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Weather monitoring system for remote places using GSM

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Abstract

This paper is aimed to design the weather monitoring system, which monitors the different parameters like temperature, humidity, light intensity and the rainfall in the remote places. The monitored weather parameters are sent to the user mobile through GSM (Global Standard for Mobile Communications), which uses a serial interface protocol to transfer the information to the user. The sensors used in the prototype are interfaced to Arduino and measures the parameters, if the parameters go beyond the pre-set value immediately the buzzer will give indication to user & information is sent to user mobile through GSM.

Key words: - Arduino, GSM, Temperature sensor, Humidity, Light intensity.

I. Introduction

Weather forecasting is one of the important factors that affect the development of an particular area. Back in olden days, the forecasting of weather was not quite enough to know the atmospherical parameters of that area, this makes the poor initiation development of an area. As the years passed, technology has grown its phase and improving the standards and new inventions had begun. At present scenario the weather forecasting is done through satellites and they can be kept record through data log system to have a particular idea about the geographical aspects of an area. While coming the scenario of remote areas, the satellites can't find the exact location of a particular area because as it taking the records of entire world. These remote areas don't have any facilities to monitor the weather. In order make this happen we are using this prototype to measure the atmospherical aspects in the remote areas. [1] this study has detailed explanation computer-based software's to monitor the weather and to have a record of data that could be saved and can be retrieved for future purposes. This data includes energy consumption, quality of air etc. [2] the author mainly concentrates on monitoring the weather parameters like temperature, humidity, light intensity and rainfall with the available sensors. The results of this monitored can be brought to users in two ways.1. Through Bluetooth 2. The smart phone application which helps the user to access the data which is sent through GSM modem. In [3]-[5] this paper the author explained about SMS based old greenhouse gases monitoring and logging network for weather monitoring system. He explained about different sensors, their working and the data storing.

II. Block Diagram

The block diagram of this prototype consists the following devices and sensors.

1. Arduino UNO.
2. Temperature sensor.
3. Humidity sensor.
4. Light intensity (LDR) sensor.
5. GSM Module.
6. 16*2 LCD

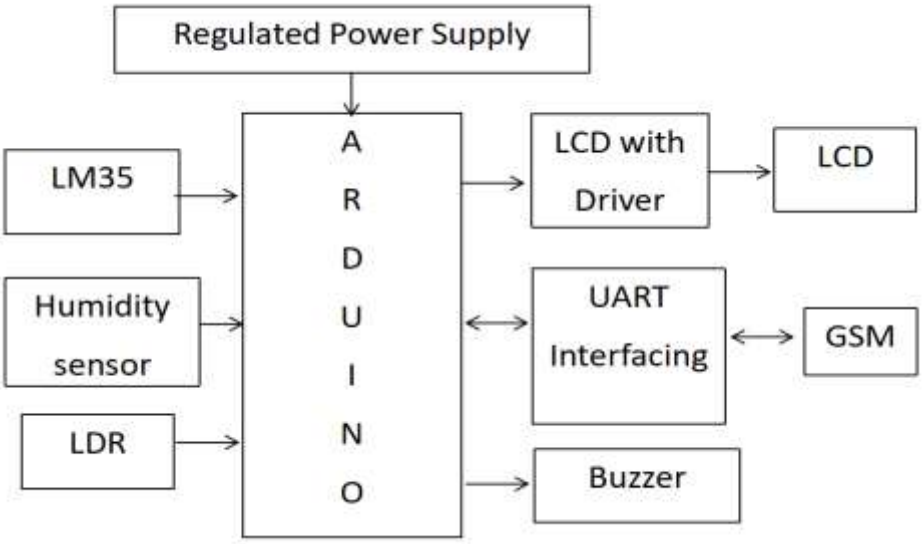

Fig.1 Block Diagram.

1. Arduino UNO:

Arduino Microcontroller is used to interface all the sensors in the prototype. Its is the heart of the prototype. It is used to monitor the weather parameters and it consisting of pre-set values which can be given through code. The Arduino code can be written in C language or C^{++} language. The Arduino can be used in many applications like reservoir monitoring, checking the driver drowsiness etc…

Fig.2 Arduino UNO.

2. Temperature sensor:

This sensor used to measure the temperature in analog form, uses an ADC to convert the analog form of data into digital form, so that the Arduino can easily read the values. In this prototype the LM35 type of sensor being used. It produces the output voltage proportional to temperature thus the temperature being measured.

Fig.3 Temperature sensor.

3. Humidity sensor:

The humidity sensor is used to measure moisture content or humidity in the air. It senses the air and calculates the humidity percentage and sends the amount of moisture in the air. In this prototype the HSM-20G module is used as a humidity sensor. The humidity can be measured in two ways: Absolute humidity (AH) & Relative humidity (RH). This sensor converts the relative humidity into standard output voltage thus the humidity is measured.

Fig.4 Humidity sensor.

4. Light intensity (LDR) sensor:

LDR stands for Light Dependent Resistor is used to measure the luminous intensity of an area. This type of sensor is made of cadmium sulphide (CdS). It works on the principle, whenever the amount of light is increased on the sensor the resistance of sensor decreases and vice versa. The amount of output voltage produced will measure the light intensity.

Fig.5 LDR sensor**.**

5. GSM Module:

GSM stands for Global Standards for Mobile Communications. It is used to transfer the data to the user mobile wirelessly by using the device protocols, it is one of the advanced devices used to transfer the data to the user via message to any type of mobile phone. It consists of a SIM used to send the message and antenna used to increase the signal of SIM. It also consists of a control circuitry used to work the GSM module properly. It is interfaced to Arduino through RS232 cable; the required messages are dumped in the code. According to the working conditions of prototype the module will send messages to the user mobile.

Fig.6 GSM Module.

6. 16*2 LCD:

LCD stand for Liquid Crystal Display is an electronic screen used to display the values that being monitored at the location. The variety of LCD screens are available in the market like plasma display panel, IPS type, thin film transistor etc. This 16*2 LCD display is used in the prototype because it is very much adaptable to Arduino when compared to other types.

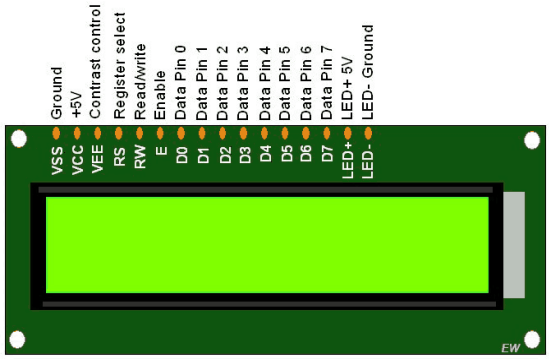

Fig.7 16*2 LCD Display

III. Working model of system.

The construction of the prototype is designed to measure the different parameters of weather like temperature, humidity, light intensity & rainfall for at least 500m surroundings in remote areas. The system comprises of different sensors that are interfaced to Arduino UNO. These sensors are used to measure their respective parameters in the atmosphere and send the information to the Arduino board.

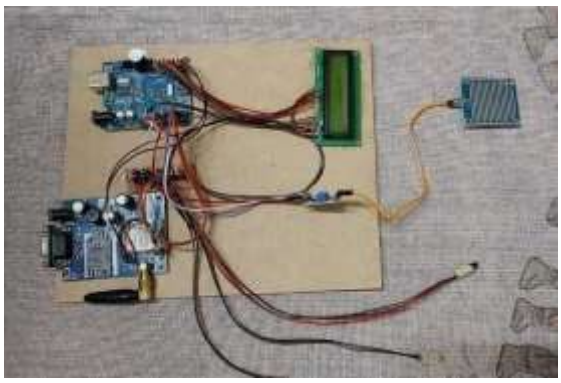

Fig.8 Working model of system

The LDR is the sensor which senses the light intensity of a particular place. It operates in such a way that the amount of light intensity is inversely proportional to its resistance. When the light intensity falls below 10% is shows low light alert on the LCD, informs the user via Buzzer and sends the information to user mobile via GSM.

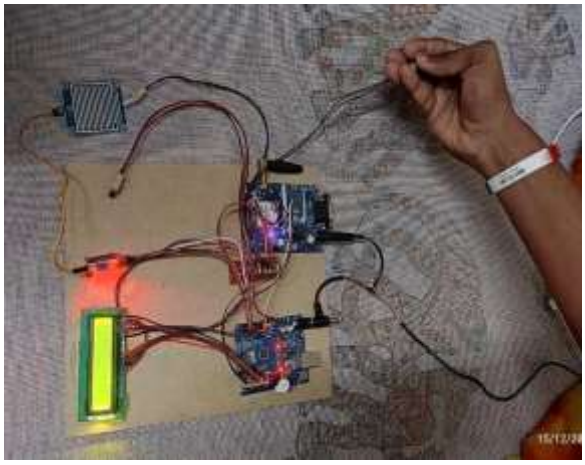

Fig.9 System operating at low light

The humidity sensor which senses the humidity in the air. In this project the humidity is sensed by placing the sensor in the water. If the humidity is reached above 95% then it shows the high humidity alert in the LDC display and sends the amount ofhumidity to user mobile.

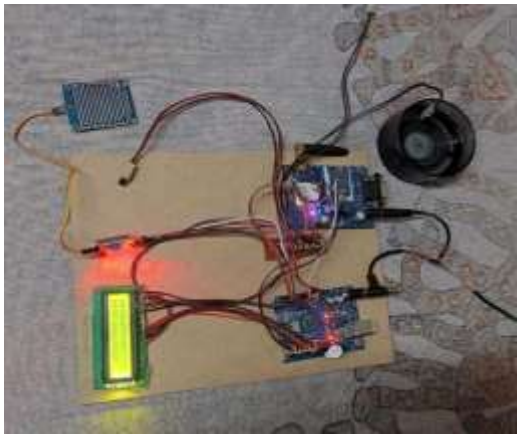

Fig.10 System operating at high humidity.

IV. Results

The proposed system gives the following results after working continuously for 5 days.

Tab.1 Observations of different parameters.

SNO	Day	Temperature (In centigrade)	Humidity (in%)	Light Intensity (in%)
1	1	30.86	30	5(low light)
2	2	35.42	34	15
3	3	38.56	41	28
4	4	42.44	44	25
5	5	45.46	94 (High humidity)	30

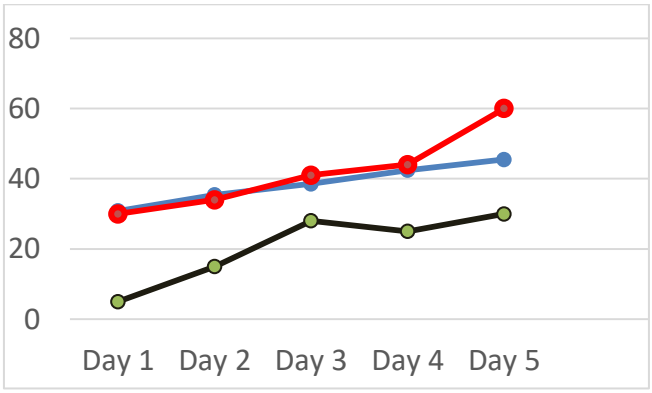

Fig.11 Temperature parameters of different days.

Fig.12 Message to the user mobile via GSM.

After sensing these parameters, the Arduino board compares these parameters with the pre-set values which are specified through the code. If the values reach above the pre-set values the Arduino will give a buzzer to warn the user and sends the information to user through GSM if the user is far away from the place.

V. Conclusion

The proposed weather monitoring system for remote places using GSM is a great model for forecasting the weather far away from cities. This system also helps the farmers to forecast the weather and perform their activities accordingly. So that the yield will be high. This system is aimed at providing the accurate weather condition in the installed area. It measures the temperature, humidity and light intensity. This system warns the user through buzzer, when the temperature exceeds 50 centigrade, humidity at 95% and light intensity below 10% and sends the information to user mobile via GSM modem.

VI. References

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