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Weather Monitoring System using IOT with Arduino Ethernet Shield

V. Nivedan[1], Dr. R. Kannusamy[2]
[1]*M. Phil Scholar, Department of Electronics, PSG College Of Arts And Science, Coimbatore, Tamil Nadu, India*
[2]*Associate Professor, Dept of Electronics, PSG College Of Arts And Science, Coimbatore, Tamil Nadu, India*

Abstract: ***Weather changes is the greatest environmental threat for humanity. Now a days it has ever face and the biggest challenge for human beings. In this paper the system represents a new monitoring system of weather changes in day to day life. This proposed system is used to monitor the weather changes in the environment and stores the data of information used by the various sensors with the help of IOT (Internet of Things) which is easy less cost and more reliable and can work for a long time. As a result, this proposed system is an Embedded system which can measure the parameters of climate changes using the various sensors***

Keywords: Weather monitoring, Arduino UNO, Ethernet shield, rain sensor, DHT11sensor, IOT.

I. INTRODUCTION

In the environment, temperature having the main role in the weather changes and impact of the temperature affects the whole surrounding activities. In this proposed system uses temperature & humidity sensor and rain sensor. Here for the data processing unit Arduino UNO is used. IOT(Internet Of Things) is used for seeing the live updates of changes in the weather conditions. The main objective of the system is to monitor the live changes in the weather conditions using the sensors in less cost. In this proposed system we using the DHT11 sensor for monitoring the temperature and humidity on the particular place this is having the advantage of less cost, more effective and reliable sensor. Here rain sensor is used for monitoring the detection of rain water.

II. IMPLEMENTATION OF THE SYSTEM ARCHITECTURE

In general, this system monitors the weather conditions and stores the data information to the webpage using IOT(Internet Of Things). There are various platforms are available for storing the data's through IOT. the reason behind sending the data to the webpage to monitor the weather condition of the particular place can be known anywhere in the world. In this paper, an ATMEGA328P is used as a the core controller of the system once the code is uploaded to the microcontroller. This system functions automatically and independently according to the code which uploaded in the microcontroller. In this system two sensors are using to monitoring the parameters. These sensors monitor continuously the weather conditions and gives the details of data to the microcontroller of the system. this microcontroller will gets the data of the actual condition of particular place and then the stored data will transmit the information to the particular platform using IOT(Internet Of Things)
with Ethernet Shield W5100 Chip. This Ethernet Shield is used to communicate with the Arduino board to the internet. This Ethernet shield is bridge between the microcontroller and the IOT platform. From this DHT11 sensor and rain sensor is connected in this system.

A. Arduino UNO

This device is based on the ATMEGA328P microcontroller board and this device is manufactured using
ATmel's high density non-volatile memory technology. It is the open source, prototyping platform and its simplicity makes easy to operate by the hobbyists and also to the professionalists. Through an SPI serial interface, the On-chip ISP flash allows the program memory to reprogrammed in system which is a conventional non-volatile memory programmer. This Arduino UNO has 14 digital inputs/output pins on this 6pins can be used as PWM output, 6 pins has analog inputs. This ATmega 328P is a powerful microcontroller that can provide a highly flexible when combining an 8-bit RISC CPU with In-system self-programmable flash on monolithic chip.

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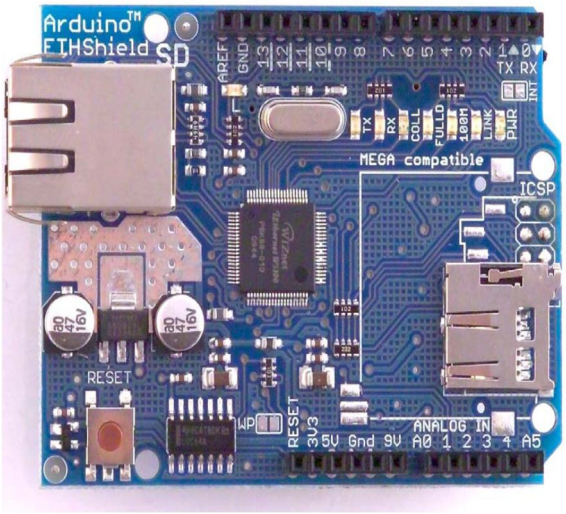
figure(1)

B. Arduino Ethernet shield

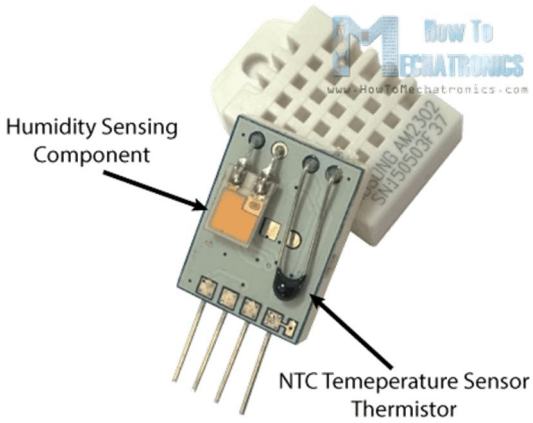
The Arduino Ethernet Shield is based on the Wiznet W5100 Ethernet chip.This ethernet shield is used to connect the Arduino board to the internet. This Wiznet W5100 has provides a network IP stack. It has a capable support of UDP and TCP and it has a capable of four socket connection simultaneously. The long wire wrap header is used to connect the Arduino Ethernet Shield and Arduino board. This keeps the pin layout intact and allows another shield to be stacked on top. The extended version of the Ethernet shield having the Micro-SD slot and it can used as the storing material for serving store files over the internet. The Arduino communicates with both the SD card and the W5100 using the help of SPI bus through the ICSP header but only one can be active at a time.



figure(2)

C. DHT11 sensor

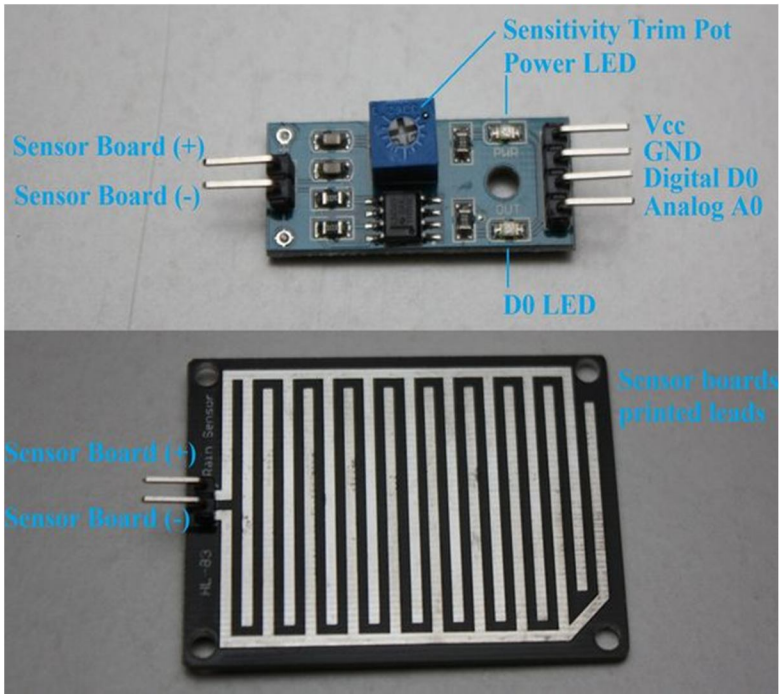
In this monitoring system we using the DHT11 as the sensor to sense the temperature and humidity in the particular place. it is having the main feature of both humidity and temperature sensor complex with the calibrated digital signal output. This sensor assures the high reliability and excellent stability factor. This sensor having configuration of four pins using for VCC, Gnd, Data. pin3is not in use and it is fabricated for further use. the data pin2 is connected with 8bit microcontroller. Its specification is having the temperature range of 0-50°c and humidity range of 20-90% Rh with the supply voltage of 5v. The configuration of sensor consists of three main things namely resistive type humidity sensor. an NTC thermister and an 8bit microcontroller, which converts the analog signals from the sensor and send the output of single digital signal. its features are relative humidity and temperature measurement, low power consumption, long term stability and full range temperature compensated.



figure(3)

D. Rain sensor

In this system, Rain sensor is used for detection of rain water. It detects water that completes the circuit on its sensor printed leads. it acts as a variable resistor and can change from 100kΩ when it will be in wet condition and it becomes as 2mΩ when it will be in dry condition.. it monitors the digital output from the module and makes the decision that it is raining if the digital output goes low. It measures the analog output and provides a moisture level when 1023 is high and when 0 is very wet. The configuration of the pins A0 as analog output, D0 as digital output and usual ground and power supply. it having the dimension of 5.5cm×4.0cm×0.8cm. It having the weight of 8g.



figure(4)

III. WORKING METHODOLOGY

By using the programming language C program should be developed and it is written with the help of Arduino IDE and the same is complied in Arduino complier. we have to add additional boards manager URLS by downloading the tool Arduino Ethernet shield. we have to change the mode as node mcv mode is required. When circuit gets connected we must change the programmed to USBasp by fixing the port. Then save and upload the program. then the process gets completed , we can build success then heck the monitor temperature, humidity and rain quantity values are shown in the webpage using IOT(Internet of things).

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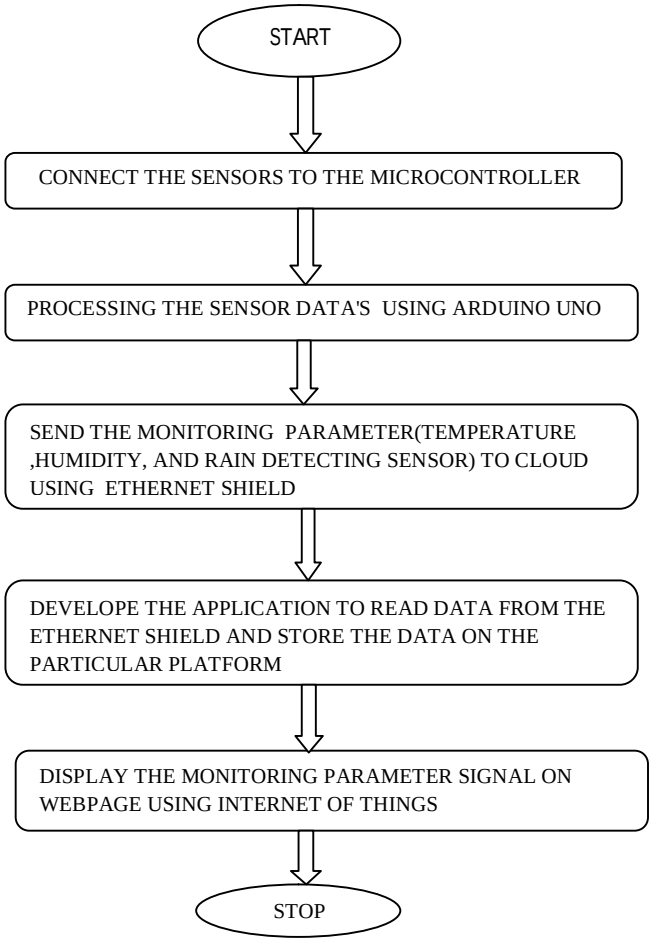
Flow chart



IV. RESULT

In this monitoring system, IOT-based temperature & humidity ,rain detecting sensor provides an efficient and reliable system for detecting in a particular place. It can also used as a safe system for the agricultural parameters to know about the soil moisture and can use to maintain the constant temperature in particular area like in drug room. The results of these parameters can seen through the webpage.

V. CONCLUSION

This weather monitoring system can use in various monitoring purposes in various parameters it is not only use to reduce the human work it also permits user to collect accurate data of change in temperature changes in the environment for the future analysis. This system uses the sensors with the low cost and consumes low power. this monitoring system can be extended for controlling the various sensors apparatus in remote locations. It can also used for an industrial areas also.

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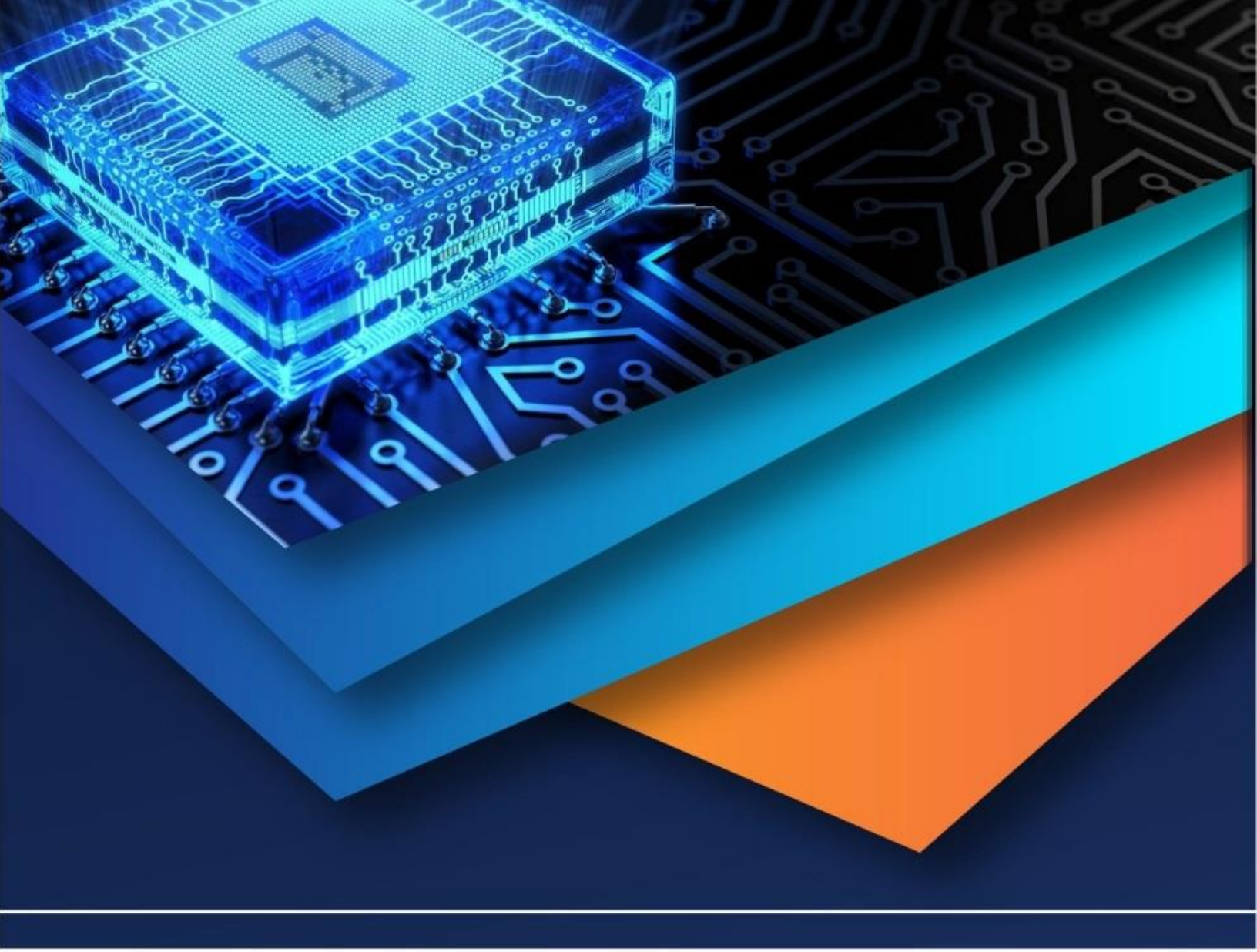

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