WEATHER MONITORING SYSTEM USING NODEMCU

A Mini Project Report Submitted in Partial Fulfilment of the Requirement for the Award of the Degree of

BACHELOR OF TECHNOLOGY

in

ELECTRONICS AND COMMUNICATION ENGINEERING

by

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CERTIFICATE

This is to certify that the Mini Project entitled **"WEATHER MONITORING SYSTEM USING NODEMCU"** is being submitted by **PULAPARTHI RAMYANJANI (19PA1A04D8),SHAIK KHAJA MASTAN AHMED (19PA1A04E9),SIRIGINEEDI SRI SIDDI SAI MAHESH (19PA1A04F0), NUTHALAPATI ANIL(19PA1A04C1), LIKITHAPUDI MAMATHARANI (20PA5A0420)** in partial fulfilment for the award of the degree of **Bachelor of Technology in Electronics and Communication Engineering** is a record of the bonafide work carried out by them under my guidance and supervision during academic year 2020–2021 and it has been found worthy of acceptance according to the requirements of the university.

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LIST OF ACRONYMS

LDR	Light Dependent Resistor
DHT11	Digital Humidity and Temperature Sensor
NODEMCU	Node Micro-controller Unit
I2C	Inter-Integrated Circuit
LCD	Liquid Crystal Display

LIST OF FIGURES

ABSTRACT

Weather plays important part in our daily life, hence designing system to monitor weather conditions which in turn it can be used as a useful tool to impact the human life daily. In this we design a system to monitor the current environmental conditions such as humidity, temperature, light intensity, rain level. According to our design we will set a clear recommendations and precautions that help in escalating the adverse effects of changes in weather conditions and helping to sustain healthy and hygienic environment. To develop such project, we will use NodeMCU as the heart of the system and DHT11 Temperature & Humidity sensor, LDR, Rain sensor, i2c LCD Display module. Finally achieving high degree of reliability, compactness, modularity, and cost effectiveness for our design is the aim and final goals targeted.

Keywords: Weather monitoring, DHT sensor, Rain sensor, LDR module, NodeMCU, Climatic conditions, IoT Automation.

CONTENTS

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Climatic changes and environmental monitoring have received much attention recently. Because weather plays crucial role in daily life of a common man. Climate decides the things, a person can do like knowing what weather inside a house or a cold storage system or within a hospital room can make things more understandable and reliable.

Man wants to stay updated about the latest weather conditions of any place like a college campus or any other particular building. Since the world is changing so fast, there should be weather stations. So, we came up with an idea of making a weather monitoring system which can help us track the weather around us. It is equipped with environmental sensors used for measurements of their respective types.

To accomplish this, we used NodeMCU and different environmental sensors like DHT11, soil moisture sensor and rain drop sensor and light intensity measuring sensor. The sensors constantly sense the weather parameters and this system is particularly in the view of building smart city by giving the weather update of any particular place.

1.2 OBJECTIVE

In this weather monitoring system, the main components are Hardware, Sensors which detects temperature, humidity, rain level and light intensity sensors which detect their following levels.

It is the future technology of connecting the entire world at one place. All the objects, things and sensors can be connected to share the data obtained in various locations and process/analyses that data for coordinating the applications like traffic signaling, mobile health monitoring in medical applications and industrial safety ensuring methods, etc. As per the estimation of technological experts, 50 billion objects will be connected in IOT by 2020. IOT offers wide range of connectivity of devices with various protocols and various properties of applications for obtaining the complete machine to machine interaction.

The system proposed for monitoring weather conditions in a particular place like temperature, humidity, rain level, light intensity using sensors, sensors detect changes in environment and send it to the users for making statistical analysis, IoT is the technology used for monitoring.

CHAPTER 2

LITERATURE SURVEY

LITERATURE SURVEY

Through weather monitoring system we can collect the information about humidity and temperature and according to current date we can produce the results in a lcd and graphical manner in the blink app.

We developed a weather monitoring system with the combination of temperature, lighting, rain level and humidity in one integrated system. So, our main idea was to coin a system that can sense the main components that formulates the weather and can be able to display the weather without human error.

Ancient weather forecasting methods usually relied on observed patterns of events, also termed pattern recognition.

For example, it might be observed that if the sunset was particularly red, the following day often brought fair weather. This experience accumulated over the generations to produce weather lore. However, not all of these predictions prove reliable, and many of them have since been found not to stand up to rigorous statistical testing. The simplest method of forecasting the weather, persistence, relies upon today's

CHAPTER 3

METHODOLOGY

3.1 PROPOSED SYSTEM

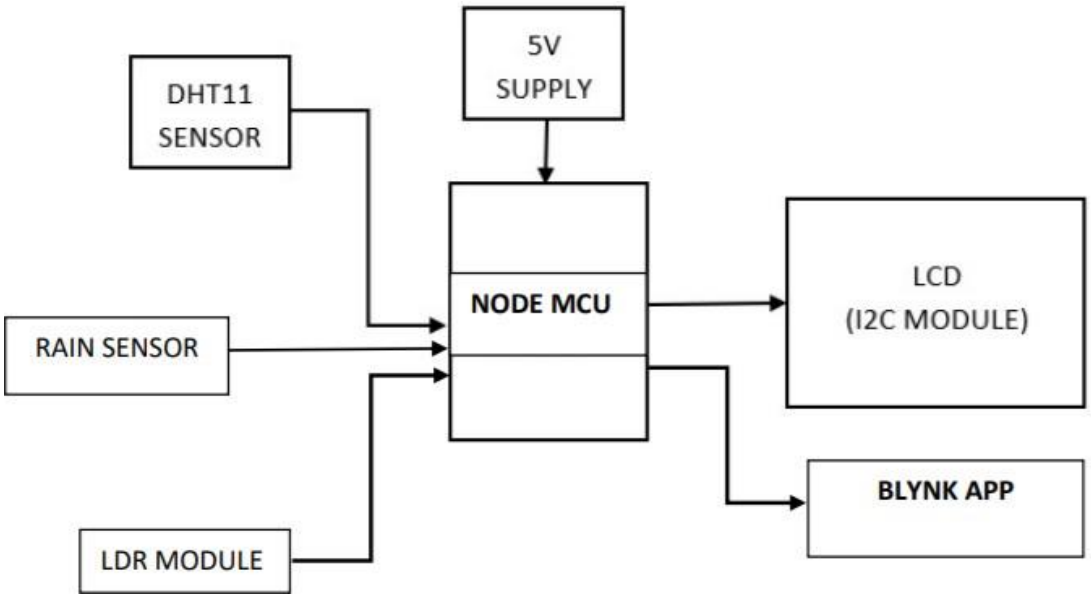

Figure 3.1: Block Diagram of the System

The above figure represents the block diagram of the proposed concept. The DHT11 Sensor is interfaced with NodeMCU to fetch the data of temperature and Humidity in the room. Rain Sensor is used to sense the rain level. LDR Senses the light intensity. Moreover, the output of the whole system is shown in LCD display and also in Blynk app in Mobile.

REQUIRED COMPONENTS

- NodeMCU
- DHT11 Sensor
- I2C Display Module
- Rain Sensor
- LDR Sensor
- JUMPER WIRES
- BREAD BOARD
- 5V power supply

OVERVIEW OF COMPONENTS

DHT11 SENSOR

The digital temperature and humidity sensor DHT11 is a composite sensor that contains a calibrated digital signal output of temperature and humidity. The technology of a dedicated digital modules collection and the temperature and humidity sensing technology are applied.

Figure 3.2: DHT11 Sensor

I2C DISPLAY MODULE

I2C_LCD is an easy-to-use display module; it can make display easier. Using it can reduce the difficulty of make, so that makers can focus on the core of the work. They developed the Arduino library for I2C_LCD, user just need a few lines of the code can achieve complex graphics and text display features. It can replace the serial monitor of Arduino in some place, you can get running information without a computer.

Figure 3.3: I2C Display Module

RAIN SENSOR:

A switching device activated by rainfall. There are two main applications for rain sensors. The first is a water conservation device connected to an automatic irrigation system that causes the system to shut down in the event of rainfall. The second is a device used to protect the interior of an automobile from rain and to support the automatic mode of windscreen wipers. The rain sensor works on the principle of total internal reflection. An infrared light beam at a 45-degree angle on a clear area of the windshield from the sensor-inside the car. When it rains, the wet glass causes the light to scatter and lesser amount of light gets reflected back to the sensor.

Figure 3.4: Rain Sensor

LDR sensor:

A photoresistor (also known as a light-dependent resistor, LDR, or photo-conductive cell) is a passive component that decreases resistance with respect to receiving luminosity (light) on the component's sensitive surface. The resistance of a photoresistor decreases with increase in incident light intensity; in other words, it exhibits photoconductivity. A photoresistor can be applied in light-sensitive detector circuits and light-activated and dark-activated switching circuits acting as a resistance semiconductor. In the dark, a photoresistor can have a resistance as high as several megaohms (MΩ), while in the light, a photoresistor can have a resistance as low as a few hundred ohms. If incident light on a photoresistor exceeds a certain frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electrons (and their hole partners) conduct electricity, thereby lowering resistance. The resistance range and sensitivity of a photoresistor can substantially differ among dissimilar devices. Moreover, unique photoresistors may react substantially differently to photons within certain wavelength bands.

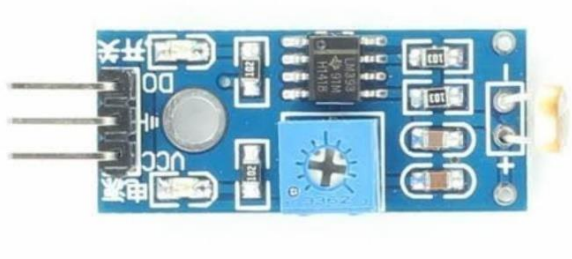

Figure 3.5: LDR Module

NODEMCU

NodeMCU is an open-source firmware for which open source prototyping board designs are available. The name "NodeMCU" combines "node" and "MCU". The term "NodeMCU" strictly speaking refers to the firmware rather than the associated development kits. Both the firmware and prototyping board designs are open source. The firmware uses the Lua scripting language. The firmware is based on the Eula project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson[9] and SPIFFS. Due to resource constraints, users need to select the modules relevant for their project and build a firmware tailored to their needs. Support for the 32-bit ESP32 has also been implemented. The prototyping hardware typically used is a circuit board functioning as a dual in-line package which integrates a USB controller with a smaller surface-mounted board containing the MCU and antenna.

Figure 3.6: NODEMCU

BREADBOARD

A breadboard, or protoboard, is a construction base for prototyping of electronics. Originally the word referred to a literal bread board, a polished piece of wood used when slicing bread. In the 1970s the solderless breadboard became available and nowadays the term "breadboard" is commonly used to refer to these. Because the solderless breadboard does not require soldering, it is reusable. This makes it easy to use for creating temporary prototypes and experimenting with circuit design. For this reason, solderless breadboards are also popular with students and in technological education. A stripboard and similar prototyping printed circuit boards, which are used to build semi-permanent soldered prototypes or one-offs, cannot easily be reused. A variety of electronic systems may be prototyped by using breadboards, from small analog and digital circuits to complete central processing units.

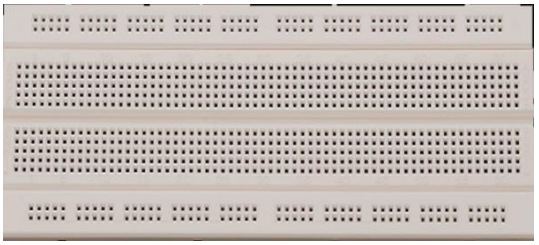

Figure 3.7: Bread Board

3.2 CIRCUIT DIAGRAM

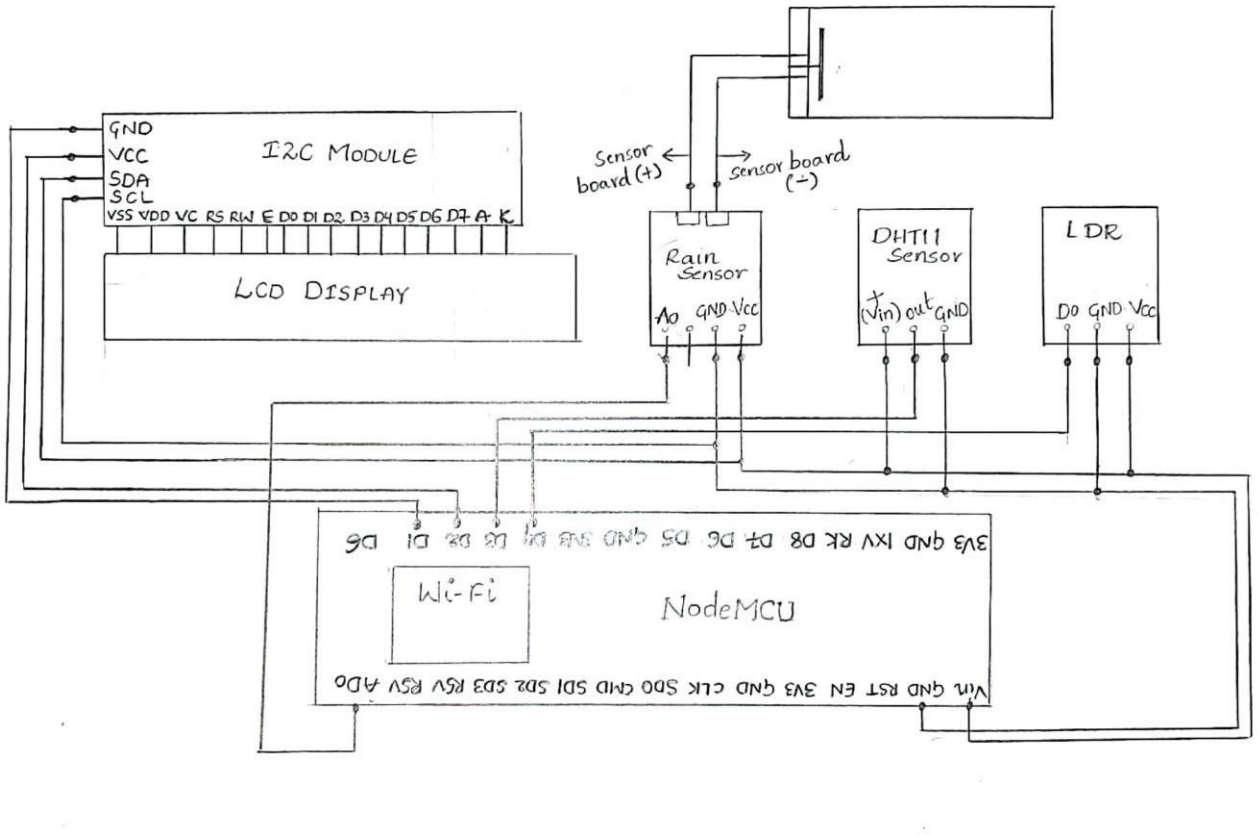

Figure 3.8: Circuit Diagram

The A0 pin of Nodemcu is connected to A0 of rain sensor. Ground pin of Nodemcu is connected to I2C ground, DHT11 Ground, Rain Ground and to the LDR Ground. D1 pin of Nodemcu is connected to SCL pin of I2C. And D2 Pin of Nodemcu is connected to SDA pin of I2C Module. D3 Pin of Nodemcu is connected to output pin of DHT11. And D4 is connected to D0 of LDR and Input pin of Nodemcu Vin is connected to Vcc of I2C and positive of DHT11 Vcc of Rain and Vcc of LDR.

SCHEMATIC DIAGRAM

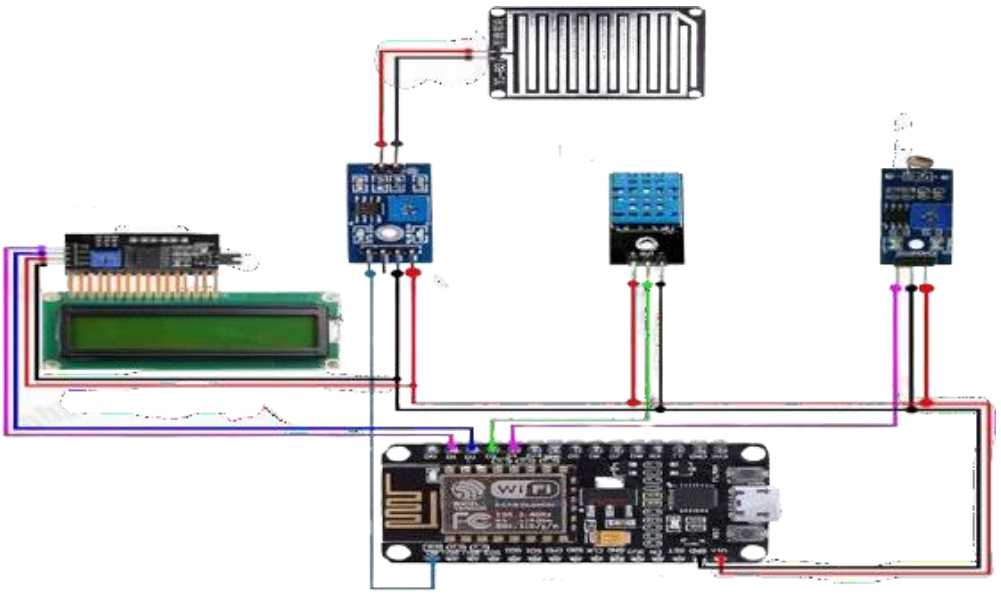

Figure 3.9: Schematic Diagram

WORKING

The main working of our project is that, making the sensors to collect the data of their respective values and sends to the lcd display channel with i2c module connected to it and the code which we have already uploaded to the NodeMCU. NodeMCU sends the data to the blink app which updates at certain time interval which help us track the data while we are far from the given source or location. First the dht11 sensor collects the data of temperature and humidity of surroundings and send it to the NodeMCU. Similarly, light detecting sensor and Rain Level sensor collect the data and send it directly to NodeMCU and the code which is already uploaded to the NodeMCU will transfer the data and will compete it and send it to the display which has i2c module which helps NodeMCU to display the complex structures and shapes. NodeMCU also upload the values to the blink app which we already created a project file with it. until there is WIFI connectivity at certain interval of time. This is the basic working of our project is displayed.

CHAPTER 4

RESULTS AND DISCUSSION

RESULTS and DISCUSSION

In this project we have finally able to get the updates temperature and other related things which are main responsible for the weather deciding and able some reach our goal of predicting the weather

Output results

1) Tracking temperature and humidity: this is the result of measuring the value of temperature and humidity using dht11 sensor and displaying on lcd
2) Tracking light intensity: this is the result of measuring the light intensity of LDR sensor and displaying on sensor
3) Tracking rain level: this is the result of checking the change in rain level and displaying on lcd
4) Tracking in blink app: all the values will be uploaded to the blink app

Both the hardware and the software parts of the design are interfaced to achieve the overall objective of safety. While the hardware part contains devices that make the gathering and collecting the data possible and achievable, the software drives the operations and enables the functioning of the interconnected devices. The primary objective of the project is to assure the safety of many things which include of storage systems and hospital rooms similarly working places and schools while at the same time managing the cost. This project has therefore relied on cost-effective devices to ensure the overall cost-effectiveness of the project.

The system designed in this case alerts the owner about any change in weather conditions which results in damage of things present in the surroundings and in particular place and also help us track while we are away using the blink app

Applications

- Storages
- Houses
- Day care centers
- Farms
- Hospitals
- Working places

OUTPUT

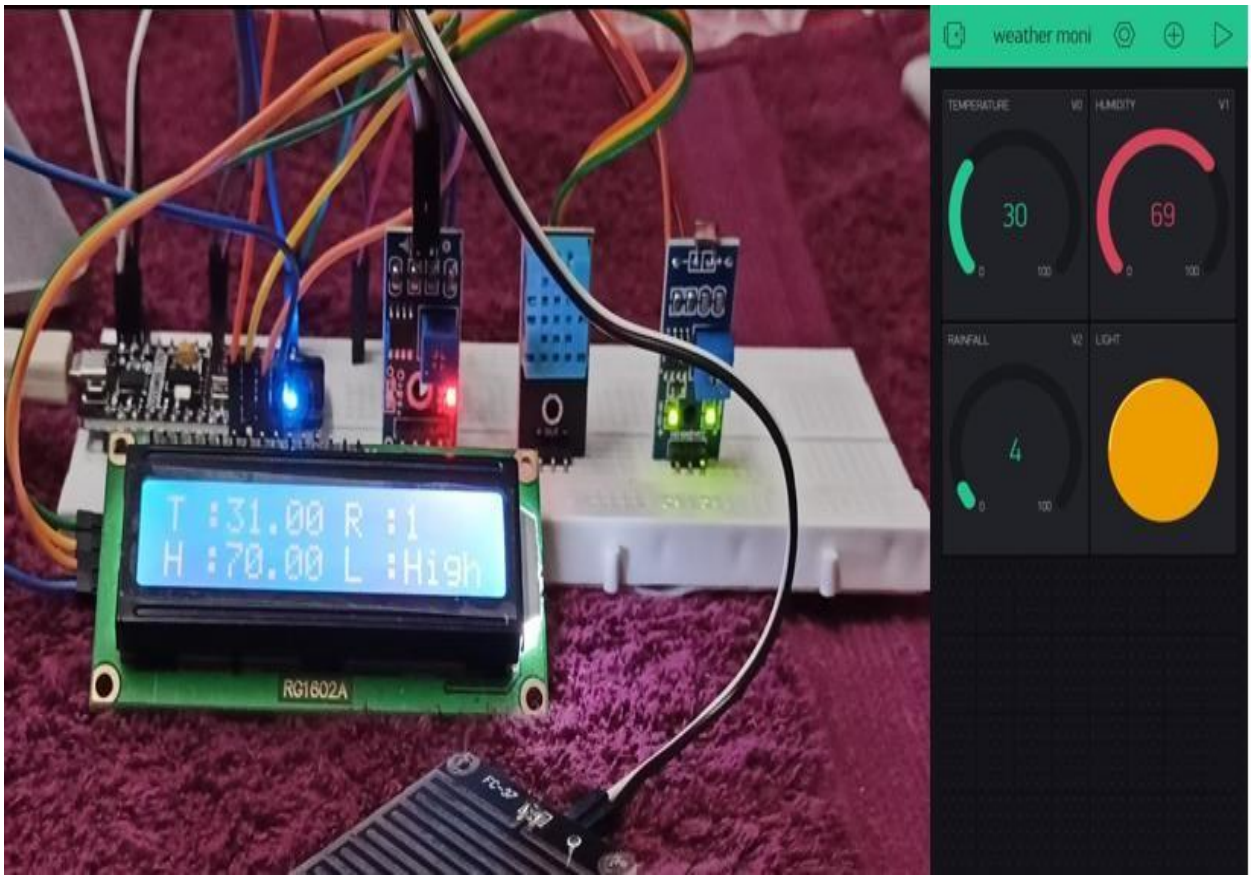

Figure 4: Output

CHAPTER 5
CONCLUSION

CONCLUSION

By the completion of project, we have fulfilled the objective of monitoring the climate around us and we made a cost-effective weather monitoring system which has many applications. We made the project with the best of our abilities in it and this project has very future scope. We can further enhance with many abilities like adding an ai system which can predict the future weather and other things or we can add an alarm which can help us warn us in case of any danger. Due to this we enhanced our mechanical knowledge along with electronics & software portion. To be more precise, the completion of the project has raised our confidence to a next level, where we feel more confident about our abilities as an engineer. Hence, we concluded that, this project perceived a lot of experience and knowledge in the field of automation and IoT.

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APPENDIX

Code uploaded to Github **https://github.com/19pa1a04e9/miniproject/**