
Automated Irrigation and Fencing using IOT

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Abstract- Nowadays, everything is getting automated in this world, let it be of any size. Even agriculture automation is one of the biggest concept which is now taking place the whole world. Artificial intelligence and Internet of things can give us many benefits in this topic. There are many things in Agriculture which need automation but this paper focuses on the irrigation problems which can be solved or reduced due to automation. So in this paper there are introduction of artificial intelligence and sensors which can be used for irrigation and fencing purposes. There are many problems in the existing system like, lack of manpower, non availability of electricity, natural calamities, animal attacks during both day and night. This system will resolve many problems listed above. The automation is achieved by creating a smart embedded system using Arduino and connected to many sensors. Moisture sensing is used keep a track of dryness present in the plant to water them when they actually need water not when the water is available. And the infrared sensors are used for the fencing purpose and also app is created to overall surveillance of the whole system. The system proposed here is fully automated and can be easily accessed from anywhere. It is beneficial for the world in future in automated world.

Keywords- Arduino, IoT

1. Introduction

The agriculture industry is vital to the global economy. People began working in farms thousands of years ago, and their numbers have since exploded, contributing significantly to worldwide trends. Population increase, environmental protection, climate change, and a diverse range of food quality and quantity necessitated the use of cutting edge technology. This has offered agricultural researchers, engineers, scientists, and business owners a whole new perspective.

According to a survey, the global population will be over 10 billion by 2050, and so land, water, and other resources may be insufficient to sustain demand supply chains.

The Internet of Things (IoT) is still in its infancy, yet It will finally have an impact on nearly every device we use on a regular basis. As a result, a more creative strategy must be found and applied in order for the farm to be more productive. Intelligence is a vital feature that distinguishes humans from everything else in the world. Artificial Intelligence is a technique that can be incorporated into any machine or computer to make it intelligent, allowing it to imitate humans and complete tasks.

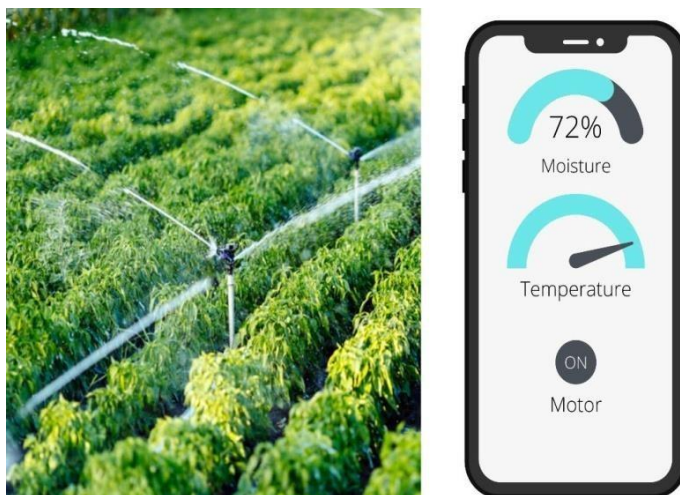


Fig. 1: Automated Irrigation System

A. Research background

The artificial intelligence is booming nowadays. Everything is getting automated in the world. Agriculture is one of biggest sector of employment in the world. And many farmers are leaving this profession due to many problems in which the irrigation is also a huge part and many crops are also eaten by the small animals like rabbit and pigs. So to overcome this problems and make agriculture a bit easy it decided to automate the whole irrigation system which can be taken care using a mobile application developed using embedded C from anywhere and anytime. To track the moisture content of the soil the sensors are used. And also the infrared sensors are used cover the field like a fence and give notification in form of alarm/buzzer to the farmer whenever any intruder breaks through.

B. Importance of the study

It is known that agriculture is the backbone of the Indian economy. So life of farmers is also one of the biggest problems in the world. This system was designed to reduce few problems of the farmers in the irrigation and fencing sector. But this needs the importance of studying else the incomplete knowledge of this system can even create more problems which are irreversible in nature. When to turn the system on and when to turn it off is to studied properly before using it to avoid problems. Proper implementation of the sensors must be done into the soil to avail maximum benefits. The software developed to control the whole system must be introduced with a basic interface so that it is easily understandable to the farmers and quick guide has to be provided.

2. Issues in the Existing System

A. Man Power Problem

This is quite huge problem for all the phases of the Agriculture. In the irrigation phase also it is a common problem. There are a only few people who come for irrigation work and so only they charge heavy amount to water the farm. And there is also a risk of getting harmed by animals or the electricity during the time of night.[1]

B. Farm security problem

It is common problem in certain areas especially during the night time. The small animals like rabbits, pigs etc and even big animals like elephants in some areas eat the crops like rice, sugarcane

and potatoes. So farmers have to keep a person as a watchman to take care of fields whole day.[2]

C.Variable Electricity and Water supply

Some villages in India still don't have electricity supply for the whole day and night. So irrigation of plants has to be taken place in night or in some rare cases a gap of few days also takes place. And due to insufficient supply of water some part of field remains arid which can harm the quality of the crops and cause a loss to the farmers

3. Proposed System

Methodology:

It is combined system which contains both hardware and software. The hardware requirements of the system are sensors, relays, relay drivers and PIC kit to connect all the materials given above. And a software part is an app created using embedded C which can be used from anywhere and anytime to control the whole system. There must be a water pump and few batteries also are required to control the system and one step-down transformer is also mandatory.

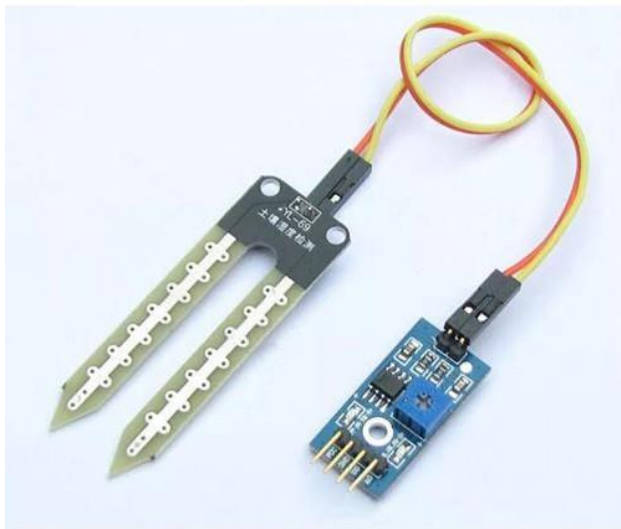


Fig.2.Soil moisture Sensor

Soil moisture sensor shown in the above figure has to be implemented in the soil present in the field. It is used to check the moisture present in the soil around the crops and if the dryness is more than the threshold (the maximum amount of dryness) set then the signal is sent to the relay through relay driver.

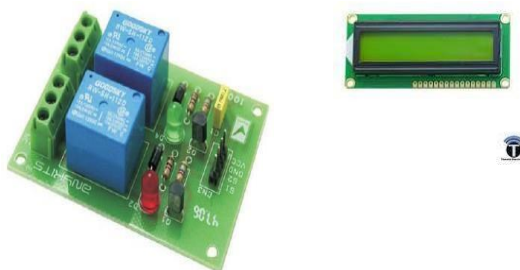


Fig.3.Relay driver and LCD display

Relay driver and relay along with the sensors are connected to the PIC controller as shown in Fig 3. Which is further connected to the water pump which releases the water when the threshold is crossed And once the moisture content is again restored then the water supply is stopped and the LED display connected to the PIC controller displays the status of the pump working or not.



Fig.4.PIC controller

Fencing is done with the help of two infra red sensors. One works as sender and another as a receiver. Once an obstacle comes in between the rays then the receiver sends the signal to the siren and a bell rings. Animals get scared due to high volume and run away from the field.

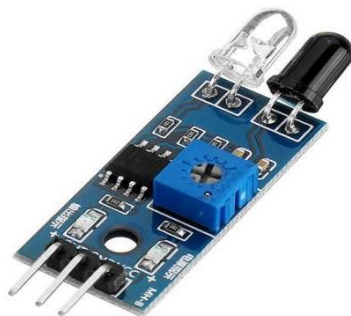


Fig.5. Infrared Sensors

The system can't be directly connected to main power supply unit which is 230V AC. It is stepped down to 12V AC using a step-down transformer. It is converted into DC with the help of rectifier. But it is still variable so it is passed through the filter circuit and constant voltage regulation gets it to 12 V and 5V and transferred to the relays of water pump and indication respectively.



Fig.6 Rectifier and Step-down transformer

4. Expected Outcomes and Future Scope

Hence by implementing the automatic irrigation system proper irrigation is done which maximizes the productivity of crops.

The scarcity or deficiency of water in field is controlled and regular irrigation is done. By implementing manual switching we use the pump to supply water for other purpose also. The pump is also used for filling the tank and used during cultivation of land.

In future the fencing can be improved by implementing the current waves or the shock waves to the intruder.

The solar panel used helps to overcome the energy crisis problem, and adapter used is for alternative used to subsidy for damage of battery or for cloudy days when solar will not get enough charge for charging the battery. Hence our idea works successfully.

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