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# MICROCONTROLLER BASED SMART IRRIGATION SYSTEM AND WEATHER FORECASTING USING ANEMOMETER

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*Abstract*: *In Indian every year farmers are facing major problem of sudden rainfall in their areas without any correct weather forecast which leads to damage their already grown crops.*

*India has a major problem for daily changes in the weather forecasting and soil structures. The aim is provide information about the soil moisture, humidity, temperature sensor values present in the soil and also anemometer is used to check the weather condition.Then it also show the water pumps in the soil which is used to control the water level automatically by saying pump is on or in off condition. The entire system is controlled using ATmega microcontroller, which is used to measure the soil moisture, humidity, temperature level in soil it is displayed in the LCD board and then anemometer is used to measure wind speed and it is also a common weather station instrument.*

*Key words: Liquid Crystral Display (LCD), Arduino Mega (ATmega)*

## I. INTRODUCTION

Weather forecasting is one of the major problems in the world which is used to affect the quality of life and the activity of mankind. It is very difficult to collect the past information and present information about the weather condition how it known looks today. So that we need to calculate the present values in the weather condition we use Anemometer which is used for measuring the speed of wind and as well as it is also a common weather station. It may helpful for the Indian farmers to cultivate their already grown crop before it becomes damage. The direction of wind speed will be displayed in the LCD board and given to GSM module as a message to alert them.

Generally, the current irrigation systems are manually operated. The sensor based irrigation system is based on soil moisture sensor that will measure the content of moisture in the soil, then the humidity sensor will also measure the amount of water vapor present in the air which changes the current flow through the soil and then the temperature sensor is used to record the value of temperature in the land field. This three sensors are displays the value in LCD (20x4) board and then it passess through GSM module to give as a message alert through a mobile phone. The automatic water motor pump is also used to give as an alert message wheather the pump is in on or off[7,8,9].

## II. MOTIVATION OF THE PROJECT

India's population rate is increasing day by day their will be serious problem in food, so the development of agriculture is necessary. In today's world, the farmers are facing many problems such as they do not know well about their lands how the soil content is there and also in some season their will be heavy rainfall which affects their already grown crops.

The main objective of this project is to provide information about their soils and also a climate changes by using an anemometer. This may be useful for the farmers to save their crops before damage and then it is easy for every farmer to get information through their mobile phone as a message to alert them.

## III. LITERATURE REVIEW

"Internal of things (IOT): A relief for Indian farmers"[1], they can't receive the information easily and it may be high in cost also. In proposed system, we use Anemometer which gives the direction of wind speed and also it is a common weather station. "Arduino Based Automatic wireless weather station with Remote Graphical Application and Alerts"[2], it uses an Arduino UNO board which has an Digital I/O pins only 14 pins and flash memory is 32KB only. In this proposed system, we used Arduino mega microcontroller which has a Digital I/O pins more as 54 pins and flash memory is also more as 256KB. It can store more memory in the Arduino microcontroller then in existed system. "A low cost smart Irrigation control system"[3], is used to control the water automatically by using motor and also select the direction of

the flow of water with the help of soil moisture sensor. Finally it sends the information to the farmer's throngh mobile message and also in gmail account of the user. The drawback of this paper is it gives information about soil moisture sensor only. In proposed system, we give inform including temperature sensor and also a humidity sensor. "Weather forecasting using hidden markov"[4],it can be prevent and overcome many hazards which leads great loss for all.So,hidden marcov model [HMM] is a statiscal marcov model it uses marcov chain in secret states.HMM can be used for weather forecasting with the help of marcov chain. It can be calculated and observed the weather data for 21 years. The data is based on the accurate value. It is reliable and works for weather forecasting. The drawback of HMM is it requires large data size. It is limited by their first order marcov property. In proposed system, we use anemometer which is used to measure wind speed, pressure, velocity and its direction. It consumes very low power consumption. It can be easily calculate and observe the weather condition with less time by using anemometer with regular daily updates. "Weather forecasting using knowledge growing system (KGS)"[5], in this method, it is using a one kind of new artificial intelligence is known as a knowledge growing system. It is mainly used to predict the weather with accuracy of 70.86% by using algorithm. The drawback is using new artificial intelligence; it may be higher in cast. In this paper, we use anemometer which is a weather station used to measure wind speed and also measures wind velocity, pressure. "Microcontroller Based Automatic Irrigation system" [6] is used to check wheather the motor is activated along with this buzzer sound is used to indicate the pump motor is on or not. In this proposed system it gives as a message alert through a mobile phone.

## IV. PROPOSED SYSTEM

This below fig(1) is a over all block diagram of Arduino based smart irrigation system and weather forecasting which consist of three sensor which are connected to microcontroller and sensor values from these sensors are send the information to the mobile device. And then anemometer is connected to the Arduino which measure the speed of the wind and a climate change is displayed in the LCD board.

The automatic pump is off when it reaches the enough water levels in the soil. It shows the result as automatic motor off and also gives as message alert through mobile phones.

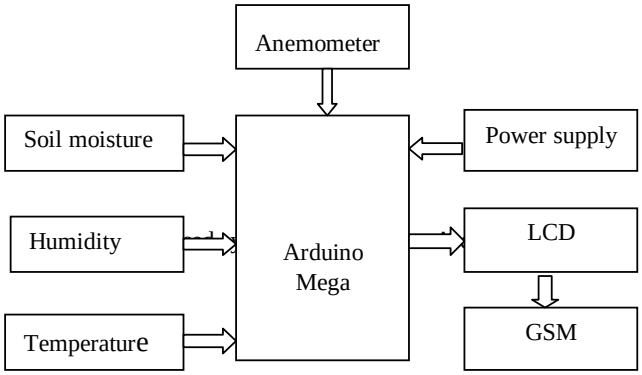



Fig (1): Smart irrigation system and Weather forecasting.

## V. SYSTEM COMPONENTS

**Hardware Components:**

Humidity,Soil Moisture Sensor, Temperature Sensor, Anemometer, LCD, GSM module, mobile.

**1. Soil Moisture Sensor:**

Soil moisture sensor is the amount of water content in the soil , It includes comparator (LM393) which converts analog signal to discrete signal, these are two probes consist of two thin copper wires each of 5cm length, it is used to immersed in to the soil under test, the soil between the two probes one act as a variable resistance whose value depends upon moisture content in soil and another acts as resistance can vary from infinity to a very little resistance one to this variation in resistance across the probes may be leads to variation in the moisture content level.

The fig (2) says the procedure of moisture sensor who we observed the moisture value with the help of arduino programming.The algorithm flow chart of soil moisture shows the working principle as how it starts and encoded the program in the sensor which is used to display the accurate value of the moisture sensor. If the soil moisture is less than 30% means it needs more water content in the soil then it will display the moisture content present in the soil.

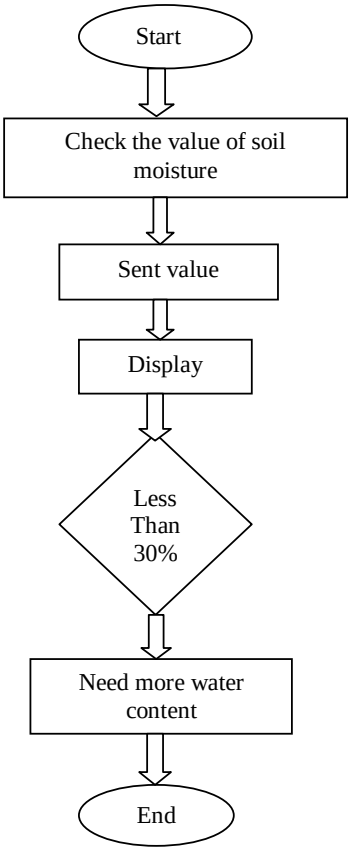



Fig (2): Flow chart of moisture sensor

**2. Humidity Sensor:**

Humidity sensor is the amount of water vapor present in the air, the change in the humidity sensor is proportional to the amount of current flowing through the soil. The sensor can measure from the average value of 3% up to 100%. If it is in low cost humidity sensor.

**3. Temperature Sensor:**

Temperature sensor is used to record the atmospheric temperature which is then displayed on LCD. It is used to provide high reliability and long term stability. The normal range of temperature sensor is 20 C (68 F) to 25 C (77 F). The fig (3) says about the value of temperature in the landfield and displays the value in degree celcius.

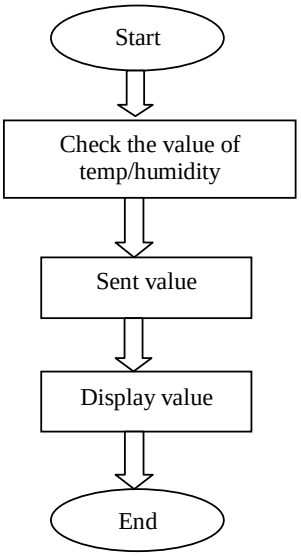



Fig (3): Flow chart of Temperature sensor

**4. ATmega2560:**

The Arduino mega microcontroller board based on the ATmega.It has 54 digital input/output pins ,16 analog inputs,4 UARTs(hardware serial ports),a 16 MHZ crystal oscillator ,a USB connection ,a power pack,an ICSP header and a reset button. It is designed for more complex project. This system receives all the information and used to display in the LCD board.

**5. Anemometer:**

An Anemometer is a device which is used for measuring the speed of wind and also a common weather station instrument. It looks like a weather vane, but instead of measuring which direction the wind is flowing with pointers, it has four cups so that it can more accurately measure wind speed.

**6. LCD (20x4):**

This is the first interfacing example for the parallel post. It does not limit light directly. LCD (20x4) means that 20 means that 20 characters can be displayed in each of the 4 rows of the 20x4 LCD thus total so characters can be displayed at any instance of time.

**7. Power Supply:**

Power supply of 12v is used for running this hardware system. It is an electrical device that supplies electric power to an electrical load.

**8. GSM module:**

The system is connected to a communication device called GSM module. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850 MHZ, 900 MHZ, 1800 MHZ and 1900 MHZ Frequency bands the connections between the two mobiles are done using GSM. When the soil moisture sensor, humidity sensor, temperature sensor uses the low moisture content of the soil and then it gibes the signal to the microcontroller and the same way an Anemometer also calculate the speed of wind and weather condition which is used to inform about the climate change. The microcontroller then gives a signal to the GSM module which further sends a message to the mobile.

## VI. DESIGN AND OUTPUT PROCEDURE

Design of a system explains the humidity; temperature and soil moisture values using flow chart humidity values are send to the microcontroller, those values will be display in the LCD Board.The motor pump indicates wheather the pump is in on or off condition.If the pump is in on then it automatically will be off down when it reaches enough water level.

The main objective is used to help the farmers to see the climate changes day by day through their mobile phones as a message, so that they could yield their already grown crops before their heavy rains fall.Then there will not be any damage of crops and this techniques may be useful to improve more crops.It is less in cost and more efficient, helpful for all kind of farmers.It is more compact and flexible.The hardware of the system is shown in fig (4). It shows the result and working of Anemometer in the fig (4).Then it collects all the information will be displayed in LCD board and also passess through mobile phones as an alert messages.It also shows the value of velocity, pressure.

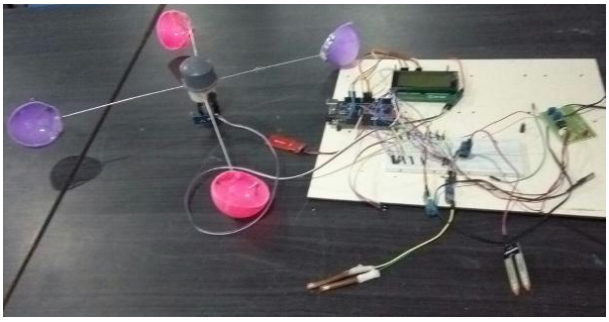


Fig (4): Hardware of Anemometer

The below fig (5) shows the system output is used to provide us with the readings of temperature sensor along with the humidity sensor content of the soil and also soil moisture content in the soil.

| S.No | Humidity Sensor (%) | Soil Moisture (%) | Temperature (Degree celcius) |
|---|---|---|---|
| 1 | 15 | 56.08 | 28.84 |
| 2 | 42 | 61.09 | 23.46 |
| 3 | 49 | 61.19 | 27.86 |
| 4 | 68 | 62.39 | 31.28 |
| 5 | 85 | 61.09 | 26.82 |

Fig (5): System output

## CONCLUSION

In Indian economy, Agriculture plays an important role. For increasing more crop production efficiently we need to know proper information about the soil. The weather condition is used to avoid damage of crops. In future farmers can know the sufficient knowledge about their soil and climate changes which passes through a mobile device as a message to alert them.In future it can be minimized as a product which is more helpful for farmers.

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