SMART IRRIGATION CONTROL SYSTEM

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Abstract – *As we all know that INDIA's population has been increasing at a constant rate whereas the resources are the same and limited. Our country is the second most populous country in the world food has been one of the major crises in the current era. For better yield in the modern world farmers are using automation techniques for increasing the efficiency. But those methods are highly expensive so we would like to introduce an efficient automated system which is economical and is affordable all the classes of people.*

We all know that there is scarcity of water in the states of Andhra Pradesh and Tamil Nadu especially for irrigation we have make use of available water very efficiently. Not only in these states there is a lot of water scarcity in the other states as well so the paper we are proposing will suggest and explain the methods and their contribution to the field of irrigation. This is an automation technique which works by itself and contains many sensors and thereby by the reading of sensor it makes several adjustments and then proceeds for the further actions i.e. sprinkling of water as per the requirement. This method is advisable for the areas which follow drip irrigation and store water due to scarcity. That stored water can be utilized on as per the requirement instead of watering on a timely basis without proper analysis.

*Key Words***: Arduino, soil moisture sensor, humidity sensor , weather prediction, relay, micro controller.**

1. INTRODUCTION

A farmer have to always check his crop and now a days people are farming as their secondary occupation as the crop is not guaranteed so they should manage the time efficiently. Earlier farmers use to check the moisture content of the soil by taking a sample and sending it to the labs provided by the government. This takes days to know the result. Apart from this there are situations when the farmer watered the crops and then comes the rain immediately. In this case the water has been wasted as he has to invest money on the water and rain water is free. So, in this paper the proposed method shows how the rain water is used efficiently without wastage. We are going to use sensor technology to reduce the wastage of water, labor and efficiently spread the water evenly as per requirement of the area and the type of crop.

2. IMPORTANCE OF SYSTEM

The reason for choosing this topic is that we all are aware of the suicides of farmers in our country. In terms of statistics according to the survey conducted by NCRB in 2014 nearly

5650 suicides have been reported. It is so sad that the people who are providing us the food are dying due to the improper maintenance of the crop and high expenses that are leading to the death. This paper is going to provide an optimized solution for this problem of water scarcity. The idea is that based on the moisture levels in the atmosphere and environment of the crop the sprinkler sprinkles the required amount of water. If it is going to rain in few minutes the moisture sensor calculates the amount of moisture and sprinkling is stopped as it is going to rain within few minutes. This avoids excessive wastage of water thereby making farming a bit economical than current expenses.

The motive of our paper is to provide a system which saves money, time and effort of the farmer. In normal irrigation it requires manpower as a thorough supervision is required for the crop. This paper describes about an automated system which can minimize the efforts and errors done by humans and gives better yield. This is economical thereby motivates farmers to invest more the crop and get a better yield. The reason why farmers are advised to use this system is that it is simple and can be easily configured. It is a one-time investment and maintenance of this system is quite easy.

3. LITERATURE SURVEY

In [1] according to the proposed system they will use the use the soil moisture sensors in the field and they water the plants according to the moisture. But that model does not include a rain prediction module. Because of it if there is a rainfall after 30 minutes of watering of plants the soil gets saturated because of the excessive water which will cause harm to the plants. So in our model by adding the rain prediction module we can save water and in the same time we can provide the adequate water to the plants. So, this model will become important in the view of present environmental conditions

Quanxing Zhang technique [2] is the best technique that is available so far in irrigation control system. In that paper they explained that how fuzzy techniques can be used in the irrigation system. In our system we are going to install the sensors near the roots of the plants. In addition to that humidity sensor will help us for providing the adequate water to the plants. So, without using any fuzzy logics we can conserve more water at the same time we can provide sufficient water to the plants.

In [3] "A low cost irrigation Control system" model uses a lot of wireless sensors. In [3] raspberry pi is used to send the

text messages to the farmer. In our system there is no involvement of farmer and our model is completely automated. In terms of cost our model is cheap because we are not even using the raspberry pi. We removed the features like sending messages to the farmer which is almost useless.

4. DESCRIPTION

4.1. COMPONENTS AND SPECIFICATION:

1) Soil moisture sensor:

The soil Moisture sensor is the sensor which gives or calculate the volumetric water content of the soil. This sensor uses the capacitance to measure the water content of soil or in technical terms the dielectric constant of the soil for measuring the moisture content of the soil, this is the reason why this sensor is used in diverse fields like botany, biology, horticulture and mainly in soil science in which we are dealing on. As the capacitance to measure the water content of soil increases the water content of the soil increases. This is the reason why the dielectric constant of air much lesser than the dielectric constant of water

2) Temperature sensor:

The temperature sensors in crude way measure the amount of heat energy or coldness that is produced by a source generating it or in technical terms the temperature sensor measures the temperature as a function of resistance. Temperature sensors can be of two types, they are digital and analogue temperature sensors. We are using a Resistance Temperature Detector over here which gives a precise or the accurate value for the experiment in which we are performing.

3) Relay:

A relay is an on/off electrically functioning switch. In the experiment we are using the relay which acts as a switch and makes the circuit or cuts the circuit in pumping the water for the required system what we are developing. Relay were used a lot in the computers and telephones in the past, as this uses a low power signal. This is the main reason why we are using it for our system. There are many types of relays, they are coaxial relay, contactor, latching relay, machine tool relay, multi voltage relay, over protection relay, polarized relay, solid state relay and many more.

4)Arduino :

Arduino is the device which is used both in hardware and software, which is one of the open source things available in the present world of electronics and the physical world. This device uses many types of microprocessors and controllers for its working. They are majorly programmed in the programming languages like C and C++. A basic Arduino consists of a USB connector, power connector, a number of

digital input and output pins and even some analogue pins. The main reason for using the Arduino in our project is that it is cheap or ineffective of cost, this system works on variety of platforms which is not possible by many of the microcontrollers. One of the most effective thing of using Arduinos are that it has a simple or flexible programming so that even rookies or beginners can easily understand implementing their own ideas. Arduinos are now the future of the world of electronics which are easy for learning and getting implemented by anyone who is a mere beginner so that he can implement with ease. This Arduinos have simple IDE's which can be used conveniently.

5) Rain prediction module:

Here we are using the Ethernet Enc28j60 no-shield module which will used for connecting to the internet. It is connected to the Arduino board. We can use any online API for getting the result. Here we are using the open weather map API to get the result. We can also use the LCD (16 x 2) to display the result that is whether there is chances of rain fall or not.

4.2. DESIGN AND WORKING MODEL:

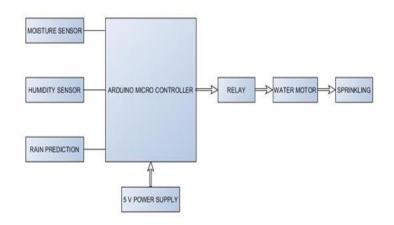The block diagram of our model is figure-I

Figure: I

In this project we are creating a model which will work for only one plot. First, we will get the value from the soil moisture sensor. As we know that the value from the soil moisture sensor is in analog form. By using Arduino, we will convert them into digital form. Here value of the dry soil is very less and the value of the wet soil is very high. If the value is above the threshold value there is no need to turn on the motor because we have adequate water in the soil. If the value is less than the threshold value then we will consider the value of the humidity sensor. From the humidity sensor we will get the values of humidity in   the air and temperature of the surrounding area. Finally, Table –I the working of motor is given in the flow chart (figure-II).
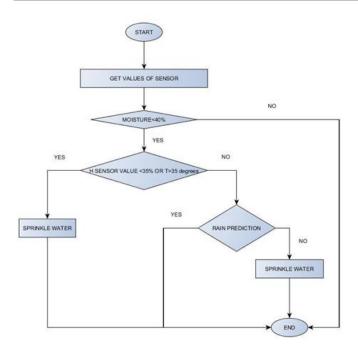
Figure -II

The output of the design is summarized in the Table-I

Moisture Sensor (< 40%)	Humidity sensor (<50%) or Temperature (>35 °C)	Rain prediction	Output (water sprinkler)
YES	YES	YES	ON
YES	YES	NO	ON
YES	NO	NO	ON
NO	YES	YES	OFF
NO	YES	NO	OFF
NO	NO	YES	OFF
NO	NO	NO	OFF

Table: I

5. CONCLUSION

The only place the rate of employment is getting reduced in modern times is the agriculture, where farmers are not able to control the adequate resources (example water) which are received by them in proper intervals of time, hence the farmer class are in a necessity of a system which helps them out to irrigate the plants with less amount of water. The project which is done may be a step to curb the thing out, the project senses the right time for the farmer to water the plants at the right places which eases the farmer to work for his profession. More over the system architecture in this project uses microcontroller and Arduino which consumes very less amount of power and have a very good life for providing its functionality .

6. FUTURE SCOPE

We can extend our model by adding automated valve which will control the flow of the water. By using an automated valve, we can reduce the amount water which is getting wasted when irrigating the plants. We can add a module which predefines the amount of water to be supplied to the different types of crops accordingly.

We can add a sensor so that if the rain fall is heavy and reaches to certain level the whole water can be drawn downslope and water can be sent down slope into a pit and that water can be later used for irrigation.

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