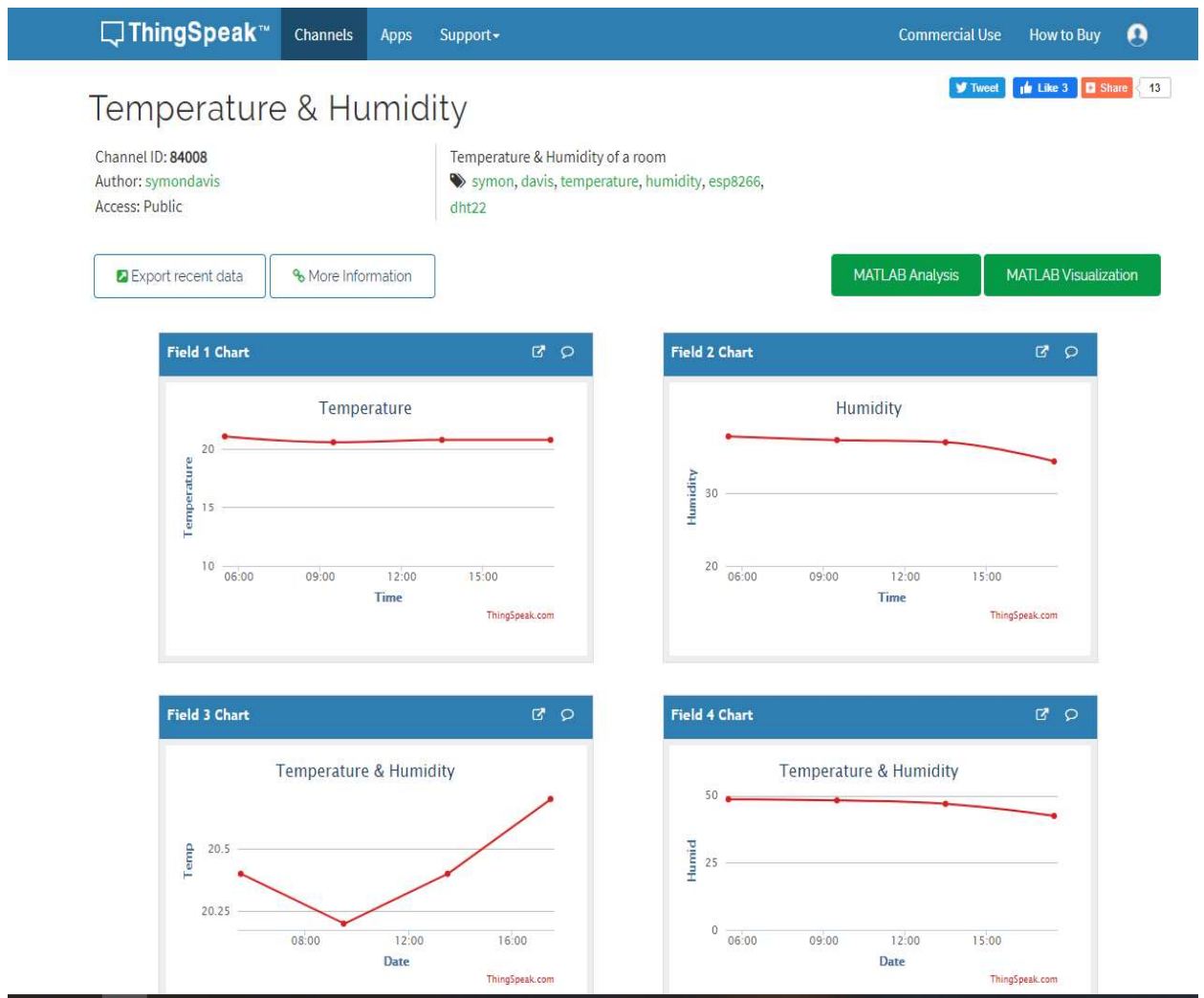


Figure 5.4 Data of Temperature & Humidity

5.3.1 FEATURES OF THINGSPEAK

- Collect data in private channels
- Share data with public channels
- RESTful and MQTT APIs
- MATLAB® analytics and visualizations
- Event scheduling

5.4 ANDROID WEB

Android Studio is the official integrated development environment for Google's Android operating system, built on JetBrains' IntelliJ IDEA software and designed specifically for Android development. It is available for download on Windows, macOS and Linux based operating systems.

5.5 THE CHALLENGES OF ANDROID APP DEVELOPMENT

While the Android platform provide rich functionality for app development, there are still a number of challenges you need to address, such as:

- Building for a multi-screen world
- Getting performance right
- Keeping your code and your users secure
- Remaining compatible with older platform versions
- Understanding the market and the user

5.5.1 BUILDING FOR A MULTI-SCREEN WORLD

Android runs on billions of handheld devices around the world, and supports various form factors including wearable devices and televisions. Devices can come in different sizes and shapes that affect the screen designs for UI elements in your apps.

In addition, device manufacturers may add their own UI elements, styles, and colors to differentiate their products. Each manufacturer offers different features with respect to keyboard forms, screen size, or camera buttons. An app running on one device may look a bit different on

another. The challenge for many developers is to design UI elements that can work on all devices. It is also the developer's responsibility to provide an app's resources such as icons, logos, other graphics, and text styles to maintain uniformity of appearance across different devices.

5.5.2 MAXIMIZING APP PERFORMANCE

An app's performance—how fast it runs, how easily it connects to the network, and how well it manages battery and memory usage—is affected by factors such as battery life, multimedia content, and Internet access. You must be aware of these limitations and write code in such a way that the resource utilization is balanced and distributed optimally. For example, you will have to balance the background services by enabling them only when necessary; this will save battery life of the user's device.

5.5.3 KEEPING YOUR CODE AND YOUR USERS SECURE

You need to take precautions to secure your code and the user's experience when using your app. Use tools such as ProGuard (provided in Android Studio), which detects and removes unused classes, fields, methods, and attributes, and encrypt all of your app's code and resources while packaging the app. To protect your user's critical information such as logins and passwords, you must secure the communication channel to protect data in transit (across the Internet) as well as data at rest (on the device).

5.5.4 REMAINING COMPATIBLE WITH OLDER PLATFORM VERSIONS

Consider how to add new Android platform version features to an app, while ensuring that the app can still run on devices with older platform versions. It is impractical to focus only on the most recent Android version, as not all users may have upgraded or may be able to upgrade their devices.

5.6 FEATURE OF ANDROID WEB

- **VISUAL LAYOUT EDITOR**

Create complex layouts with Constraint Layout by adding constraints from each view to other views and guidelines. Then preview your layout on any screen size by selecting one of various device configurations or by simply resizing the preview window.

- **APK ANALYZER**

Find opportunities to reduce your Android app size by inspecting the contents of your app APK file, even if it wasn't built with Android Studio. Inspect the manifest file, resources, and DEX files. Compare two APKs to see how your app size changed between app versions.

- **FAST EMULATOR**

Install and run your apps faster than with a physical device and simulate different configurations and features, including ARCore, Google's platform for building augmented reality experiences.

- **INTELLIGENT CODE EDITOR**

Write better code, work faster, and be more productive with an intelligent code editor that provides code completion for Kotlin, Java, and C/C++ languages.

- **FLEXIBLE BUILD SYSTEM**

Powered by Gradle, Android Studio's build system allows you to customize your build to generate multiple build variants for different devices from a single project.

- **REALTIME PROFILERS**

The built-in profiling tools provide real-time statistics for your app's CPU, memory, and network activity. Identify performance bottlenecks by recording method traces, inspecting the heap and allocations, and see incoming and outgoing network payloads.

5.7 KOTLIN

Kotlin is a cross-platform, statically typed, general-purpose programming language with type inference. Kotlin is designed to interoperate fully with Java, and the JVM version of its standard library depends on the Java Class Library, but type inference allows its syntax to be more concise. Kotlin mainly targets the JVM, but also compiles to JavaScript or native code (via LLVM). Language development costs are borne by JetBrains, while the Kotlin Foundation protects the Kotlin trademark.

On 7 May 2019, Google announced that the Kotlin programming language is now its preferred language for Android app developers. Since the release of Android Studio 3.0 in October 2017, Kotlin has been included as an alternative to the standard Java compiler. The Android Kotlin compiler targets Java 6 by default, but lets the programmer choose between Java 8 to 13, for optimization.

In July 2011, JetBrains unveiled Project Kotlin, a new language for the JVM, which had been under development for a year. JetBrains lead Dmitry Jemerov said that most languages did not have the features they were looking for, with the exception of Scala. However, he cited the slow compilation time of Scala as a deficiency. One of the stated goals of Kotlin is to compile as quickly as Java. In February 2012, JetBrains open sourced the project under the Apache 2 license.

CHAPTER 6

RESULT

Detection of Air Contamination using NodeMCu design involves hardware and connection and finally the collection of data from the sensor through NodeMCu. As discussed earlier in the proposed system, MQ-135 is connected with NodeMCU and the corresponding data is recorded in the ThingSpeak, Iot Analytics platform service.

The Graphs are plotted in ThingSpeak according to the sensors data received and the same can be visualized in an Android App in a tabular format.

The Android App developed helps the user to know about the level of contamination near him. The App shows the data collected by the MQ-135 sensor which sends the data to ThingSpeak via NodeMCU.

In this study, the sensor nodes were used to collect air pollutant data every fifteen minutes and we set up in the pollutant area to check the air pollutant data and in the non-pollutant data.



Figure 6.1 Android Studio

The data of air pollutant is show via ThingSpeak is given in the below image.

gas sensor

Channel ID: **1015927**

Author: [g16bec3061](#)

Access: Private

Private View

[Public View](#)

[Channel Settings](#)

[Sharing](#)

[API Keys](#)

[Data Import / Export](#)

[+ Add Visualizations](#)

[+ Add Widgets](#)

[Export recent data](#)

Channel Stats

Created: [about a month ago](#)

Last entry: [about a month ago](#)

Entries: 38



Figure 6.2 Data of Air Pollutants

CHAPTER 7

CONCLUSION AND FUTURE WORK

7.1 CONCLUSION

The smart way to monitor environment and air as well as sound pollution being a low cost but efficient and embedded system is presented in this paper. In the proposed architecture functions of different sensors and their working procedure were discussed. How they work, their functionality, their optimal uses and their data taking procedures and comparison with standard base data's are also discussed here. The noise and air pollution monitoring system was tested for monitoring the gas levels on different parts of the country. It also sent the sensor parameters to the data server. Our project device showed that it is effective and cheap and with some highly working sensors it can really be a reliable one to everybody and its data's will be a key to take some necessary steps for the betterment of the society as it will help to identify the affected area so that we can take early steps to reduce damages for the next generation.

7.2 FUTURE WORK

Our work can demonstrate vast opportunities to work on the device, on the app and also on the field using the device that we have worked with. The device can be used any time efficiently in different locations of a city and then research with the achieved data for that particular area in that city. The device can be updated with additional sensors that can sense data from the existence of other gases such as O₂ and H₂. These

gases will provide the condition of the atmosphere and authority can take into further decisions accordingly. The sensors that we have been worked with can also be reset according to most recent time update. The android app which we have developed for turning on and off the device can be updated with newer features by implementing necessary codes. In future time, our device can be kept testing for checking whether the sensors still runs properly and give real time data. The webpage that we have designed, there is more opportunities to add options like related tables, pie chart, diagram that will be implemented by back-end programming(server side) so that those options can be visible to the administrator and user as well. With the future plan programmer can add PHP programs to create additional tables to show amount of O₂ or H₂ and pie chart to show which color represents which particular gas and also diagram that can show relations with gas and time. Like Through-out the year on which time the amount of gases are in what level and also the increase and decrease level and rates of the gases. Related app can notify when it is actual time to take data reading by sending the notification to user that will be programmed on the server-side by PHP language. Also other language can be used. In the hardware device it can be added light system. Light system will be work like automatic way. Such as, there are four lights for four types of gases. While a particular sensor detects the gas for that sensor, the related light beside that gas will be on and while the sensor stops getting that particular gas the light will be off automatically. For this matter, there will be necessity of PHP back-end code implementation also that is must.

LIST OF PAPERS PUBLISHED

[1] Ajith Kumar.S , K.Gogulnath, L.Ramesh, “Detection of Air Contamination using NodeMCU” International Journal of Future Generation Communication and Networking Vol. 13, No. 1, (2020), pp. 301 - 309]ISSN: 2233-7857 IJFGCN Copyright © 2020 SERSC

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Detection of Air Contamination using NodeMCU

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Abstract

Where contamination has become a significant issue far and wide, air contamination is the most perilous, stunning and serious contamination among different contamination, for example water contamination, soil contamination, clamor contamination, light contamination, warm contamination and so on. Air contamination is the significant reason for infections like asthma, malignant growth, bronchitis, birth deformities and invulnerable illnesses. This framework includes the blend of an android application, server, and gas detectors to distinguish the air nature of the earth and shows the veritable nick of air. Fathoming the disadvantages of existing air quality sensors this gadget can be utilized to screen different gasses at once. The most requesting thing would be this system will give the ongoing information and will show the nature of the air dependent on the standard air quality. The framework will offer the customer the hint of the air quality(measure) and subject to given parameters it will tell the customer how much the regular air is defiled or safe. This framework will do everything in the interest of human so that for a shrewd city when individuals will possess less energy for spending and there will be more industry and air will be increasingly contaminated, this gadget will tell individuals how safe the air is. Internet of Things is nowadays discovering critical use in each and every division, expect a key activity in our air quality checking framework too. Detection of air pollution utilizing NodeMCU is utilized to screen the Air Quality over a web server using Internet. It will trigger an alarm through versatile application when the air goes past a particular level, infers when there are ample proportion of toxic gases present in air like CO₂, smoke, benzene, NH₃ and NO_x. The system utilizes a MQ-135 sensor as it recognizes most destructive gases and can quantify their sum precisely.

Keywords- NodeMCU, MQ-135,

I. FOUNDATION

Contemplating the regular papers and some other voltaic or print media, a staggering tidings which is escalating bit by bit is humankind is getting cleared out and the clime is choppy such a way, that it makes the living of people so hard. From the angle through and through, each individuals are enduring the scourge of environmental change. The primary explanation behind the environmental change and individual's wellbeing is air contamination. It has gotten changes atmosphere like a worldwide temperature alteration, worldwide darkening, over pouring, dry season, storms, corrosive downpour, foggy climate and so forth. Earth has both living things above and submerged are persevering through various issues like change in life in view of nonattendance of suitable workplaces of life.

For each and every living thing needs air to make a living. When we see into the critical issue this present framework's crucial explanation behind existing was to measure the idea of air for people and all the other living around the world. It is very important for us to know the environment about being how much safe and how the atmosphere and air has changed for air pollution and it will proceed with sound. This framework will rearrange the reactions from air.

In this framework we are using huge gas sensors which are responsible for the most air sullyng, which is used to study about the various gases. The most air sullyng gases are CO₂, CO, LPG, Humidity are broadcasted to be the most threatening and in this framework we are measuring them. A server and an android application have been made to know the measurements since now days nearly everybody has an android working gadget and access to web.

II. IoT

A. Basis

The Internet of Things (IoT) is a system of 'shrewd' gadgets that associate and impart through the Internet. The way in to the IoT is the interconnectivity of gadgets, which gather and trade data through inserted programming, cameras and sensors which sense things like light, solid, separation and development. Savvy gadgets work consequently, or are controlled and checked remotely.

B. Evolution of IoT

During ongoing years, one of the most recognizable name scaling new statures and making a benchmark is Internet of Things (IoT). It is in reality the fate of correspondence that has changed Things (Objects) of this present reality into more intelligent gadgets. The useful part of IoT is to join each question of the world in such a way, that people can control them by means of Internet. Besides, these articles give standard just as auspicious reports on their present status to its end client. Despite the fact that IoT ideas were proposed two or three years prior, it may not be erroneous to cite that this term has become a benchmark for setting up correspondence among objects.

III. RELATED WORKS

Starting late, various authorities have investigated the improvement of flexible data gathering plans. As demonstrated by their targets, the present plans can be divided into the going with groupings:

A. A LESS POWERED ACTUAL AIR QUALITY TRACKING SYSTEM USING LPWAN BASED ON LORA

A Student proposed a LoRa Wireless Communication, less powered constant air quality tracking framework. The advance framework can be spread out in a gigantic number in the watching zone to shape detector sort out. The framework consolidates a sole fragment microcontroller, a couple of air defilement detectors (O₃), LongRange (LoRa) - Modem, a daylight based PV-battery part and graphical UI (GUI). As correspondence module LoRa transfers the data to the central checking cabin. The range tests at an outside zone show that LoRa can stick out to around 2Km. The TX power is just about 110mA which is lesser differentiated and other used remote development. An uncomplicated to use GUI was arranged in the framework. Considering LoRa advancement, GUI, and Solar PV-battery part the framework has a couple of dynamic features, for instance, negligible exertion, long division, high incorporation, long contraption battery life, easy to work.

B. AN IMPLANT FRAMEWORK MODEL FOR AIR QUALITY TRACKING

A Student presented a set-up work which can encourage the appraisal of wellbeing impression caused because of inside air contamination just as open air and can insinuate the living earlier regarding the hazard the human being going to have, here we are centering our work in setting to unfavorably susceptible victims as they will be educated by this apparatus to such an extent that they can verify themselves without really encountering the hazard factors, here an identifying framework based microcontroller equipped with gas sensors, optical buildup particle sensor, moisture and temperature sensor has been used for air quality checking. The arrangement included various units for

the most part: distinguishing unit, taking care of unit, power unit, show unit, correspondence unit. This work will apply the strategies of electrical structure with the data on biological planning by using sensor frameworks to measure Air Quality Parameters.

C. A WIFI-ENABLED INDOOR AIR QUALITY MONITORING AND CONTROLLING SYSTEM

A Student proposed a here an identifying framework build microcontroller furnished with gas sensors, imaged buildup fleck detector, moisture and temperature detector has been used for air quality checking. The arrangement comprised of units for the most part: distinguishing unit, taking care of unit, power unit, show unit, correspondence unit. This framework will work the strategies of voltaic structure with the data on biological planning by using detectors frameworks to measure air quality variables. Examination results under a genuine office condition show the viability of the proposed plan.

IV. SENSOR & NODEMCU

A. Air Quality Sensor (MQ135)

Air quality snap is reasonable for identifying smelling salts (NH_3), nitrogen oxides (NO_x) benzene, smoke, CO_2 and other destructive or noxious gases. A sensor coating assembled of tin dioxide in air quality sensor, an inanimate blend which has lesser conductivity in scrubbed air than when contaminating gases are available. To align Air quality, utilize the on-board pot to modify the heap obstruction on the detector circuit.



Fig 1. MQ-135

B. NodeMCU

NodeMCU is an open source IoT stage. It links firmware which works on the ESP8266 Wi-Fi System, and gear which banks upon the ESP-12 module. The expression "NodeMCU" as per normal procedure put forward the firmware rather than the improvement units. The firmware uses the Lua language. It banks upon the eLua adventure, and dependable on the Espressif Non-OS SDK for ESP8266.



Fig 2. NodeMCU

V. PROPOSED SYSTEM

Detection of Air Contamination utilizing NodeMCU is to identify the Air toxins with the MQ-135 sensor which gauges the hurtful gases, for example, CO, smoke, benzene and NH₃. It will trigger a caution by means of versatile application when the air around the individual is debased. Since utilizing NodeMCU which have a worked in Wi-Fi, not at all like Arduino.

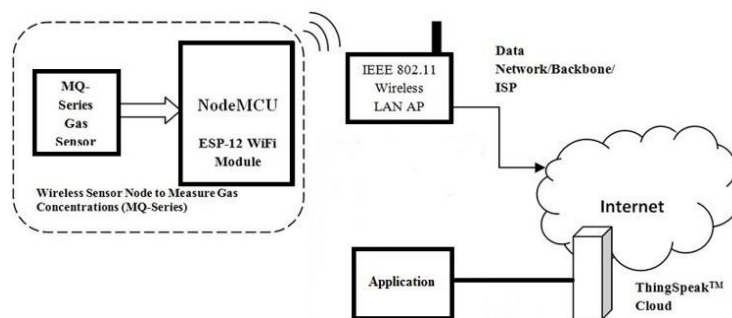


Fig 3. Block Diagram of Proposed System

VI. ANDROID APPLICATION

The fundamental thought behind Android presence is to furnish engineers with the opportunity and capacity to figure pioneer portable applications alongside the capacity of utilizing every one of the capacities that are given by the versatile handset. In this manner, the advancement of portable applications was made allowed to all clients and anybody can get profited by these abilities since it is open source. Notwithstanding that, it is somewhat simple to fuse the utilization of the GPS area framework that is available in the portable handset. The application can likewise utilize the Internet to move information from the PDA to specific servers on the web.

For the development of mobile application this is necessary to take into consideration about certain constraints and features. For mobile application design user interface (UI) is essential. This user interface considers screen size (for wide length array), constraints and other circumstances. Mobile front-end is completely dependent on back- end. The mobile back-end provides security, data routing, authentication and also authorization.

There are two parts in the Android application. They are:

- i. Administrative application.
- ii. User Application.

A. *Administrative Application*

In the wake of getting every one of the estimations of gases, sounds, temperature and mugginess, those qualities will go to the gadget, and afterward through gadget the information will go to the application and from application it will go the server.

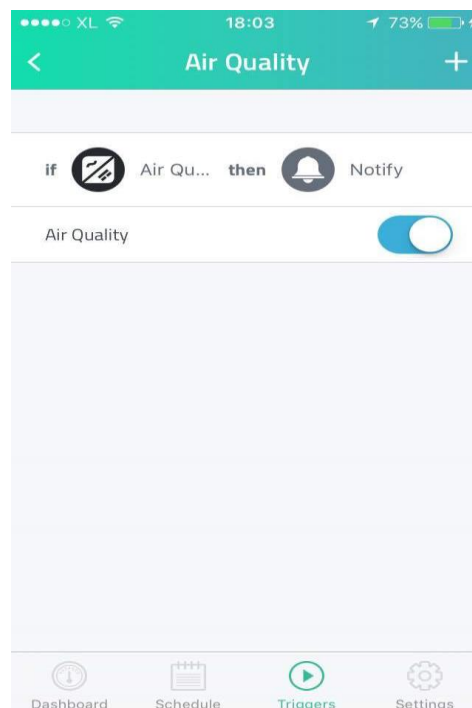
B. *User Application*

After sending all the values and measurements to server, the application will show the Android app UI.

VII. RESULT

This task is to screen the Air Quality particularly CO₂ with NodeMCU as microcontroller and wifi.

By make this task now I can screen if the air quality is acceptable or not and it will trigger consequently if the air quality is poor.



VIII. DISCUSSION

Our work can exhibit huge chances to take a shot at the gadget, on the application and furthermore on the field utilizing the gadget that we have worked with. The gadget can be utilized whenever productively in various areas of a city and afterward look into with the accomplished information for that specific territory in that city.

The gadget can be refreshed with extra sensors that can detect information from the presence of different gases, for example, O₂ and H₂. These gases will give the state of the environment and authority can take into further choices appropriately. The sensors that we have been worked with can likewise be reset by latest time update.

The android application which we have produced for killing on and the gadget can be refreshed with more up to date includes by actualizing fundamental codes. In future time, our gadget can be continued trying for checking whether the sensors still runs appropriately and give ongoing information. The website page that we have structured, there is more chances to include choices like related tables, pie outline, graph that will be executed by back-end programming (server side) so those alternatives can be unmistakable to the chairman and client also.

With the tentative arrangement developer can add PHP projects to make extra tables to show measure of O₂ or H₂ and pie outline to show which shading speaks to which specific gas and furthermore chart that can show relations with gas and time. Like Through-out the year on which time the measure of gases are in what level and furthermore the expansion and abatement level and paces of the gases. Related application can tell when it is real time to take information perusing by sending the notice to client that will be modified on the server-side by PHP language. Additionally other language can be utilized.

In the equipment gadget it very well may be included light framework. Light framework will be work like programmed way. For example, there are four lights for four sorts of gases. While a specific sensor identifies the gas for that sensor, the related light close to that gas will be on and keeping in mind that the sensor quits getting that specific gas the light will be off naturally. For this issue, there will be need of PHP back-end code usage additionally that is must.

IX. CONCLUSION

The savvy approach to screen condition and air just as sound contamination being an ease however proficient and installed framework is displayed in this paper. In the proposed engineering elements of various sensors and their working methodology were examined. How they work, their usefulness, their ideal uses and their information taking strategies and correlation with standard base information's are likewise examined here. The clamor and air contamination checking framework was tried for observing the gas levels on various pieces of the nation. It likewise sent the sensor parameters to the information server. Our undertaking gadget demonstrated that it is viable and modest and with some profoundly working sensors it can truly be a solid one to everyone and its information's will be a key to make some important strides for the improvement of the general public as it will recognize the influenced region so we can find a way to diminish harms for the people to come.

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