International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 4 Volume No.6 July – 2022
DOI:10.46647/ijetms.2022.v06si01.008 ISSN: 2581-4621

DESIGN A NOVEL AUTOMATIC SMART IRRIGATION SYSTEM FOR FARMING

G.NAVEEN[1], K.SARATH[2], D.PREEETHI[3], K.MAHESH[4], A.BHASKAR REDDY[5]
[1,2,3,4]B.Tech Scholar, Dept of ECE, Chalapathi Institute of Engineering and Technology ,Lam, Guntur, Andhra Pradesh, India
[5]Assistant Professor, Dept of ECE, Chalapathi Institute of Engineering and Technology ,Lam, Guntur, Andhra Pradesh, India

ABSTARCT: For continuously increasing demand of food necessities, it's important to rapid improvement in production of food technology. Agriculture is depends on the weather and rain conditions which is not sufficient sources of water for whole irrigation for the agricultural crops. The productivity of crops depends on good irrigation system. In this project main aim is to design a novel automatic irrigation system for forming. The purpose of the system is to monitor and control the growth of plants in forming based on environmental factors, like soil moisture and surrounding temperature. The Arduino is used in this system which is the heart of system used to transfer the control signals among different devices. This system controls the water motor to turn ON and OFF based on soil moisture content. This allows the farmer to apply the right amount of water at the right time, regardless of the availability of the labor to turn valves or motor ON and OFF. This reduces runoff over watering saturated soils avoid irrigating at the wrong time of the day. The temperature sensor is also used to monitor the environment temperature surrounding forming area for maintaining the crops fresh in high temperature also by sprinkle the water using water sprinkler. It improves crop performances and help in time saving in all the aspects. Human intervention reduction is the main purpose of this project. Water wastage would be reduced which is one of the major concern in today's world. Other aspects like cost, time conservation, effectiveness and low maintenance are also aided.

KEY WORDS: Arduino, Soil moisture Sensor, Temperature Sensor, Water Motor, Water sprinkler, 16X2 LCD display.

I. INTRODUCTION

Continuous increasing demand of food requires the control in highly specialized greenhouse vegetable rapid improvement in food production technology [1]. In a production and it is a simple, precise method for country like India, where the economy is mainly based on irrigation. It also helps in time saving, removal of human agriculture and the climatic conditions are isotropic, still error in adjusting available soil moisture levels and to we are not able to make full use of agricultural resources [2]. In crop production earth is reducing the water level due to which lot of land is it is mainly used in dry areas and in periods of rainfall coming slowly in the zones of un-irrigated land [3]. Very important reason of this is due to unplanned use of Types of Irrigation water due to which a significant amount of water goes to surface irrigation waste. Localized irrigation in modern drip irrigation systems, the most significant Drip Irrigation advantage is that water is supplied near the root zone of sprinkler irrigation.

The plants drip by drip due to which a large quantity of water is saved. At the present era, the farmers have been the conventional irrigation methods like overhead using irrigation techniques in India

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through manual control sprinklers, flood type feeding systems usually wet the in which farmers irrigate the land at the regular intervals [4]. Lower leaves and stem of the plants. The entire soil this process sometimes consumes more water or surface is saturated and often stays wet long after irrigation sometimes the water reaches late due to which crops is completed. Such condition promotes infections by leaf get dried. Water deficiency can be detrimental to plants mold fungi. On the contrary the drip or
trickle irrigation is before visible wilting occurs. Slowed growth rate, lighter a type of modern irrigation technique that slowly applies weight fruit follows slight water deficiency. This problem small amounts of water to part of plant root zone. Water is can be perfectly rectified if we use automatic micro supplied frequently, often daily to maintain favorable soil controller based drip irrigation system in which the moisture condition and prevent moisture stress in the plant irrigation will take place only when there will be acute with proper use of water resources [5]. Drip irrigation saves requirement of water because only the plant.

For continuously increasing demand of food necessities, it's important to rapid improvement in production of food technology. Agriculture is depends on the weather and rain conditions which is not sufficient sources of water for whole irrigation for the agricultural crops. Moreover the productivity of crops depends on good weather and irrigation system [6]. So, in this project main aim is to design a novel automatic irrigation system for forming. The purpose of the system is to monitor and control the growth of plants in forming based on environmental factors, like soil moisture and surrounding temperature. The main purpose of this project is to develop an automatic smart irrigation system which switches the water motor based on environment conditions. The main advantage of using this technique is to decrease the human intervention and risk of less production due to environmental effects.

II. LITERATURE SURVEY

In [7], R.Suresh et al. mentioned about using automatic microcontroller based rain gun irrigation system in which the irrigation will take place only when there will be intense requirement of water that save a large quantity of water. These systems bring a change to management of field resource where they developed a software stack called Android is used for devices that include an operating system, middleware and key applications. The Android SDK provides the tools and APIs necessary to begin developing applications on the Android platform using the Java programming language. Mobile phones have almost become an integral part of us serving multiple needs of humans. This application makes use of the GPRS feature of mobile phone as a solution for irrigation control system. These system covered lower range of agriculture land and not economically affordable.

Venkata Naga Rohit Gunturi et al [8] provided automatic irrigation to the plants which helps in saving money and water. The entire system is controlled using 8051 micro controller which is programmed as giving the interrupt signal to the sprinkler. A wireless application of drip irrigation automation supported by soil moisture sensors Irrigation by help of freshwater resources in agricultural areas has a crucial importance.

Indu et al. [9] mainly focuses on reviews in the field of remote monitoring and control, the technology used and their potential advantages. The paper proposes an innovative GSM/Bluetooth based remote controlled embedded system for irrigation. The system sets the irrigation time depending on the

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temperature and humidity reading from sensors and type of crop and can automatically irrigate the field when unattended. Information is exchanged between far end and designed system via SMS on GSM network. A Bluetooth module is also interfaced with the main microcontroller chip which eliminates the SMS charges when the user is within the limited range of few meters to the designated system. The system informs users about many conditions like status of electricity, dry running motor, increased temperature, water content in soil and smoke via SMS on GSM network or by Bluetooth.

Yunseop (James) Kim et al [10], the setup of technical system describe in this paper is broad based and is relatively one of the efficient system that has developed windows application to monitor the field. Field is equipped with wireless communication sensors that avails better facilitated sensor communication and covers wider field area. Detailed description on site field sensors and Internet technology is described briefly. The statistical data provided is measured to be efficient and used for research work.

III. PROPOSED SYSTEM

The Arduino is used in this system which is the heart of system used to transfer the control signals among different devices. In this project Arduino processor is programmed to transfer the control signals between the soil moisture and temperature sensor to the water motor. This system controls the water motor to turn ON and OFF based on soil moisture content. This allows the farmer to apply the right amount of water at the right time, regardless of the availability of the labor to turn valves or motor ON and OFF. The temperature sensor is also used to monitor the environment temperature surrounding forming area for maintaining the crops fresh in high temperature also by sprinkle the water using water sprinkler. The block diagram of proposed system is shown in figure which is controlled by the Arduino processor. This reduces runoff over watering saturated soils avoid irrigating at the wrong time of the day. It improves crop performances and help in time saving in all the aspects. Human intervention reduction is the main purpose of this project. Water wastage would be reduced which is one of the major concern in today's world. Other aspects like cost, time conservation, effectiveness and low maintenance are also aided. The overview of the system is shown below figure (1) and explained briefly.

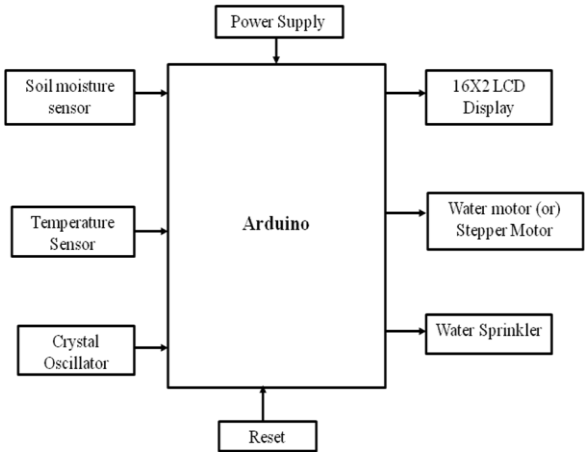

Fig. 1: PROPOSED SYSTEM

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Arduino

Arduino is an open-source hardware and software company project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physicGas al and digital world. Arduino board is an open- source platform used to make electronics projects. It consists of both a microcontroller and a part of the software or Integrated Development Environment (IDE) that runs on your PC, used to write & upload computer code to the physical board. Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or breadboards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to the use of traditional compiler tool chains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

Crystal Oscillator

An oscillator gives a wellspring of tedious
A.C. motion over its yield terminals without requiring any contribution (aside from a
D.C. supply). The flag produced by the oscillator is more often than not of steady sufficiency. The wave shape and sufficiency are controlled by the plan of the oscillator circuit and decision of segment esteems. The recurrence of the yield wave might be fixed or variable, contingent upon the oscillator structure.

Power Supply

Power supplies in recent times have greatly improved in reliability but, because they have to handle considerably higher voltages and currents than any or most of the circuitry they supply, they are often the most susceptible to failure of any part of an electronic system. Modern power supplies have also increased greatly in their complexity, and can supply very stable output voltages controlled by feedback systems. Many power supply circuits also contain automatic safety circuits to prevent dangerous over voltage or over current situations.

LCD Display

LCD is used to display the data. 16x2 is the LCD that has been used i.e. 16 characters in 1 line, total 2 lines are there. It requires +5V to operate. It is connected to port 2 of microcontroller. It acts as an output to microcontroller. It uses ASCII values to display the character.

Moisture sensor

By using a Moisture sensor, have 3 parts– first pin is input of voltage, another pin is ground and third one is analog input. Here by using a sensors, calculate the moisture content of the soil (volume %). To calculate percentage of the moisture content, the value of analog is to be combining in the range of 0-100. The electrical resistance of soil is used in this sensor. And also have 2 analyses that allow permission transfer the power through the soil. Here to calculate the content of the water level then by using the value of resistance. Hence, when the increases the water content then automatically increases the conduction of electricity and also at the same time decreases the resistance. The percentage of the soil is decreases when the soil is dry; it tends to high in level of resistance. Here to calculate in moisture soil uses the properties of resistance by using a 2 various ways Analog and Digital mode are it could

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be combined.

Temperature Sensor

A Temperature Sensor can be defined as 'The amount of heat energy can be measured and detects the physical changes of temperature from one source and it changes the data for a user or device'. Hence that equipment called as Temperature Sensor. In various devices, these temperature sensors are used for a long time. Moreover by the development of IoT, they found more rooms to be present in an even greater number of devices. For control the environment refrigerators, A/C control and similar devices this sensor is used in few years ago. However, with the appearance of IoT world, it played an important role in health industry, manufacturing processes, and agriculture. Many machines are require the device temperature and specific environment temperature in the process of manufacturing.
Due to this measurement, the manufacturing process is always optimal.

Water Motor

A water motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. The pump uses a 12V DC motor. The pump is turn on and off automatically by motor driver IC. The Arduino board reads the moisture values and compared with the reference value, thereby activating the motor driver circuit. It is a small pumping motor that can be powered by a 2.5 ~ 12V power supply. It has a low current consumption of 220mA

IV. RESULTS

The following figure (2) shows the complete circuit diagram of proposed system.

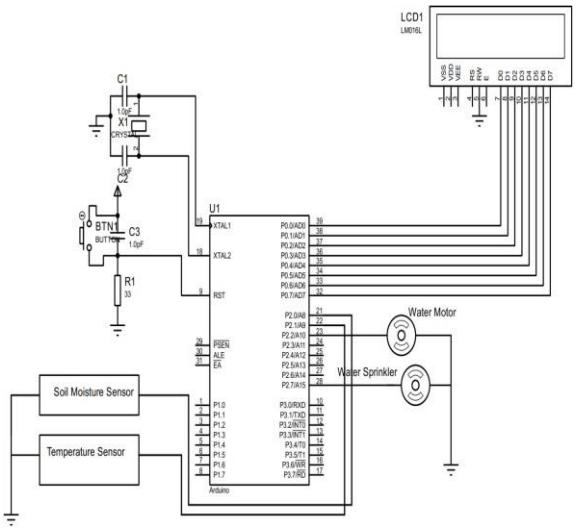

Fig. 2: CIRCUIT DIAGRAM OF PROPOSED SYSTEM

The following figure (3) shows the circuit diagram when the Soil Moisture sensor is activated.

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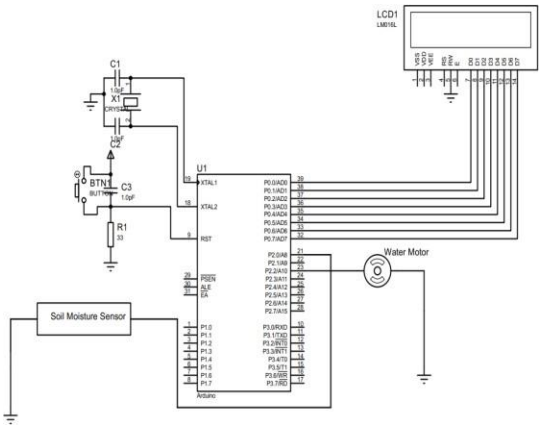

Fig. 3: WHEN SOIL MOISTURE SENSOR IS ACTIVATED

The following figure (4) shows the circuit diagram when the Temperature sensor is activated. When the Temperature sensor is activated Water sprinkler is activated to spray the water for reducing temperature.

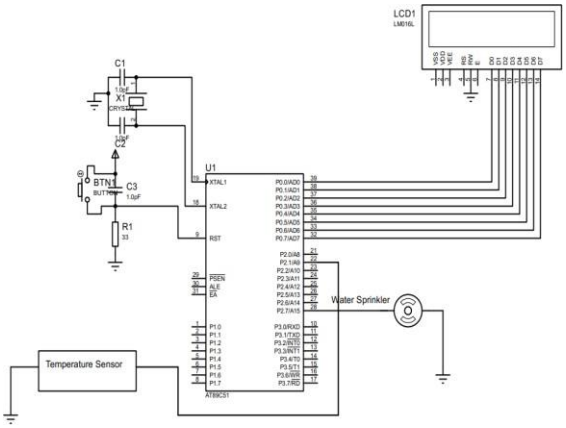

Fig. 4: WHEN TEMPRATURE SENSOR IS ACTIVATED

V. CONCLUSION

The design of novel automatic smart irrigation system for forming was implemented in our project. This project is primarily intended for farmers and gardeners who do not have time to monitor watering and condition of plants. The soil moisture sensor and temperature sensors are used in this system for continuously monitoring the moisture content in the soil as well as in the environment. The water motor automatically ON and supplies water to the crop based soil moisture content.Similarly Water sprinkler is used to spray the water on crops based on temperature sensor values. This project is primarily intended for farmers and gardeners who do not have time to tack care and water their plants. On agricultural land with severe rainfall shortages, this model can be successfully applied to achieve excellent results with most soil types. Thus, this system acts as an efficient irrigation method.

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