

Raspberry Pi Based Weather Reporting Over IOT

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering Degree in
Electronics and Communication Engineering

by

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**DEPARTMENT OF ELECTRONICS AND COMMUNICATION
ENGINEERING
SCHOOL OF ELECTRICAL AND ELECTRONICS**

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

Accredited with Grade "A" by NAAC

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May – 2022



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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of Jakkampudi Venkata Satya Sriram (38130087), Pepakayala Tejas Sai (38130163) who carried out the project entitled “**Raspberry Pi Based Weather Reporting Over IOT**” under our supervision from November 2021 to May 2022.

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We **Jakkampudi Venkata Satya Sriram (RegNo.38130087)** and **Pepakayala Tejas Sai (RegNo.38130163)** hereby declare that the Project Report entitled ” **Raspberry Pi Based Weather Reporting Over IOT**” done by us under the guidance of **Dr.S.Emalda Roslin, M.E, Ph.D** and **Dr. N.R.Krishnamoorthy, M.E, Ph.D** is submitted in complete fulfillment of the requirements for the award of Bachelor of Engineering degree in Electronics and Communication Engineering.

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ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to Board of Management of SATHYABAMA for their kind encouragement in doing this project and for completing it successfully. I am grateful to them.

I convey my thanks to Dr. **N.M. NANDITHA, M.E., Ph.D.**, Dean, School of **ELECTRONICS AND COMMUNICATION ENGINEERING** and Dr. **T. RAVI, M.E., Ph.D.**, Head of the Department, Dept. of **ELECTRONICS AND COMMUNICATION ENGINEERING** for providing me necessary support and details at the right time during the progressive reviews.

I would like to express my sincere and deep sense of gratitude to my Project Guide Mrs. **Dr.T.BERNATIN.,M.E.,Ph.D.**, for his valuable guidance, suggestions and constant encouragement paved way for the successful completion of my project work.

I wish to express my thanks to all Teaching and Non-teaching staff members of the Department of **ELECTRONICS AND COMMUNICATION ENGINEERING** who were helpful in many ways for the completion of the project.

ABSTRACT

In this proposed is an advanced solution for monitoring the weather conditions at a particular place and make the information visible anywhere in the world. The technology behind this is Internet of Things (IoT), which is an advanced and efficient solution for connecting the things to the internet and to connect the entire world of things in a network Here things might be whatever like electronic gadgets, sensors and automotive electronic equipment. The system deals with monitoring and controlling the environmental conditions like temperature, relative humidity, light intensity and CO level with sensors and sends the information to the web page and then plot the sensor data as graphical statistics. The data updated from the implemented system can be accessible in the internet from anywhere in the world.

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CHAPTER-1

INTRODUCTION

Nowadays, the application of Internet of Things (IoT) affects all habitual domains[1]. The invented IoT systems are attempted to control, manage, and monitor human usual actions, environmental parameters, or animal movements. So, all these innovations are developed to facilitate human work and make the life easier than before. In this stage, the environmental monitoring systems are invented to measure and control the environment parameters.

For many years, humans try to understand their environment.

So, humans have invented many objects to measure various parameters. For example, humans have created thermometer, barometer, and pyrometer for measuring temperature, atmospheric pressure, and solar system radiation, respectively. However, those traditional tools must be used locally. On the other hand, with the invention of IoT, humans can measure all environment parameters remotely. Thus, the procedure of quantifying and measuring environmental parameters has become simple than in previous days.

CHAPTER-2

LITERATURE SURVEY

A F Pauzi¹ and M Z Hasan¹

Weather forecast these days is unpredictable too be exact because of the climate changes drastically over weather. In cause of that, Weather Reporting System is mostly used to monitor the continuously changing climatic and weather conditions over controlled areas likes house, industry, agriculture and etc. in real time monitoring. Internet of Things (IoT) platform use is ThingSpeak it's should be able displaying the weather parameters and the information will visible wherever in the world and it's also displaying on the OLED with two-way microcontroller communication via Wi-Fi hotspots

Puja Sharma¹ and Shiva Prakash²

In Today's World, knowing live environmental condition is one of the biggest issues because there is an IoT of hurdles arrives when live environmental condition is measured. The proposed system will remove this problem since it monitors real- time weather conditions. In this proposed work we will monitor the live weather's parameter of the Gorakhpur Region. The proposed system will work on the client- server architecture model using IoT. The system is organized in Two-tier

Architecture. Our proposed system contains a various sensor which will monitor the temperature of the region, humidity, Rain value and pressure of the system

Jamal Mabrouki , Mourade Azrour, Driss Dhiba, Yousef Farhaoui, and Souad El Hajjaji

In recent years, the monitoring systems play significant roles in our life. So, in this paper, we propose an automatic weather monitoring system that allows having dynamic and real-time climate data of a given area. The proposed system is based on the internet of things technology and embedded system. The system also includes electronic devices, sensors, and wireless technology. The main objective of this system is sensing the climate parameters, such as temperature, humidity, and existence of some gases, based on the sensors. The captured values can then be sent to remote applications or databases. Afterwards, the stored data can be visualized in graphics and tables form.

Girija C, Harshalatha H, Andreanna Grace Shires, Pushpalatha H P

By keeping the embedded devices in the environment for monitoring enables self protection (i.e., smart environment) to the environment. To implement this need to deploy the sensor devices in the environment for collecting the data and analysis. By deploying sensor devices in the environment, we can bring the environment into real life

i.e. it can interact with other objects through the network. Then the collected data and analysis results will be available to the end user through the Wi-Fi.

CHAPTER-3

AIM AND SCOPE OF PROPOSED SYSTEM

- **3.1 AIM AND OBJECTIVE:** To increase the efficiency of the System we are upgrading from Arduino Uno board to Raspberry pi board its Special designed for IoT applications
- And also upgrading Arduino IoT cloud platform its reliable and secure for tracking the our own weather data
- Provide a remote monitoring and controlling application for analysis of a particular sensor data
- Allow the user to manipulate the data and take some necessary actions
- To provide very user-friendly interface for interacting with given data by sensors
- The monitoring framework incorporates sensors like fire sensor, smoke sensor, ultrasonic sensor, moisture and temperature sensor, current and voltage with Wi-Fi module for control operations. With the benefits of unusual exercises, reasonable activities will be activated.

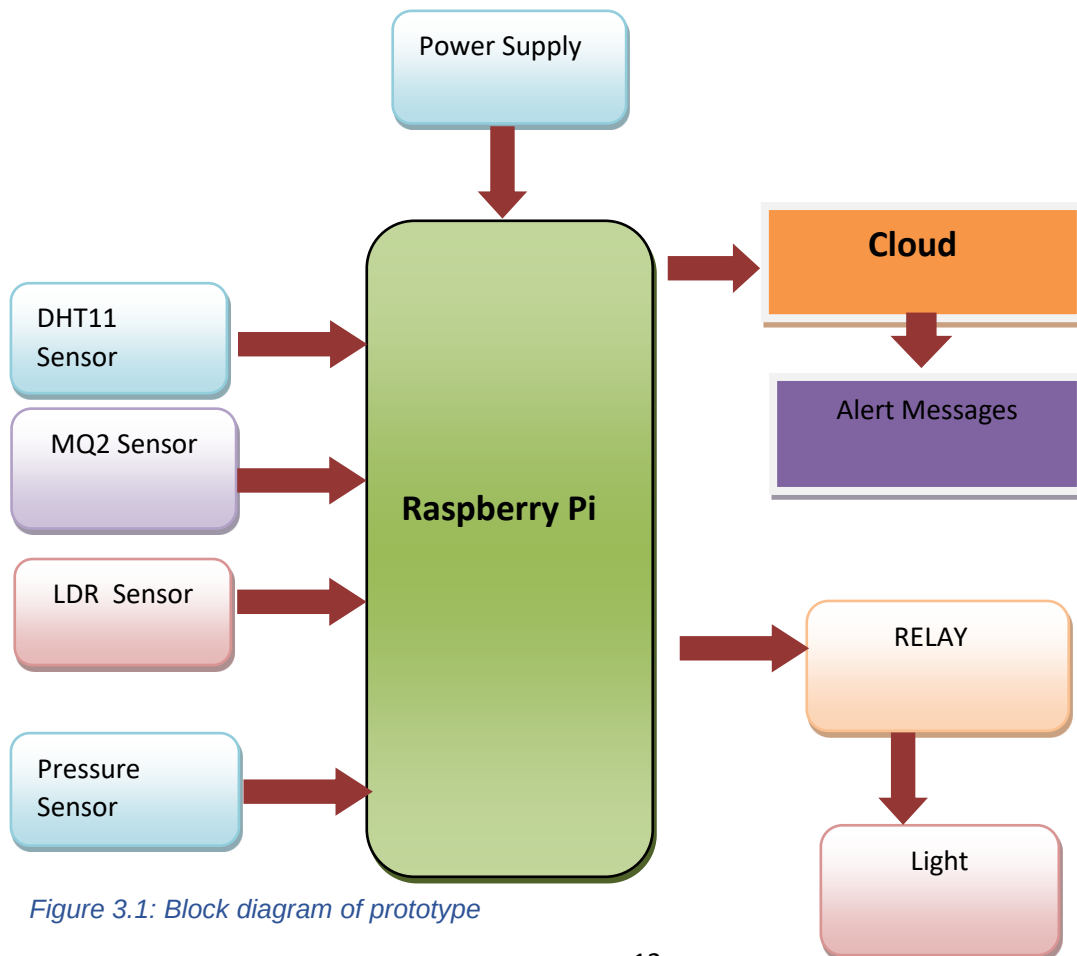


Figure 3.1: Block diagram of prototype

3.2 PROPOSED SYSTEM:

- The implemented system consists of a raspberry pi as a main processing unit for the entire system and all the sensor and devices can be connected with the microcontroller.
- The sensors can be operated by the microcontroller to retrieve the data from them and it processes the analysis with the sensor data and updates it to the internet through Wi-Fi module connected to it.
- The pressure sensor used to monitor the pressure level sensor
- The temperature sensor used to monitor temperature level.
- The water level sensor is used to monitor the rain fall.
- Humidity level sensor is used to monitor the air moisture level

3.3 WORKING :

The implemented system consists of a Raspberry pi as a main processing unit for the entire system and all the sensor and devices can be connected with the Raspberry pi. The sensors can be operated by the Pi to retrieve the data from them and it processes the analysis with the sensor data and updates it to the internet through Wi-Fi module connected to it. The gas sensor used to monitor the gas level in atmosphere, the DHT11 used to measures the temperature as well as humidity in the environment. The sensor used to monitor temperature level and Humidity level sensor is used to monitor the air moisture level. The smoke sensor (CO₂) is used to measure the poisons gases. LDR is used to identify the sun light, when the sun light below the threshold level then turn on the light. If any critical condition automatically send the alert

message. . The pressure sensor working was so fascinating it will calculate the pressure in hector Pascal with this calculation we know the day is sunny or cloudy when the pressure less than normal day the chances will be high for rain fall else the its greater than threshold the chances of sunny.

APPLICATIONS

- Weather Monitoring
- Atmosphere Changes detection

ADVANTAGES:

- Easy to Operate The System
- Low Cost Maintanance

CHAPTER-4

METHODOLOGY

4.1 INTRODUCTION

In this chapter, the procedure for design and development of Raspberry Pi Based Weather Reporting Over IOT is explained. The block diagram of the system is shown. The schematic of embedded control hardware circuit is shown in diagram. The hardware and software description of the data acquisition system for monitoring physical parameter are described below.

4.2 HARDWARE REQUIRED

- Raspberry Pi
- DHT11 Sensor
- LDR Sensor
- BMP180 Pressure Sensor
- MQ2 Sensor
- Relay
- LED
- Battery
- Power Supply

4.2.1 Raspberry Pi:

Raspberry Pi 3 Model B was released in February 2016 with a 1.2 GHz 64-bit quad core ARM Cortex-A53 processor, on-board 802.11n Wi-Fi, Bluetooth and USB boot capabilities

On PI DAY 2018, the Raspberry Pi 3 Model B+ was launched with a faster 1.4 GHz processor, a three-times faster gigabit Ethernet (throughput limited to ca. 300 Mbit/s by the internal USB 2.0 connection), and 2.4 / 5 GHz dual-band 802.11ac Wi-Fi (100 Mbit/s). [26] Other features are Power over Ethernet (PoE) (with the add-on PoE HAT), USB boot and network boot (an SD card is no longer required)



Figure 4.1 : Raspberry Pi

The Broadcom BCM2835 SoC used in the first generation Raspberry Pi includes a 700 MHz ARM1176JZF-S processor, VideoCore IV graphics processing unit (GPU), and RAM. It has a level 1 (L1) cache of 16 KB and a level 2 (L2) cache of 128 KB. The level 2 cache is used primarily by the GPU. The SoC

is stacked underneath the RAM chip, so only its edge is visible. The ARM1176JZ(F)-S is the same CPU used in the original iPhone,[53] although at a higher clock rate, and mated with a much faster GPU.

The earlier V1.1 model of the Raspberry Pi 2 used a Broadcom BCM2836 SoC with a 900 MHz 32-

bit, quad-core ARM Cortex-A7 processor, with 256 KB shared L2 cache. The Raspberry Pi 2 V1.2 was upgraded to a Broadcom BCM2837 SoC with a 1.2 GHz 64-bit quad-core ARM Cortex-

A53 processor, the same one which is used on the Raspberry Pi 3, but underclocked (by default) to the same 900 MHz CPU clock speed as the V1.1. The BCM2836 SoC is no longer in production as of late 2016.

The Raspberry Pi 3 Model B uses a Broadcom BCM2837 SoC with a 1.2 GHz 64-bit quad-core ARM Cortex-A53 processor, with 512 KB shared L2 cache. The Model A+ and B+ are 1.4 GHz

The Raspberry Pi 4 uses a Broadcom BCM2711 SoC with a 1.5 GHz (later models: 1.8 GHz) 64-bit quad-core ARM Cortex-A72 processor, with 1 MB shared L2 cache. Unlike previous models, which all used a custom interrupt controller poorly suited for virtualisation, the interrupt controller on this SoC is compatible with the ARM Generic Interrupt Controller (GIC) architecture 2.0, providing hardware support for interrupt distribution when using ARM virtualisation capabilities.

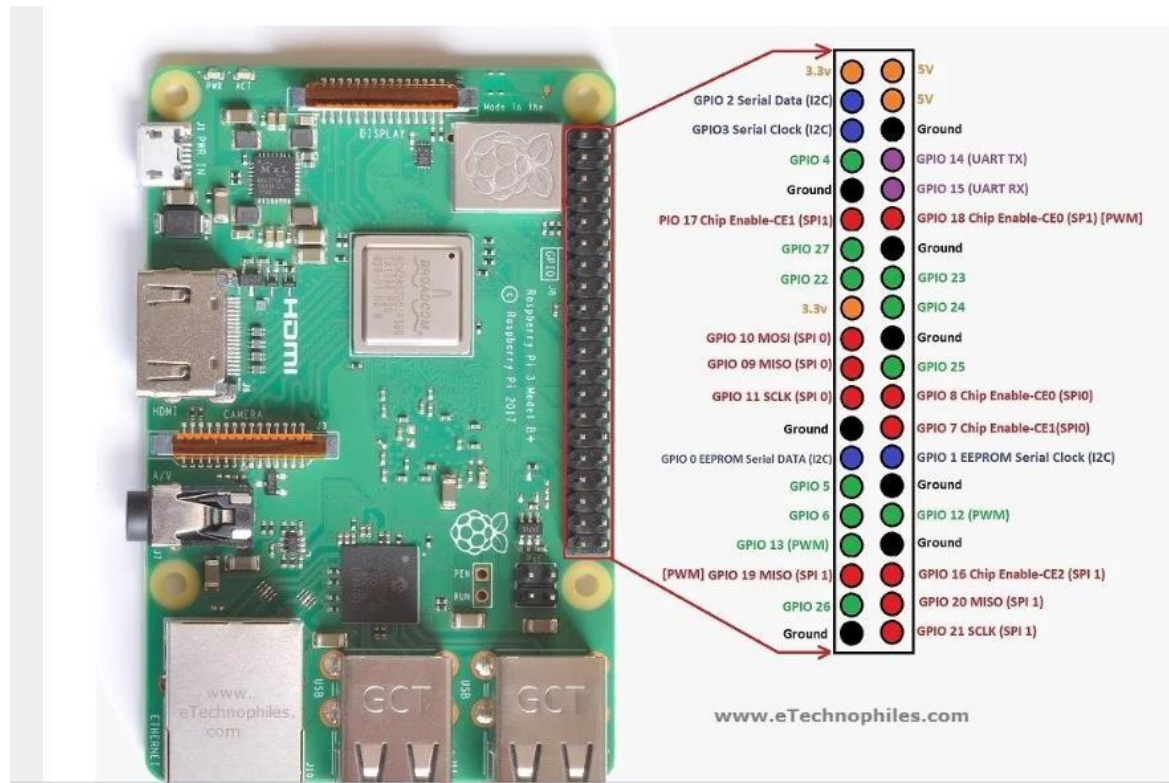


Figure 4.2 : Raspberry Pi Pin Description

Table 4.1 Technical specs

Raspberry Pi	Raspberry Pi 3
Operating Voltage	3V
Input Voltage (recommended)	5V,2A Power source
Input Voltage (limit)	3-5V

Digital I/O Pins	17
PWM Digital I/O Pins	4
Analog Input Pins	0
DC Current per I/O Pin	16 mA
DC Current for 3.3V Pin	50mA
Flash Memory	8GB eMMC
DRAM	1GB
Clock Speed	700MHz to 1.4GHz
Length	68.6 mm
Width	53.4 mm
Weight	42 g

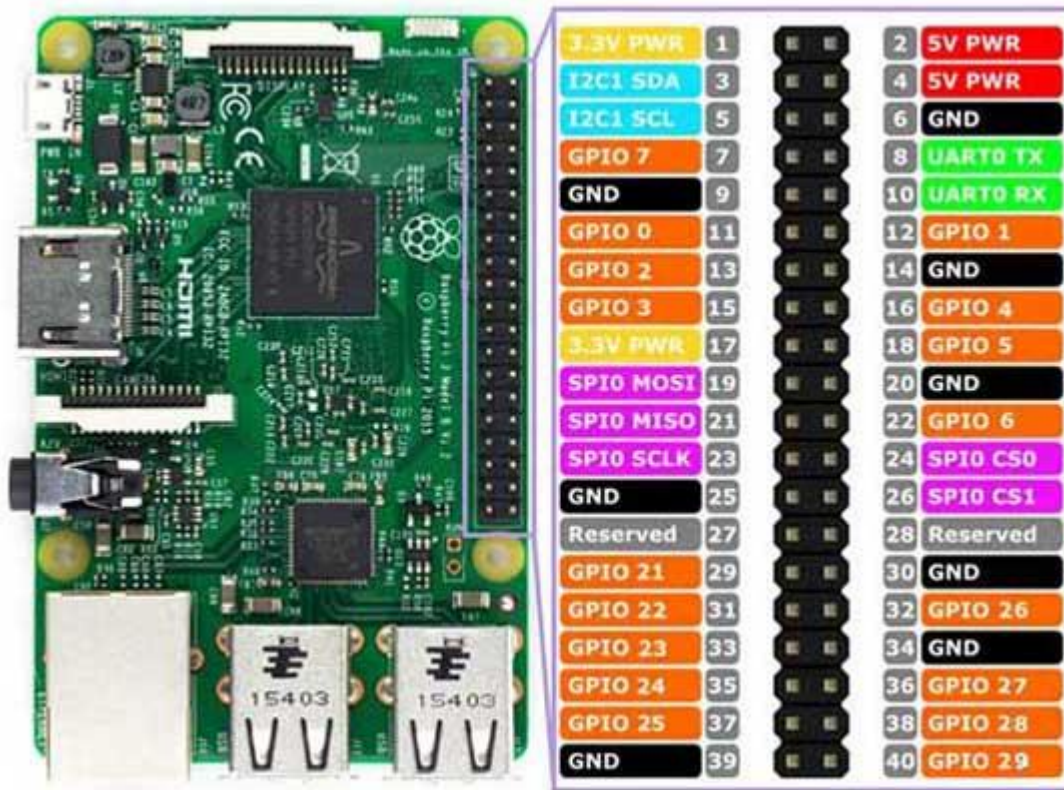


Figure 4.3 : Raspberry PI pin Reference

4.2.2.DHT11 Sensor:

Measurement and control of temperature and relative humidity finds applications in numerous areas. These days devices are available which have both temperature and humidity sensors with signal conditioning, ADC, calibration and communication interface all built inside them. The use of such smart sensors greatly simplify the design and reduces the overall cost. Humidity and temperature measurements with Sensirion's SHT1x/SHT7x sensors. These sensors are capable of measuring both temperature and relative humidity and provide fully calibrated digital outputs. While SHT1x/SHT7x are very accurate sensors, they are still expensive for hobbyists use. This articles discusses the DHT11 sensor which also provides calibrated digital outputs for temperature and humidity but is relatively lot cheaper than the Sensirion sensors. The

DHT11 sensor uses a proprietary 1-wire protocol which we will be exploring here and implementing with the Raspberry Pi that will receive the temperature and humidity values from the sensor and display them on cloud.

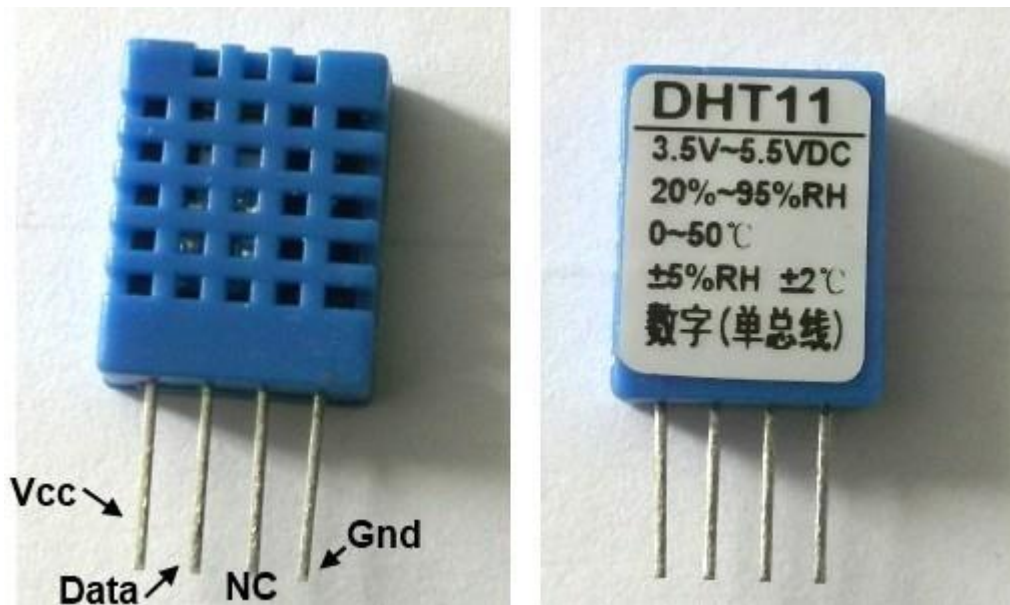


Figure 4.4:DHT11 Sensor

4.2.2.1 Introduction to DHT11 Sensor:

The DHT11 sensor comes in a single row 4-pin package and operates from 3.5 to 5.5V power supply. It can measure temperature from 0-50 °C with an accuracy of $\pm 2^{\circ}\text{C}$ and relative humidity ranging from 20-95% with an accuracy of $\pm 5\%$. The sensor provides fully calibrated digital outputs for the two measurements. It has got its own proprietary 1-wire protocol, and therefore, the communication between the sensor and a microcontroller is not possible through a direct interface with any of its peripherals. The protocol must be implemented in the firmware of the MCU with precise timing required by the sensor.

4.2.2.2.DHT11 signal description:

The following timing diagrams describe the data transfer protocol between a MCU and the DHT11 sensor. The MCU initiates data transmission by issuing a “**Start**” signal. The MCU pin must be configured as output for this purpose. The MCU first pulls the data line low for at least 18 ms and then pulls it high for next 20-40

µs before it releases it. Next, the sensor responds to the MCU “**Start**” signal by pulling the line low for 80

µs followed by a logic high signal that also lasts for 80 µs. Remember that the MCU pin

must be configured to input after finishing the “**Start**” signal. Once detecting the response signal from the sensor, the MCU should be ready to receive data from the sensor. The sensor then sends 40 bits (5 bytes) of data continuously in the data line. Note that while transmitting bytes, the sensor sends the most significant bit first.

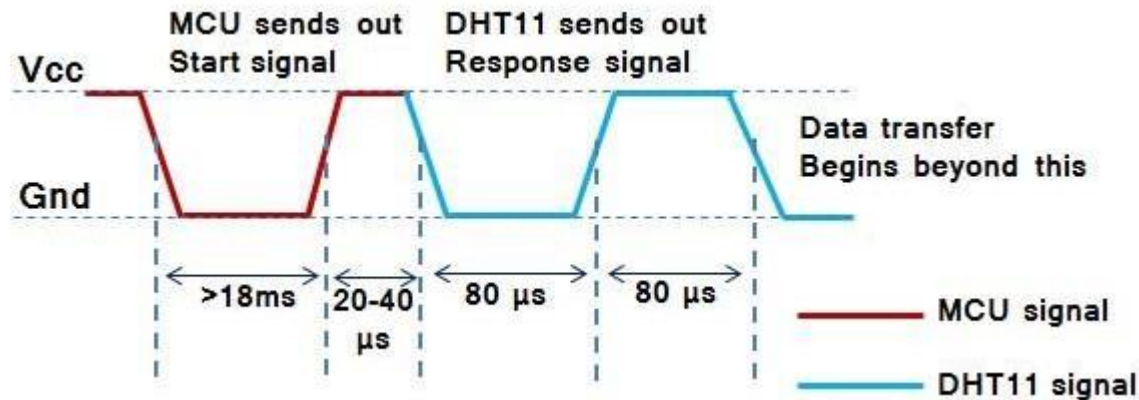


Fig 4.5 :DHT11 Signal

"Start" and "Response" signals

The 40-bit data from the sensor has the following structure.

Data (40-bit) = Integer Byte of RH + Decimal Byte of RH + Integer Byte of Temp. + Decimal Byte of Temp. + Checksum Byte

For DHT11 sensor, the decimal bytes of temperature and humidity measurements are always zero. Therefore, the first and third bytes of received data actually give the numeric values of the measured relative humidity (%) and temperature ($^{\circ}\text{C}$). The last byte is the checksum byte which is used to make sure that the data transfer has happened without any error. If all the five bytes are transferred successfully then the checksum byte must be equal to the last 8 bits of the sum of the first four bytes, i.e.,

Checksum = Last 8 bits of (Integer Byte of RH + Decimal Byte of RH + Integer Byte of Temp. + Decimal Byte of Temp.)

Now let's talk about the most important thing, which is signalling for transmitting "0" and "1". In order to send a bit of data, the sensor first pulls the line low for $50\text{ }\mu\text{s}$. Then it raises the line to high for $26\text{-}28\text{ }\mu\text{s}$ if it has to send "0", or for $70\text{ }\mu\text{s}$ if the bit to be transmitted is "1". So it is the width of the positive pulse that carries information about 1 and 0.

4.2.3 LDR Sensor:

The controlling of lights and home appliances is generally operated and maintained manually on several occasions. But the process of appliances controlling may cause wastage of power due to the carelessness of human beings or unusual circumstances. To overcome this problem we can use the light-dependent resistor circuit for controlling the loads based on the intensity of light. An LDR or a photo resistor is a device that is made up of high resistance semiconductor material. This article gives an overview of what is LDR, light-dependent resistor circuit and its working

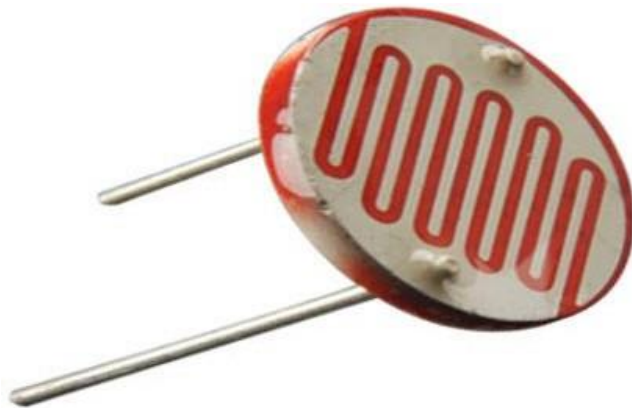


Fig 4.6. Light Dependent Resistor

4.2.3.1 Construction of an LDR

The construction of an LDR includes a light-sensitive material that is placed on an insulating substrate like as ceramic. The material is placed in a zigzag shape in order to get the required power rating and resistance. The area of zigzag separates the metal placed

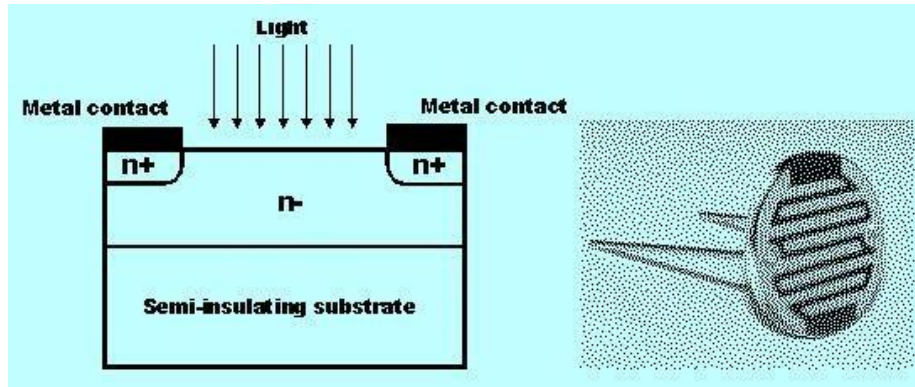


Fig 4.7:LDR Construction

Where the Ohmic contacts are made either on the sides of the area. The resistances of the contacts must be as less as possible to make sure that the resistance, mainly varies due to the light effect only. The use of lead & cadmium materials is avoided as they are injurious to the environment.

4.2.3.2 Working Principle of Light Dependent Resistor

The working principle of an LDR is photo conductivity that is nothing but an optical phenomenon. When the light is absorbed by the material then the conductivity of the material reduces. When the light falls on the LDR, then the electrons in the valence band of the material are eager to the conduction band. But, the photons in the incident light must have energy superior than the band gap of the material to make the electrons jump from one band to another band (valance to conduction).

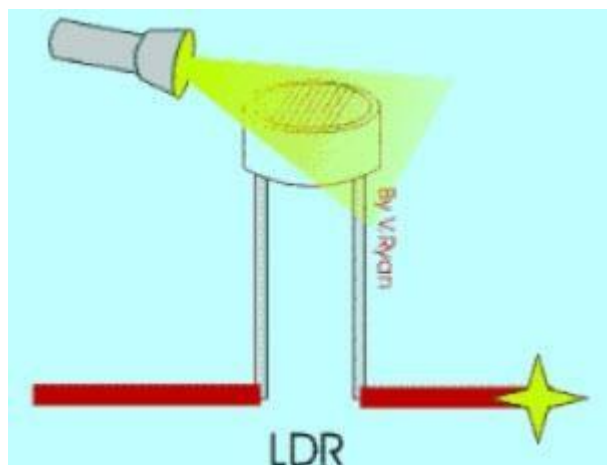


Fig 4.8:LDR Working Principle

4.2.3.3 Light Dependent Resistor Circuit

The circuit of LDR is an electronic circuit built with LDR, relay, Darlington pair, diode, &

resistors shown in the below circuit diagram. A voltage supply is given to the load

The required DC voltage of the LDR circuit is supplied from a bridge rectifier circuit or a battery. This circuit changes the AC supply into a DC. The bridge rectifier circuit uses a step-down transformer to step-down the voltage from 230v into 12v. The diodes are connected in the form of a bridge used to alter the AC voltage into DC. The voltage regulator is used to change the 12v DC-6v DC, and then, this DC voltage is supplied to the entire circuit. A 230v AC supply for both the bridge rectifier and the load is to be kept continuously for continuous operation of the light sensor circuit.

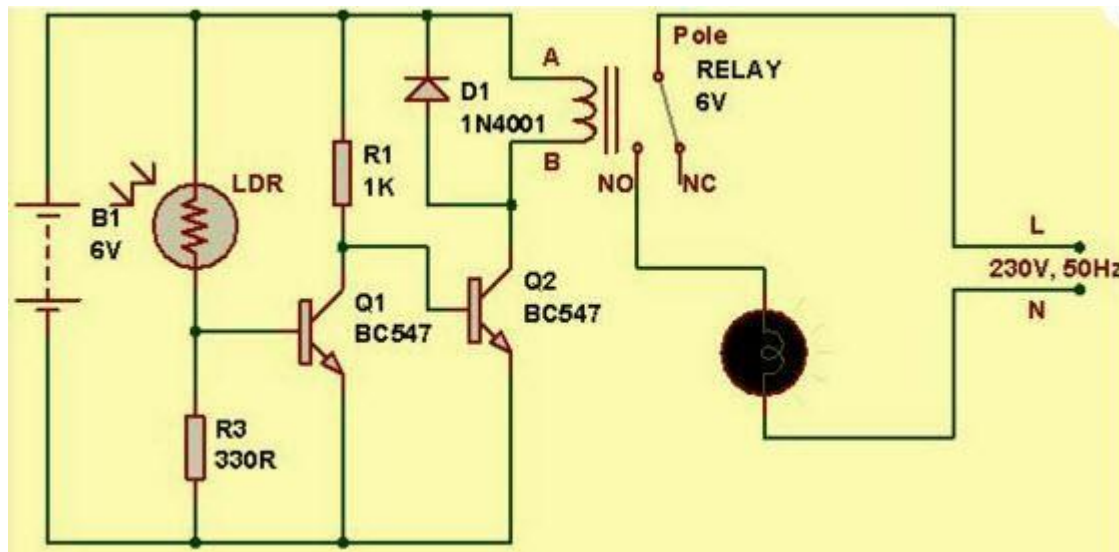


Fig 4.9:Light Dependent Resistor Circuit Diagram

In the morning time, this sensor has a low resistance around 100Ω . Thus, the power supply flows through the LDR & ground through the variable resistor and resistor as shown in the above light sensor circuit. This is due to the resistance offered by the light-dependent resistor in the daytime or when the light falls on the LDR, then it is less compared to the resistance of the remaining part of the sensor circuit. We are alert of the principle of current, that the flow of current always flows in the path of low resistance.

Therefore, the relay coil does not get sufficient supplies to get strengthened. Hence, the light is switched off in the daylight. In the same way, during the night time, the resistance of the LDR increases to a high value ($20M\Omega$). Thus, due to the high resistance of the resistor, the flow of current is low or almost zero. Now, the flow of current through the low-resistance lane such that it increases the base voltage of the Darlington pair to reach more than 1.4v. As the Darlington pair transistor is triggered, the relay coil acquires enough supply to get energized, and hence, the light switches in the night time

4.2.3.4 Applications of LDR

Light-dependent resistors are simple and low-cost devices. These devices are used where there is a need to sense the presence and absence of light is necessary. These resistors are used as light sensors and the applications of LDR mainly include alarm clocks, street lights, light intensity meters, burglar alarm circuits. For a better understanding of this concept, here we have explained one project namely; power conserving of intensity controlled street lights using LDR.

4.2.4 BMP180 SENSOR:

The BMP180 is the function compatible successor of the BMP085, a new generation of high precision digital pressure sensors for consumer applications. The ultra-low power, low voltage electronics of the BMP180 is optimized for use in mobile phones, PDAs, GPS navigation devices and outdoor equipment. With a low altitude noise of merely 0.25m at fast conversion time, the BMP180 offers superior performance. The I2C interface allows for easy system integration with a microcontroller. The BMP180 is based on piezo-resistive technology for EMC robustness, high accuracy and linearity as well as long term stability.

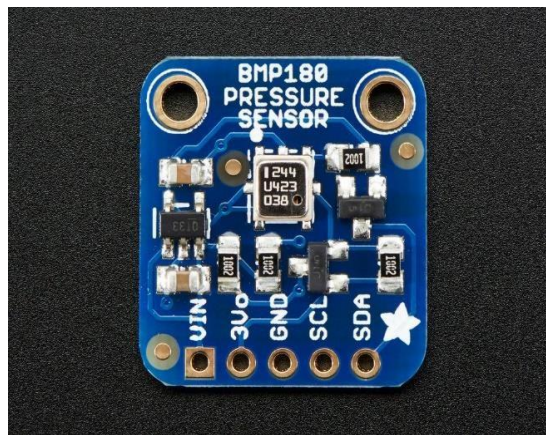


Fig 4.10: BMP180 Pressure Sensor

4.2.4.1 General description

The BMP180 is designed to be connected directly to a microcontroller of a mobile device via the I2C bus. The pressure and temperature data has to be compensated by the calibration data of the E 2PROM of the BMP180.

4.2.4.2 General function and application schematics

The BMP180 consists of a piezo-resistive sensor, an analog to digital converter and a control unit with E2PROM and a serial I2C interface. The BMP180 delivers the

uncompensated value of pressure and temperature. The E2PROM has stored 176 bit of individual calibration data. This is used to compensate offset, temperature dependence and other parameters of the sensor. · UP = pressure data (16 to 19 bit) · UT = temperature data (16 bit)

4.2.4.3 Measurement of Pressure and Temperature

The Raspberry Pi sends a start sequence to start a pressure or temperature measurement. After converting time, the result value (UP or UT, respectively) can be read via the I²C interface. For calculating

temperature in °C and pressure in hPa, the calibration data has to be used. These constants can be read out from the BMP180 E²PROM via the I²C interface at software initialization.

The sampling rate can be increased up to 128 samples per second (standard mode) for dynamic measurement. In this case, it is sufficient to measure the temperature only once per second and to use this value for all pressure measurements during the same period.

4.2.4.4 Global Memory Map

The memory map below shows all externally accessible data registers which are needed to operate BMP180. The left columns show the memory addresses. The columns in the middle depict the content of each register bit. The colors of the bits indicate whether they are read-only, write-only or read- and writable. The memory is volatile so that the writable content has to be re-written after each power-on.

Not all register addresses are shown. These registers are reserved for further Bosch factory testing and timing

Oss (register F4h <7:6>): controls the oversampling ratio of the pressure measurement (00b: single, 01b: 2 times, 10b: 4 times, 11b: 8 times).

Soft reset (register E0h): Write only register. If set to 0xB6, will perform the same sequence as power on reset.

Chip-id (register D0h): This value is fixed to 0x55 and can be used to check whether communication is functioning.

After conversion, data registers can be read out in any sequence (i.e. MSB first or LSB first). Using a burst read is not mandatory.

4.2.4.7 I2C protocol

The I²C interface protocol has special bus signal conditions. Start (S), stop (P) and binary data conditions are shown below. At start condition, SCL is high and SDA has a falling edge. Then the slave address is sent. After the 7 address bits, the direction control bit R/W selects the read or write operation. When a slave device recognizes that it is being addressed, it should acknowledge by pulling SDA low in the ninth SCL (ACK) cycle.

At stop condition, SCL is also high, but SDA has a rising edge. Data must be held stable at SDA when SCL is high. Data can change value at SDA only when SCL is low.

Even though VDDIO can be powered on before VDD, there is a chance of excessive power consumption (a few mA) if this sequence is used, and the state of the output pins is undefined so

that the bus can be locked. Therefore, VDD *must* be powered before VDDIO unless the limitations above are understood and not critical.

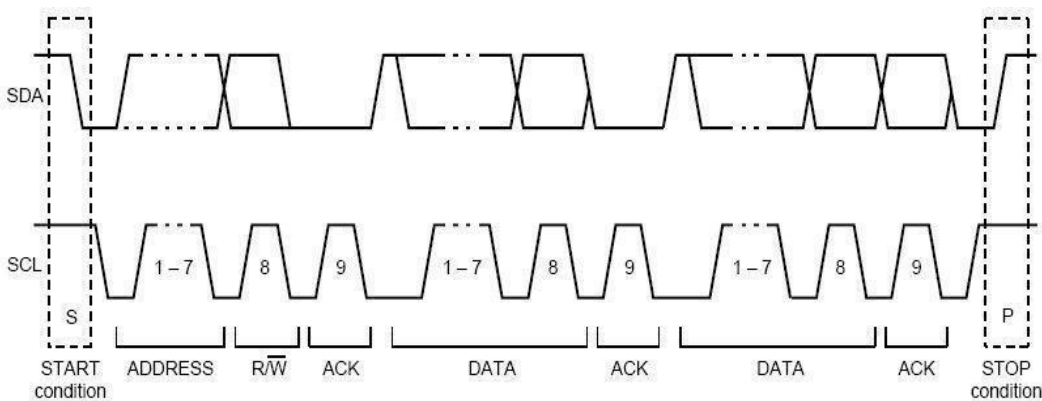


Fig 4.11:I2c Protocol

4.2.4.6 Start temperature and pressure measurement

The timing diagrams to start the measurement of the temperature value UT and pressure value UP are shown below. After start condition the master sends the device address write, the register address and the control register data. The BMP180 sends an acknowledgement (ACKS) every 8 data bits when data is received. The master sends a stop condition after the last ACKS

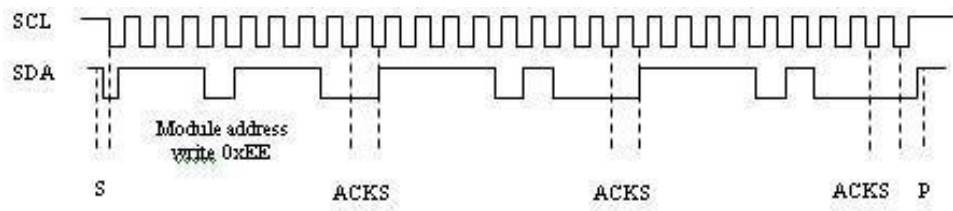


Fig 4.12: Timing diagram for starting pressure measurement

4.2.5 MQ2 Sensor:

Sensitive material of MQ-2 gas sensor is SnO_2 , which with lower conductivity in clean air. When the target combustible gas exist, The sensor's conductivity is more higher along with the gas concentration rising. Please use simple electrocircuit, Convert change of conductivity to correspond output signal of gas concentration.

MQ-2 gas sensor has high sensitiy to LPG, Propane and Hydrogen, also could be used to Methane and other combustibile steam, it is with low cost and suitable for different application.

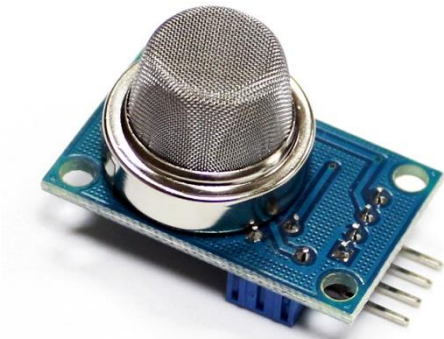


Fig 4.13:MQ2 Sensor

4.2.5.1 Character

Configuration

*Good sensitivity to Combustible gas in wide range

- * High sensitivity to LPG, Propane and Hydrogen
- * Long life and low cost
- * Simple drive circuit

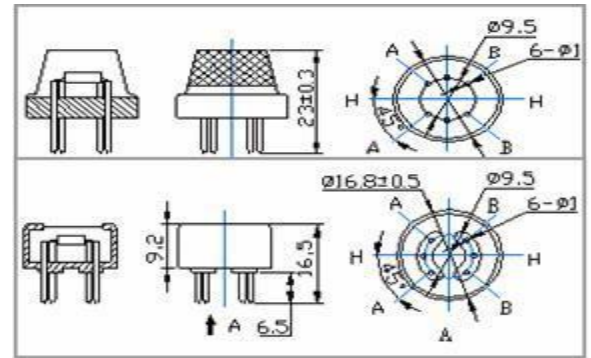


Fig 4.14:MQ2 Sensor configuration

4.2.5.2 Application

- * Domestic gas leakage detector
- * Industrial Combustible gas detector
- * Portable gas detector

4.2.5.3 Basic test tool

The above is basic test circuit of the sensor. The sensor need to be put 2 voltage, heater voltage (VH) and test voltage (VC) . VH used to supply certified working temperature to the sensor, while VC used to detect voltage (VRL) on load resistance (RL) whom is in series with sensor. The sensor has light polarity, Vc need DC power. VC and VH could use same power circuit with precondition to assure performance of sensor. In order to make the sensor with better performance, suitable RL value is needed: Power of Sensitivity body(Ps):

$$P_s = V_c^2 \times R_s / (R_s + R_L)^2$$

4.2.5.4 Sensitivity Characteristics

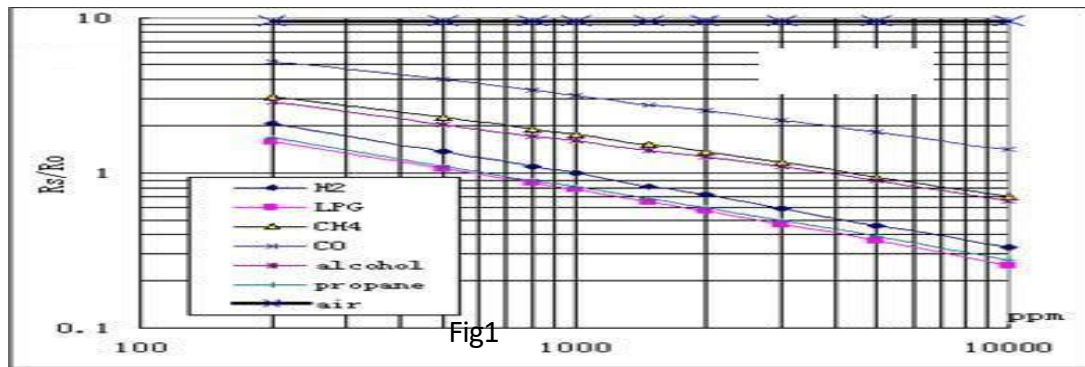


Fig 4.15:typical sensitivity characters

The MQ-2, ordinate means resistance ratio of the sensor (R_s/R_o), abscissa is concentration of gases. R_s means resistance in different gases, R_o means resistance of sensor in 1000ppm Hyrogen. All test are under standard test conditions.

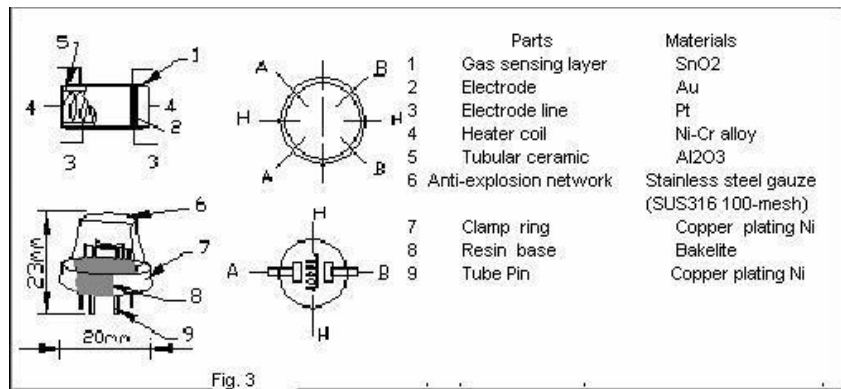


Fig 4.16:MQ2 Parts Description

Structure and configuration of MQ-2 gas sensor is shown as Fig. 3, sensor composed by micro AL₂O₃ ceramic tube, TinDioxide (SnO₂) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steelnet. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-2 have 6 pin, 4of them are used to fetch signals, and other 2 are used for providing heating current.

4.2.6 SINGLE CHANNEL RELAY:

The Single Pole Double Throw relay is quite useful in certain applications because of its internal configuration. It has one common terminal and 2 contacts in 2 different configurations: one can be Normally Closed and the other one is opened or it can be Normally Open and the other one closed. So basically you can see the SPDT relay as a way of switching between 2 circuits: when there is no voltage applied to the coil one circuit “receives” current, the other one doesn’t and when the coil gets energised the opposite is happening.



Fig 4.17 Single channel relay

Relays consist of three pins normally open pin , normally closed pin, common pin and coil. When coil power on magntic field is generated the contacts connected to each other.

4.2.6.1 features:

- Contact current 10A and 250V AC or 30V DC.
- Each channel has indication LED.
- Coil voltage 12V per channel.
- Kit operating voltage 5-12 V ,
- Input signal 3-5 V for each channel.
- Three pins for normally open and closed for each channel.

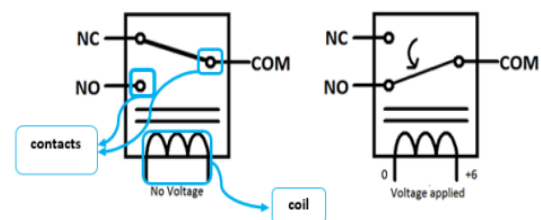


Fig 4.18 relay working

How to connect relay module with Arduino

As shown in relay working idea it depends on magnetic field generated from the coil so there is power isolation between the coil and the switching pins so coils can be easily powered from Arduino by connecting VCC and GND pins from Arduino kit to the relay module kit after that we choose Arduino output pins depending on the number of relays needed in project designed and set these pins to output and make it out high (5 V) to control the coil that allow controlling of switching process

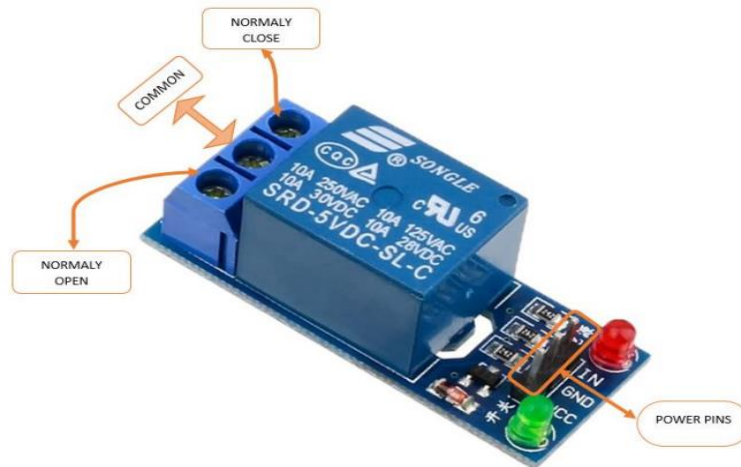


Figure: 4.19 5v Relay module pins

4.2.7 LED:

Light-emitting diode (LED) is a widely used standard source of light in electrical equipment. It has a wide range of applications ranging from your mobile phone to large advertising billboards. They mostly find applications in devices that show the time and display different types of data.



Fig 4.20 led

4.2.8 BATTERY:

9 VO.LTS HW BATTERY and Connector, HI-WATT 100% Original 6F22 9V Long Life Carbon Zinc Batter Electronic Toys, Clocks, Walkie-Talkies, Smoke Alarms, Handheld Test Equipment, Digital Instruments, Transistor Radiosies



Fig 4.21 HW Battery

4.2.9 POWER SUPPLY:

In my project I used 9 volts transformer for continuous power supply. Why I am using this means to continuous power will come. Otherwise If I use a battery some times the total currents will loss so that's way I am using A.C Transformer. A.C transformer is giving the input to Bridge Rectifier. Bridge Rectifier converts A.C to D.C. After that we are using one filter capacitor 1000uf/25v electrolytic capacitor .We connecting this capacitor in parallel section. The main purpose of this capacitor is if there is any alternate peaks we need to reduce that peaks. Nothing but a filtering that repull's. After that we are using LM7805 Regulator Most digital logic circuits and processors need a 5 volt power supply. To use these parts we need to build a regulated 5 volt source. We make a 5 volt power supply, The LM7805 is simple to use. First connect the positive lead of our unregulated DC power supply Input pin, connect the negative lead to the Common pin and then when we turn on the power, we get a 5 volt supply from the Output pin. Here we are using one red color led to indicate the power.

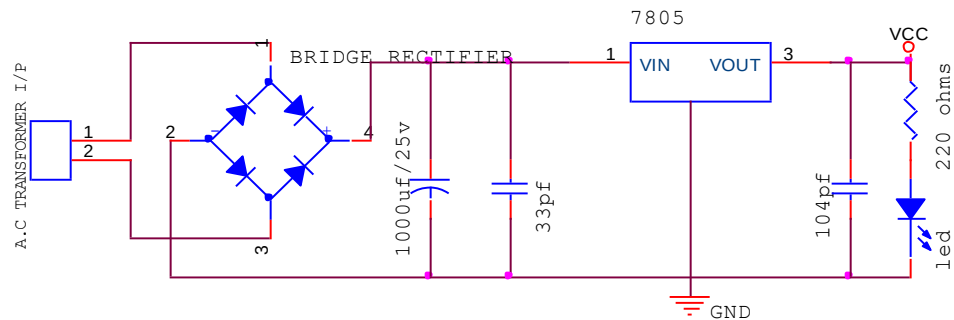
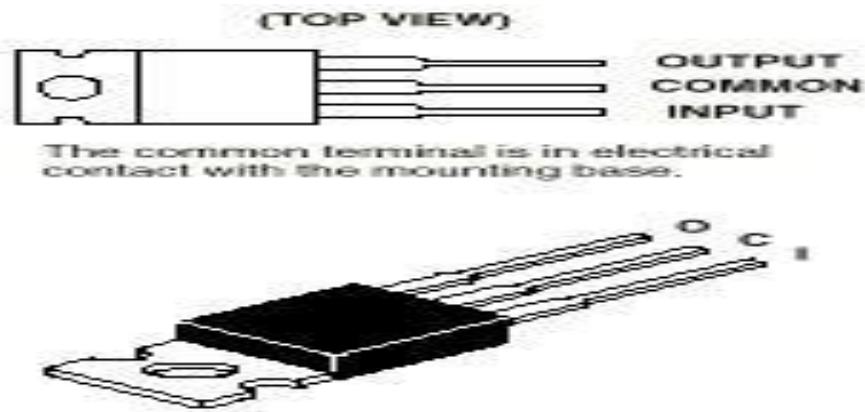


Fig 4.22 Circuit diagram of power supply

We are using General purpose PCB. To mount or place the components on the PCB. After that

The LM7805 is simple to use. You simply connect the positive lead of your unregulated DC power supply (anything from 9VDC to 24VDC) to the Input pin, connect the negative lead to the Common pin and then when you turn on the power, you get a 5 volt supply from the Output pin.

CHAPTER-5

RESULTS AND DISCUSSION

5.1 RESULTS

The Weather Monitoring with Raspberry Pi has the special sensor detecting the carbon monoxide which is used to know the co level at our surrounding to live in quality air it will perform sensing of gases, rainfall, pressure, etc. It works on 5 volt power supply and Raspberry Pi has fastest among other wifi modules and less cost efficient also. when any one of the sensor not working it gives an error. when the power went off and come back it will automatically boot the sensor and resume working without operator. This System starts recording the values from sensor and stores analyze in cloud

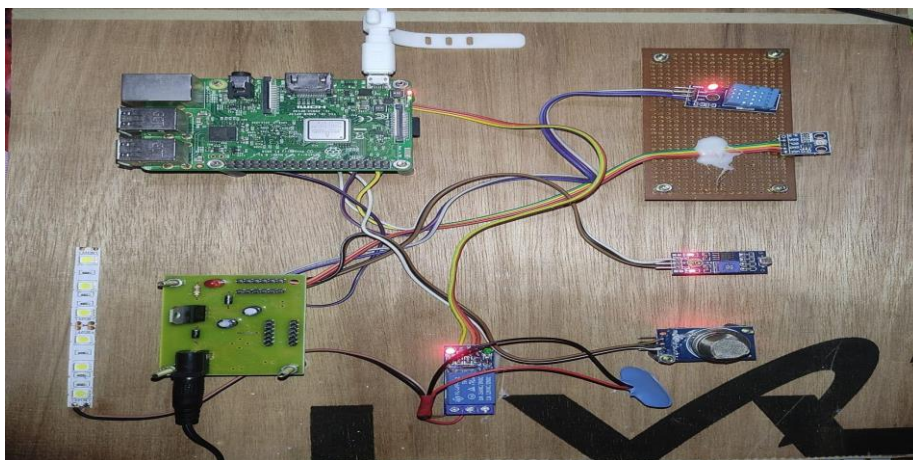


Figure 5.1 Experiment setup of Raspberry Pi Based Weather Reporting Over IOT

5.2 Weather Report of 24 Hours

Day	Temperature	Humidity	Pressure	C02
Morning	22*c	82%	1009	405
Afternoon	41*c	85%	1007	405
Evening	30*c	53%	1006	405
Night	26*c	43%	1009	405

5.3 DISCUSSION

This weather monitoring arrangement is placed on top of roof which is located on the building, it has portable and adjustable. According to the weather monitoring system which senses the physical and chemical characteristics. In- between if there any disturbance in the system automatically stops and starts indications.

After connecting, it starts giving required power supply to sensors based on operation defined by program. Humidity is continuously taken by the sensor and given to the Raspberry Pi and then it will show the value given by the sensor with some mathematical manipulations like this all sensors working perfectly

CHAPTER 6

CONCLUSION AND FUTURE SCOPE

6.1 CONCLUSION

The design and development weather monitoring system is very challenging this system has been tested successfully in different areas with various terrain, in various conditions. The performance and efficiency of weather monitoring is increased by the help of this Raspberry Pi. This Raspberry Pi has a good capturing capability, so that the Big number values are easily manipulated, because of this the quality of values increased. This can be used throughout day and night which reduces the labor cost. Since it was designed to be user friendly, the operator can control the Weather monitoring system easily .In this paper, a comparative analysis on various systems developed for the controlling and monitoring system for the industry is proposed. Design and implementation of the existing system is also discussed. After reviewing the existing studies, a cost efficient system has been proposed for industrial monitoring and controlling based on IoT framework. In our system various parameters are continuously monitored remotely that to without any human interference. The system ensures a safety work environment for the worker. Facial recognition based logging system is designed to prevent the network intrusion.

6.2 FUTURE SCOPE

- By using the artificial intelligence the weather monitoring system can be modified with great features.
- This will conclude that the real time data successfully helpful because of low agriculture crops and wrong prediction of weather.
- The future of this system is very wide. Internet of Things is just opening its arms, Same system can be applicable to the variety of a

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