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COLLEGE OF ENGINEERING
NAAC Accredited Autonomous Institution
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ISO 9001:2015 & ISO 14001:2015 Certified Institution
Thalavapalayam, Karur – 639 113.

IOT BASED WEATHER MONITORING SYSTEM USING ARDUINO-UNO

A MINOR PROJECT – II REPORT

Submitted by

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BACHELOR OF ENGINEERING

in

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

M.KUMARASAMY COLLEGE OF ENGINEERING

(Autonomous)

KARUR – 639 113

APRIL 2023

M.KUMARASAMY COLLEGE OF ENGINEERING, KARUR

BONAFIDE CERTIFICATE

Certified that this 18ECP104L **- Minor Project II** report **"IOT BASED WEATHER MONITORING SYSTEM USING ARDUINO-UNO"** is the bonafide work of **"BABU PRASANTH S (927621BEC018) , BALAJI G (927621BEC020) , HARIHARAN M (927621BEC059)"** who carried out the projectwork under my supervision in the academic year 2022-2023 EVEN.

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This Minor project-III report has been submitted for the **18ECP104L – MinorProject-II**

Review held at M. Kumarasamy College of Engineering, Karur on _____.

PROJECT COORDINATOR

INSTITUTION VISION AND MISSION

Vision

To emerge as a leader among the top institutions in the field of technical education.

Mission

M1: Produce smart technocrats with empirical knowledge who can surmount the global challenges.

M2: Create a diverse, fully -engaged, learner -centric campus environment to provide quality education to the students.

M3: Maintain mutually beneficial partnerships with our alumni, industry and professional associations

DEPARTMENT VISION, MISSION, PEO, PO AND PSO

Vision

To empower the Electronics and Communication Engineering students with emerging technologies, professionalism, innovative research and social responsibility.

Mission

M1: Attain the academic excellence through innovative teaching learning process, research areas & laboratories and Consultancy projects.

M2: Inculcate the students in problem solving and lifelong learning ability.

M3: Provide entrepreneurial skills and leadership qualities.

M4: Render the technical knowledge and skills of faculty members.

Program Educational Objectives

PEO1: Core Competence: Graduates will have a successful career in academia or industry associated with Electronics and Communication Engineering

PEO2: Professionalism: Graduates will provide feasible solutions for the challenging problems through comprehensive research and innovation in the allied areas of Electronics and Communication Engineering.

PEO3: Lifelong Learning: Graduates will contribute to the social needs through lifelong learning, practicing professional ethics and leadershipquality

Program Outcomes

PO 1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO 2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO 3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO 4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO 6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO 7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

PSO1: Applying knowledge in various areas, like Electronics, Communications, Signal processing, VLSI, Embedded systems etc., in the design and implementation of Engineering application.

PSO2: Able to solve complex problems in Electronics and Communication Engineering with analytical and managerial skills either independently or in team using latest hardware and software tools to fulfil the industrial expectations.

Abstract	**Matching with POs, PSOs**
Arduino Uno, Raspberry Pi, LCD Display	**PO 1,PO 2,PO 7,PO 9,PSO 1**

ACKNOWLEDGEMENT

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

It is a great privilege for us to express our gratitude to **Dr.B.S.Murugan**., **B.Tech., M.Tech., Ph.D., Principal** for providing us right ambiance to carry out thisproject work.

We would like to thank **Dr.S.Palanivel Rajan, M.E., M.B.A., Ph.D., D.Litt (USA).,Professor and Head, Department of Electronics and Communication Engineering** for his unwavering moral support and constant encouragement towards the completion of this project work.

We offer our wholehearted thanks to our **Project Supervisor**, **Dr. R. KALAIARASAN M.E.,Ph.D.,** Assistant Professor, Department of Electronics and Communication Engineering for his precious guidance, tremendous supervision, kind cooperation, valuable suggestions and support rendered in making our project to be successful.

We would like to thank our **Minor Project Co-ordinator, Dr.E.Dinesh, M.E., Ph.D., Associate Professor,** Department of Electronics and Communication Engineering for his kind cooperation and culminating in the successful completion of this project work. We are glad to thank all the Faculty Members of the Department of Electronics and Communication Engineering for extending a warm helping hand and valuable suggestions throughout the project. Words are boundless to thank our Parents and Friends for their motivation to complete this project successfully.

ABSTRACT

Arduino measures 4 weather parameters using respective 4 sensors in IOT Weather Reporting System Project. These sensors are a temperature sensor, humidity sensor, light sensor, and rain level sensor. These 4 sensors are directly connected to Arduino Uno since it has an inbuilt Analog to Digital converter. Arduino calculates and displays these weather parameters on an LCD display. Then it sends these parameters to the Internet using IOT techniques. The process of sending data to the internet using Wi-Fi is repeated after constant time intervals. Then the user needs to visit a particular website to view this data. The IOT enabled weather monitoring system project connects and stores the data on a web server. Thus the user gets Live reporting of weather conditions. Internet connectivity or Internet connection with Wi-Fi is compulsory in this IOT weathermonitoring project. IOT – The Internet of Things proves really effective in such scenarios. We can upload these weather parameters data to the cloud using internet connectivity over a WiFi module through wireless communication and using the Internet of Things. Thus this project is also categorized under Wirelesscommunication projects.

Keywords: Arduino Uno, Raspberry Pi, LCD Display

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ABBREVIATIONS

ACRONYM		ABBREVIATION
IOT	-	Internet of Things
DTH11	-	Digital Temperature and Humidity
LDR	-	Light Dependent Resistor
LCD	-	Liquid Crystal Display
DHT	-	Digital Humidity and Temperature
ESP8266	-	Electronic Stability Program
BMP	-	Barometric Pressure

CHAPTER 1

INTRODUCTION

1.1 OVERVIEW:

Weather is the state of the atmosphere and can be determined by several variables including pressure, wind, precipitation, solar radiation, temperature and humidity and so on. Temperature and humidity have shown to be suitable in forecasting weather condition in a short term (Danladi et al, 2017). These factors can be measured to determine the quality of local atmospheric conditions and weather forecast. Forecasting is a method of making future prediction using previous or present information (Danladi et al, 2017). Monitoring weather conditions is necessary to maintain quality working conditions and also needed for planning purposes.

Weather is a daily aspect but climate is the average of atmospheric conditions over a longer period of time. Weather changes with respect to the latitude and longitude of a place so even small changes may lead to large effects onthe system. In the past few years, the increase in human activities and growing industries has had a drastic impact on the weather conditions. We need to be aware and ready for the upcoming disasters hence weather forecasting is important. In India, weather forecasting system are setup at a proximity of 32kms, due to their cost constraint. The data gathered by those stations is insufficient, eventually the accuracy is affected to a greater extend. In order to monitor the changes an effective system needs to be designed. A weather station is used to measure atmospheric conditions at different locations at different periods of time for weather forecasts and to study different climatic conditions. Weather is mainly driven by temperature, humidity and atmospheric pressure. Other parameters like wind speed, wind direction and precipitation amount can also be measured. These parameters can be recorded periodically and a statistical analysis can be obtained which can determine the future conditions. India is an agriculture-based country, almost 17-18% of the country's GDP is contributed by agriculture which accounts to 50 percent of the workforce, but it is totally dependent on weather and rainfall, so weather monitoring needs to be accurate as well as zone specific in order to plan contingency for the upcoming situations.

Weather monitoring station or weather monitoring system using Arduino is the simplest Arduino project which can help us to monitoring the temperature and humidity by using one sensor. There we are using the DHT11 sensor which is easily capable to measure the temperature and humidity. Also we are using the Arduino Uno there which helps to calculate & display the informationto the display. DHT11 sensor have two things inside one is for detecting the temperature and other one is detecting the humidity. also, there are two system in this project one is transmitter and other is receiver. Both have NRF for communication.

1.2 OBJECTIVES:

The main aim of this project is to design a smart way of weather monitoring system using sense the weather in simplest form. The weather parameters are monitored using sensing devices like temperature and humidity sensors.

At the side of transmitter there are dht11 sensor which gives the output to the transmitter microcontroller and transmitter microcontroller of weather monitoring system send this information to the receiver via transmitter nrf. Now the receiver nrf receive the same information and send it to the Arduino microcontroller attached at the receiver end. Now the Arduino of weather station display this information to the Display. The device works by taking readings from various sensors.

All the sensors are connected using a breadboard. For temperaturesensor to prevent any damage or unstable behavior a 10kΩ resistor is attached in parallel to the temperature sensor on the breadboard. We've used DHT11 temperature sensor to get the temperature and humidity readings connected to digital pin 7 on board for input signals. It gives us continuous reading of surrounding environment in the range of two to three seconds. A battery is connected in a circuit which the battery is a device that converts chemical energy contained within its active materials directly into electric energy by means of an electrochemical oxidation-reduction (redox) reaction. Hence our project will help us to sense the temperature and humidity of the place in simpler manner.

CHAPTER 2

LITERATURE SURVEY

Weather Forecasting using Arduino Based Cube-Sat, by M. Rahaman Laskar, R. Bhattacharjee,M. SauGiri and P. Bhattacharya. They have designed an autonomous small cube satellite which provides the weather information without using any internet network. The limitations of this system are that it may not communicate to a long distance without powerful transceivers section, there may be problem in recording data at higher altitude with the help of gas balloon. The components have no protection from rain so they may get damaged even due to long time use. Arduino Based Weather Monitoring System by Jitendra Singh, Rehan Mohammed, Mradul Kankaria, Roshan Panchal, Sachin Singh, Rahul Sharma. They have presented an automated system for weather monitoring which uses different sensors like DHT11, Light dependent resistor and Rain sensor. Implementation of Weather Monitoring System by Kiranmai Nandagiri and Jhansi Rani Meetu[. The authors have proposed a system which senses the temperature and humidity of a particular room. The system cannot be operated from anywhere and the data collected is not accessible. Wireless Arduino Based Weather Station by Amber Katyal, Ravi Yadav, Manoj Pandey. The authors have described a system with Arduino which functions using a Wi-Fi shield and different sensors like DHT11, BMP 185, Rain sensor, soil moisture sensor, etc. They used Think speak in order to use MATLAB to get knowledge from the information obtained from the readings on the server. Design of Weather Monitoring System Using Arduino Based Database Implementation by Sarmad Nozad Mahmood Forat Falih Hasan.

The R language is used to evaluate results and reveal outputs. They have setup a control unit which can operate other appliances like a.c, heater, fans etc. Raspberry Pi Based Weather Monitoring System by Meetali V. Rasal, Prof. Jaideep G. Rana. The authors have proposed a model which can visualize and storevarious weather parameters and with the help of sensors interfaced to raspberry pi which stored data in SD card and it can be controlled using the LCD display which shows results. A web application with the current status recorded can be accessed by logging in using the username and password which will give the output in the form of graphically represented data. IoT Based Weather Monitoring System using Raspberry Pi by Shubham R. Vilayatkar, Vaibhav R. Wankhade,

Pranjali G. Wangekar, Nikhil S. Mundane. The authors have proposed a system in which different sensors it is read by server and stores it in a csv and textual format. Arduino Based Automatic Wireless Weather Station with Remote Graphical Application and Alerts by Hardeep Saini, Abhishek Thakur, Satinderpar Ahuja, Nitant Sabharwal, Naveen Kumar[9]. The model proposed in this system includes Zigbee wireless technology which measures the meteorological data.Here the scientific invention can avoid the IOT based concept and design the simplest form of arduino based weather station. The author proposed an Automatic weather monitoring Station based on a wireless sensor network. The planning of the author is to develop three generations of Automatic weather stations or AWS prototypes. In this research, the author evaluates the 1st-generation AWS prototype to improve the 2nd generation depending upon the need and generation. The author provides a suggestion to improve the nonfunctional requirement such a power consumption, data accuracy, reliability, and data transmission in order to have an Automatic Weather Station. So, in this project, the author aims to make a weather monitoring with the help of IoT. In this project, the hardware and software are used which makes it easy to implement. In the project, the author uses a different sensor to collect the information of the climate and stored it in the cloud. For this storage, the website www.thingspeak.com is commonly used for Internet of things projects. And from the cloud storage space, it extracts the whole weather data and uploads it to the android mobile application using an API key.

Tools which detect the rain drops, is called rain sensor. Once the plague reveals the raindrops on the strips and the voltage is considered from that.The author describes that Uganda and various other developing countries have looked challenges in developing timely & accurate weather data due to scarce weathers observation. The scarce weather monitoring is a part of the high cost of developing automatic weather situations. The restricted funding is available to national meteorological services of the respective countries. In this proposed system the author firstly takes care of the problems and then applies them. The author uses a different sensor to scale the various parameter like humidity, temperature, pressure, rain value & the LDR sensor is used. The system also calculates the dew point value from the temperature prototype. The temperature sensor can be used to measure the value of the particular area, room, or any place. With the help of the LDR sensor, the light intensity can be used as described by the author.

CHAPTER 3
EXISTING SYSTEM

3.1 BLOCK DIAGRAM

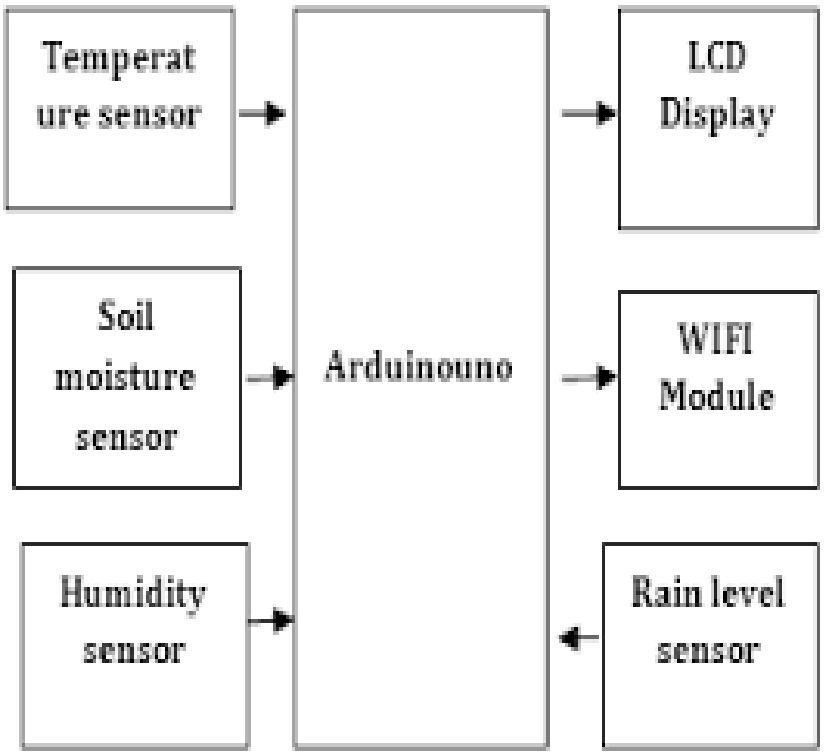

Figure 3.1.1.BLOCK DAIGRAM

Arduino is an open-source platform that enables us to quickly build electronic projects. We designed a simple weather station using Arduino Uno to program, calculate the output data and display the weather. This solves the forecasting future weather by using present data.

This sensor is enough to cover and collect temperature data in a room and it is a lot cheaper than DHT22 Sensor. The projects used with the same LCD, RGB Backlight LCD -16x2. The algorithm is coded in the Arduino. Imaginative idea, keeping track of the humid content of your room helps you maintain your wood and metal objects. The device will track and monitor the level of humidity in a normal

bedroom. The project will need the DHT11 Sensor which is on the less expensive price and it will help the project easier to obtain data of humidity and temperature. The Humidity Tracker will receive and project data gathered from the saturation changes in air temperature and calculates it. By keeping track of the humid content in a room, we can estimateand control the airflow and temperature in a room. Having things in a room with wood materials in our place gives us a hard time because once cold air and water enters the wood, the wood will easily warp and same case for metal things but instead it will rust. This is to prevent warping and rusting in our things and help maintain to always keep in quality.

3.2 CONSTRUCTION OF WEATHER MONITORING SYSTEM COMPONENTS REQUIRED:

i) Arduino Uno.
ii) DHT11 Sensor.(Humidity and Temperature Sensor)
iii) I2C Module for 16x2 display.
iv) 16x2 LCD Display
v) Jumper wires

3.2.1 ARDUINO UNO:

The Arduino Weather Shield from Spark Fun is an easy-to-use Arduino shield that grants you access to barometric pressure, relative humidity, luminosity, and temperature. There are also connections to optional sensors such as wind speed/direction, rain gauge, and GPS for location and super accurate timing.

Arduino UNO is based on an ATmega328P microcontroller. It is easy to use compared to other boards, such as the Arduino Mega board, etc. The board consists of digital and analog Input/Output pins (I/O), shields, and other circuits.

Figure 3.2.1.Arduino Uno

3.2.1 DHT11 SENSOR:

Varying temperature and humidity information of the environment are captured by the DHT11 component (see Fig 1). It is a Temperature and Humidity Sensor which has a calibrated digital signal output. The DHT11 ensures a high reliability and long-term stability by using the exclusive digital-signal-acquisition technique and temperature & humidity sensing technology. With a resistive-type humidity measurement component and a temperature measurement component, the DHT11 provides a reliable data. Its element is calibrated in the laboratory under extremely accurate humidity calibration conditions and stores the calibration coefficients in memory as programmes for later use (D-Robotics, 2010). The temperature and humidity sensor used for this study has a coverage range of up to 20meters. It complies with standard reference temperature for industrial measurement which is given as 200c – 250c; details of how this was arrived at were discussed by Doiron (2007)It has low power consumption and an impressively small size suitable for most projects. It is worthy of note that the DHT11 sensor requires a minimum of one second delay for it to stabilize.

This delay is imperative to guarantee a reliable data from the sensor (D-Robotics, 2010). Besides temperature measurements, DHT11 also measures relative humidity – which is the amount of water vapor in the atmosphere (D-Robotics, 2010). Normally, at the saturation point, water vapor begins to condense to form dew (Shelton, 2008). Changes in the air temperature greatly determine its saturation point. Notably, a higher air temperature holds more water vapor than a cold air temperature. At 0% Relative humidity ,

expressed as The ranges and accuracy of the DHT11 is as follows (D-Robotics, 2010):

- Humidity Range: 20-90% RH
- Humidity Accuracy: ±5% RH
- Temperature Range: 0-50 °C
- Temperature Accuracy: ±2% °C
- Operating Voltage: 3V to 5.5Va percentage – the air is considered totally dry, but condenses at 100%

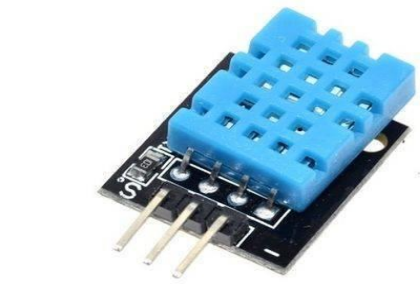

Figure 3.2.2.DTH11 Sensor

3.2.3 ESP8266 WIFI MODULE:

ESP8266 is responsible for connecting the weather monitoring system to internet. This module is inserted on a breakout board adapter so that ESP8266 can be interfaced on a breadboard. ESP8266 is not a just another ordinary module, it has a full-fledged 32-bit microcontroller which requires a program code to function. We will be using a programmer to upload the code to this ESP8266 module which we will see in the later part of this article. It operates on 3.3V and communicates on serial interface with Arduino. This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration

allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existance interfaces, it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts.

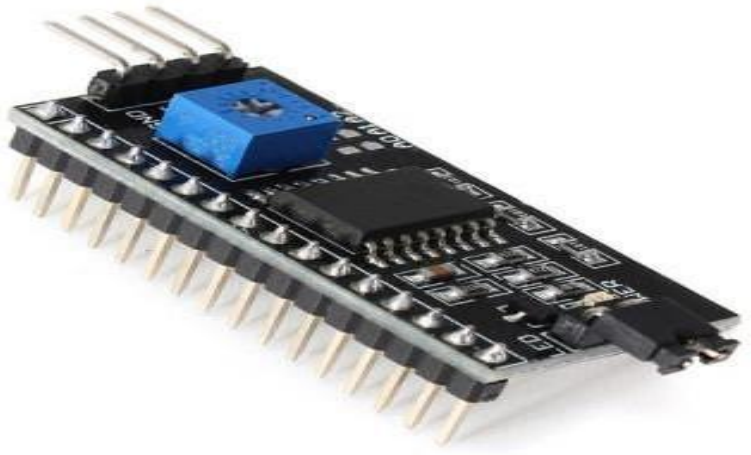

Figure.3.2.3. ESP8266

3.2.4 RAIN SENSOR MODULE

The rain sensor module is an easy tool for rain detection.It can be used as a switch when raindrop falls through the raining board and also for measuring rainfall intensity. The analog output is used in detection of drops in the amount of rainfall. When dropping a little amount water, DO output is low, The switches indicator will turn on. Brush off the water droplets, and were restored to the initial state, outputs high level. A rain sensor or rain switch is a switching device activated by rainfall. Raindrop sensor is a board on which nickel is coated in the form of lines. It works on the principle of resistance. The raindrop sensor measures the moisture via analog output pins and it provides a digital output when a threshold of moisture exceeds. Rain sensors prevent this frustrating and wasteful occurrence. These devices are designed to temporarily shut off an irrigation system so it stops running when it detects rain. Rain sensors can be retrofitted on installed sprinkler systems. You may also see them referred to as rain shut-off devices or rain switches. Most rain-sensing wipers use a sensor that's mounted behind the windshield. It sends out a beam of

infrared light that, when water droplets are on the windshield, is reflected back at different angles.

Figure.3.2.4 RAIN SENSOR MODULE

3.2.5 MQ-135 AIR SENSOR MODULE

MQ-135 is an analog air quality sensor which takes air samples from your surroundings and gives out an analog voltage at its output terminal. The sensor has built-in heater for heating the sensor for its normal operation and if the sensor is exposed to strong wind we may get incorrect readings. The sensor takes typically around 3 to 5 minutes to reach optimum temperature depending on surrounding air flow. The sensor has good sensitivity to detect the above mentioned gases, but the disadvantage is it cannot differentiate which gas or gases have been detected. The MQ 135 sensor can be implemented to detect smoke, benzene, vapors, and other hazardous gases. It can detect various harmful gases. It can be used for air quality monitoring, noxious gas detection, home air pollution detection, industrial pollution detection, portable air pollution detection, etc.

Figure.3.2.5 MQ-135 AIR SENSOR MODULE

3.2.6 LIGHT DEPENDENT RESISTOR – LDR

LDR is responsible for collecting data about the intensity of light at your surroundings and it is a passive analog sensor.The LDR is essentially a resistor that is sensitive to the light, when higher intensity light falls on the photosensitive surface its resistance drops and when less light is received its resistance increases.In other words, the resistance is inversely proportional to the intensity of the light on the photosensitive surface of LDR.

Figure.3.2.6 LDR

3.2.7 LCD DISPLAY:

An LCD is an electronic display module that uses liquid crystal toproduce a visible image. The 16×2 LCD display is a very basic module commonly used in DIYs and circuits. The 16×2 translates o a display 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5×7 pixel matrix. LCDs are used in a wide range of applications, including LCD televisions, computer monitors, instrument panels, aircraft cockpit displays, and indoor and outdoorsignage. Small LCD screens are common in LCD projectors and portable consumer devices such as digital cameras, watches, calculators, and mobile telephones, including smartphones. LCD screens have replaced heavy, bulky and less energy-efficient cathode-ray tube (CRT) displays in nearly all applications. A Liquid Crystal Display commonly abbreviated as LCD is basically a display unit built using Liquid Crystal technology. When we build real life/real world electronics based projects, we need a medium/device to display output values and messages. The most basic form of electronic display available is 7 Segment displays, which has its own limitations.

Figure.3.2.7. LCD Display.

3.3 WORKING PRINCIPLE:

The device works by taking readings from various sensor sat different pins in arduino microcontroller It increases the scope of this project. The various sensors are attached to the microcontroller each of them taking 5V input from arduino except one pressure sensor requiring 3.3V using a3.3V pin out from the board. All the sensors are connected using a breadboard. For temperature sensor to prevent any damage or unstable behavior a 10kΩ resistor is attached in parallel to the temperature sensor on the bread board. We've used DHT11 temperature sensor to get the temperature and humidity readings connected to digital pin7 on board for input signals. It gives us continuous reading of surrounding environment in the range of two to three seconds. Because of its low cost it doesn't affect the overall system . It also has great libraries and support all around the world. The website for this project is an open source website named Thing speak by a community of Mathworks. So it provides further facility to a information obtained from the reading son the server.

The website provides its DNS. On the Thing speak website, the first step is to register for the account .After registration, create a channel which will be for your device. A channel is made for taking all the information you want to display update send or receive. It is used for interaction between arduino and your channel. While creating the channel, specify or check the number of fields for data you want to visualize or post on the server. Thing speak website provide API write key and API read key for each of its own purpose. In order to send or update information regarding our device in live feed we will use API write key specify in our code while making requests to the website.dd code in Mat lab and weather around them as well as the environment. The weather monitoring system is still able to provide localized information on the weather conditions around your house or in the nearby areas you live.

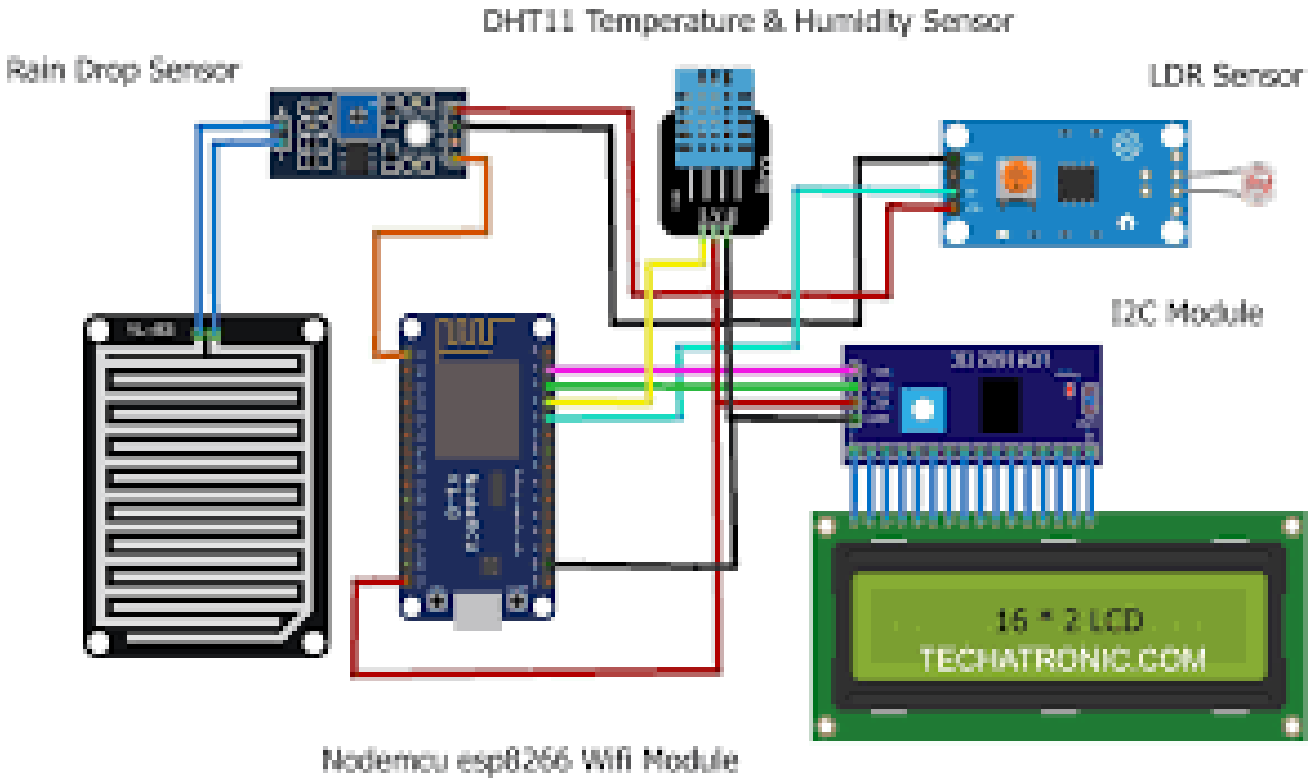

Figure.3.3.1. Circuit Connection.

CHAPTER- 4
RESULT AND DISCUSSION

The Arduino IDE was used in developing the sketches that were uploaded as firmware into the microcontroller. Thereafter, the system could work without the user's intervention. Libraries are required for a robust firmware development using Arduino. In this case, we used the 'Liquid Crystal' and 'dht' libraries. Next we set the Arduino pins and attached them to the LCD for display. Arduino pins 9, 10, 4, 5, 6, 7 were attached to the RS, E, D4, D5, D6, D7 pins respectively on the LCD. The 'pinMode 'of Arduino pin12 was set as INPUT. This is the pin that reads the numeric values from the signal pin of the DHT11 sensor. At least a second delay is required to get reliable readings from the DHT11 sensor. However, we used three(3) seconds delay to ensure that the previous values have been displayed. It is also important to confirm that the temperate and humidity readings are within the acceptable range for the sensor. In this work the humidity range was between 20 - 90 relative humidity, while the temperature ranged between 0 - 500c. Once the read values arewithin range, it is displayed on the LCD screen as seen in Fig 4.1.

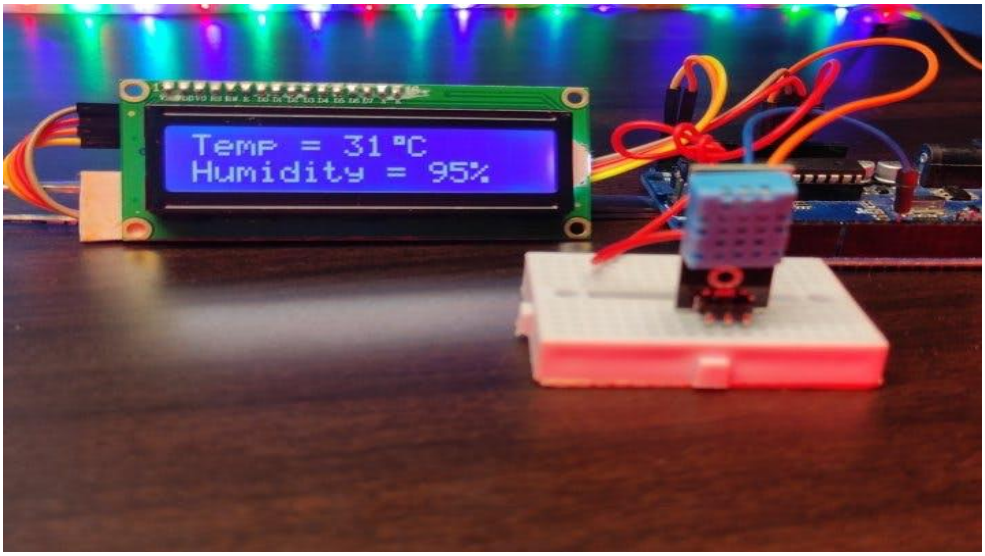

Figure 4.1.Arduino Based Weather

CHAPTER-5

CONCLUSION AND FUTURE WORK

We can determine if the weather is HOT, NORMAL, or COLD based on the air temperature and humidity read by a DHT11 sensor. All the components used in this project were cased with plastic foam – which would have otherwise being discarded as waste. The circuit diagram and the component connections used for the design are presented in Figure 3 and 4. We also presented the flowchart used for the firmware design which was uploaded into the Arduino-based microcontroller. The system was stable as appropriate delays were enforced to enable communication between the components before a report was displayed. This weather monitoring system will provide farmers, pharmacists, event planners and others with accurate information to guide them to take appropriate action. The system is not currently designed to control other devices. However, future studies can extend the system to control several task based on weather conditions. Here we learnt that how present system is better and also more efficient than the other systems. It is exceptionally compatible. It reduces human efforts. This terminate that present project work is a huge success and will provide a considerable way for saving weather parameters of real time and will help farmers, industries, normal people as well as others whose daily life is related with weather and its parameters. It can be used to get required information about for each or particular area for many years. The collected information will used to determine the best conditions required for plants to grow if we talk about agriculture and the farmer can modify the environment conditions which is more suitable for the plan growth.

APPENDICES

```
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27,16,2); // set the LCD address to 0x27 for a 16 chars and 2 line display
byte degree_symbol[8] =
{
0b00111,
0b00101,
0b00111,
0b00000,
0b00000,
0b00000,
0b00000,
0b00000
        };
int gate=11;
volatile unsigned long duration=0;
unsigned char i[5];
unsigned int j[40];
unsigned char value=0;
unsigned answer=0;
int z=0;
int b=1;
void setup()
{
lcd.init();
lcd.init();
```

```
lcd.backlight();
lcd.print("Temp = ");
lcd.setCursor(0,1);
lcd.print("Humidity = ");
lcd.createChar(1, degree_symbol);
lcd.setCursor(9,0);
lcd.write(1);
lcd.print("C");
lcd.setCursor(13,1);
lcd.print("%");
}
void loop()
{
delay(1000);
while(1)
{
delay(1000);
pinMode(gate,OUTPUT);
digitalWrite(gate,LOW);
delay(20);
digitalWrite(gate,HIGH);
pinMode(gate,INPUT_PULLUP);//by default it will become high due to internal pull up
// delayMicroseconds(40);


  duration=pulseIn(gate, LOW);
  if(duration <= 84 && duration >= 72)
```

```
{
 while(1)
{
duration=pulseIn(gate, HIGH);
if(duration <= 26 && duration >= 20){
value=0;}
else if(duration <= 74 && duration >= 65){
value=1;}
else if(z==40){
break;}
i[z/8]|=value<<(7- (z%8));
j[z]=value;
z++;
}}
answer=i[0]+i[1]+i[2]+i[3];
if(answer==i[4] && answer!=0)
{
lcd.setCursor(7,0);
lcd.print(i[2]);
lcd.setCursor(11,1);
lcd.print(i[0]);
}
z=0;
i[0]=i[1]=i[2]=i[3]=i[4]=0;
 }
```

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Thalavapalayam, Karur – 639 113.

Proceedings of the

DST-SERB Sponsored Second International Conference on Signal Processing and Communication Systems

(ICSPCS 2023)

MARCH 07TH, 2023

ORGANIZED BY,

Research and Development Cell,

Department of Electronics and Communication Engineering,

M.KUMARASAMY COLLEGE OF ENGINEERING,

THALAVAPALAYAM, KARUR - 639113, TAMILNADU, INDIA

www.mkce.ac.in

 ISBN: 978-81-951431-8-4

ISBN: 978-81-951431-8-4

Published by

M.Kumarasamy College of Engineering

Karur – 639113.

commonly termed as microcontroller. This onboard computer can efficiently communicate with the different sensors being used.

Keywords-GSM Module ,On-board computer ,Substation ,Microprocessors and Controllers.

PAPER ID: I208

IOT BASED WEATHER MONITORING SYSTEM USING ARDUINO

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Abstract-Arduino measures 4 weather parameters using respective 4 sensors in IOT Weather Reporting System Project. These sensors are a temperature sensor,humidity sensor, light sensor, and rain level sensor. These 4 sensors are directly connected to Arduino Uno since it has an inbuilt Analog to Digital converter. Arduino calculates and displays these weather parameters on an LCD display. Then it sends these parameters to the Internet using IOT techniques. The processof sending data to the internet using Wi-Fi is repeated after constant time intervals. Then the user needs to visit a particular website to view this data. The IOT enabled weather monitoring system project connects and stores the data on a web server. Thus the user gets Live reporting of weather conditions. Internet connectivity or Internet connection with Wi-Fi is compulsory in this IOT weathermonitoring project. IOT – The Internet of Things proves really effective in such scenarios. We can upload these weather parameters data to the cloud using internet connectivity over a WiFi module through wireless communication and using the Internet of Things. Thus this project is also categorized under Wireless communication projects.

Keywords-Arduino Uno, Raspberry Pi, LCD Display.

PAPER ID: I209

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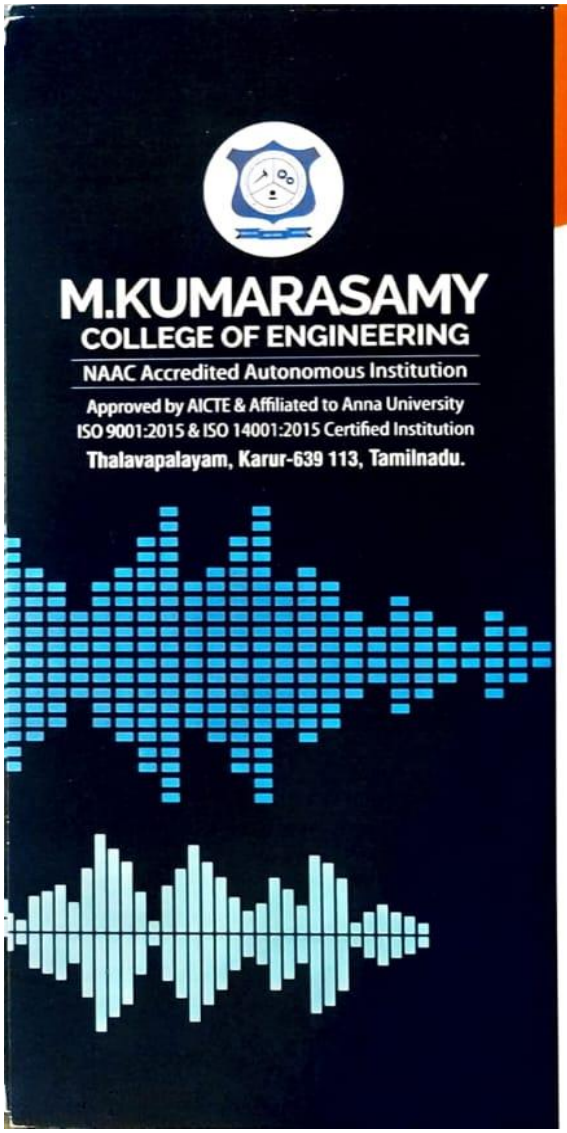

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Organizing Chair

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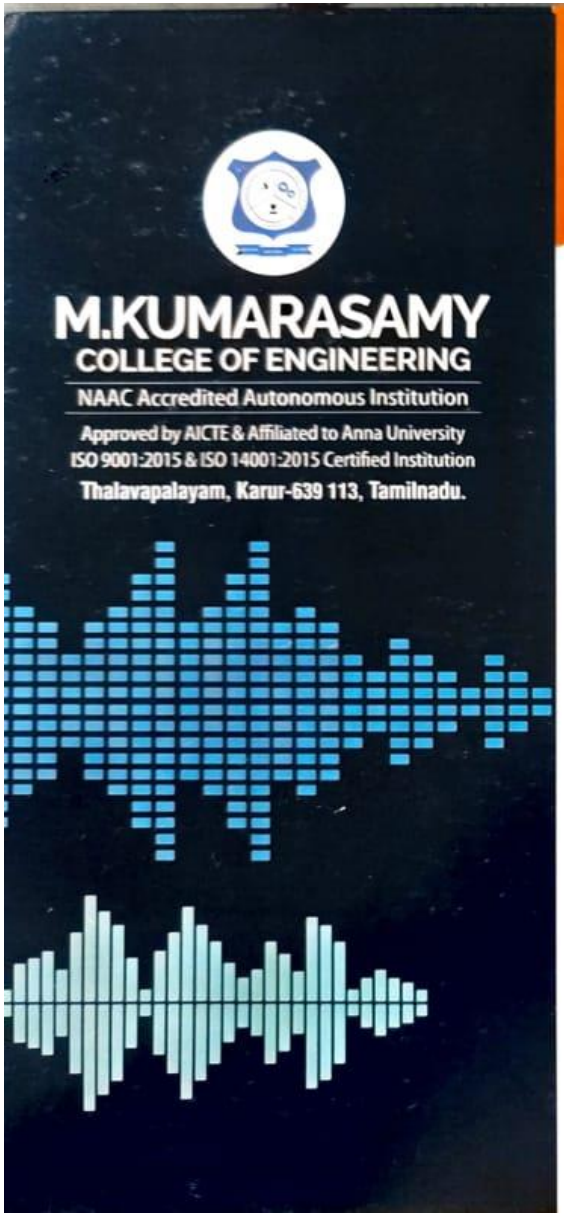

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