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Automatic Sprinkler Irrigation

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A B S T R A C T

Agriculture is the major source of income for majority of the citizens of our country. The level of agriculture in India is decreased. The people who are dependent on farming should know use future technologies to solve difficulties which are shortages in water, excess expenditure on goods required for farming. This leads to huge financial loss for the farmers thus leading to the suicide. Because agriculture is such an essential issue, every technological breakthrough should be pursued. Agriculture's need has increased drastically as the world's population has grown, yet farmers are unable to supply the never-ending demand. Implementing smart or precision agriculture practices using IoT will be a better solution than expanding agricultural scale. The micro- and macronutrients in the soil have a direct impact on the quantity and quality of the yield, as well as the crop's health. Historically, human observation and judgement were employed to determine the health of the soil and crops.

Keywords: IOT, Internet of Things, AUTOMATIC SPRINKLER IRRIGATION

Introduction

More than half of all human life is supported by agriculture, which also contributes to the total economic success of India. This industry faces a number of difficulties, including limited water supplies, labour management, product marketing, etc. Of course, managing water is one of the major issues in this area. Traditional agricultural methods need to be modernised in order to increase crop output over the same area of the field. Smart farming, which is a more exact and controlled process for crops, is necessary to assist farmers in increasing agricultural productivity. In the agricultural industry, It can be used in a variety of ways to help farmers produce more. Smart planning and analysis, smart control, and smart sensing and monitoring are the three key processes. Precision farming eliminates unintentional waste of raw materials. According to research, precision farming increases yields by 40-60%, which increases premium prices by 30% and allows farmers to live better lives. For the most part, inadequate water management results in a lower than optimal water consumption rate, and occasionally, a specified amount of water is wasted. Therefore, in order to monitor and manage the crop and soil and get the highest yield, we need a model. The crop's maturity stage has a significant impact on the quality of the crop during ripening and its marketability after ripening. Farmers' capacity to determine crop maturity will be a huge aid in maximizing the harvesting period and preventing the collection of either an under- or an over-matured crop.

Objective Of Research

• To develop a system that can be used by farmers for efficient way of irrigation.

• To develop a system which helpful for farmers to identify the maturity of crops.

• This system can prove to be helpful in agriculture, to detect the moisture content of the soil and depending on it sprinkle water.

• To provide an automatic irrigation system.

• To give an effective crop protection method for farmers.

Proposed Work

The proposed system takes the input from the sensors in the field and gives the expected outcome. There are three main sensors which are used in this project. They are: PIR motion sensor, moisture sensor and PH sensor.

The second problem is about irrigation. For crops like paddy and ragi, a certain water level must be maintained during the cultivation. In the absence of rain, irrigation must be provided for the growth of plants. Farmers need to monitor the water level periodically and switch the pump ON/OFF as required. Sometimes the water overflows and there is wastage of water and soil erosion may also take place. To avoid this, the proposed system provides smart irrigation facility to the farmers. The moisture sensor is placed in the field. When the moisture content is less, the sensor sends the signal to the relay board and the pump is switched ON. And when the moisture comes to required level, the pump will be turned OFF.

The last problem addressed in the proposed system is the animal intrusion. Farmers lose a large amount of yield due to animal intrusion. During the seeding, the birds feed on the germinated seeds and there is a considerable loss of production. And during the harvest, the animals such as wild boar, cattle, goat, sheep etc. enter the field and destroy most of the crops. For large areas fencing is very expensive, and farmers may not be able to detect the intrusion early. In order to scare the animals away from the field and also alert the farmer of the intrusion, this project has introduced a buzzer/alarm which is activated when the PIR motion sensor in the field detects any movement in the vicinity.

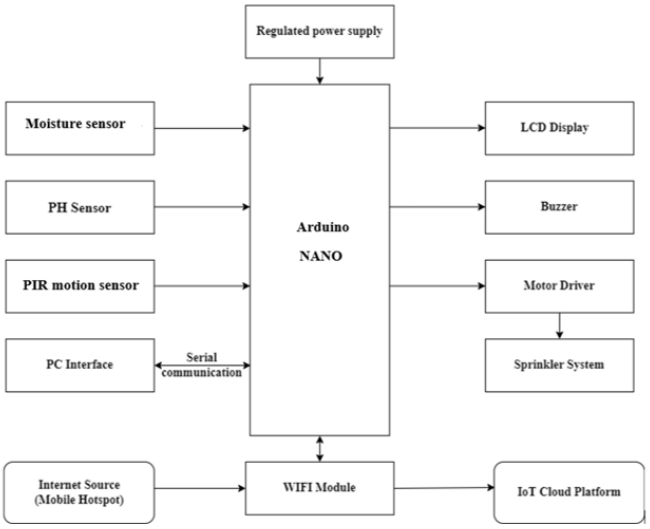

Fig. 1 - System Design.

This phase consists of a design which gives a rough idea about the project and the implementation is done based on this design. Since we are following the agile method of development, the design can be changed at any stage during the development. The final design of the project is described below.

There are various types of sensors to measure mechanical, physical and chemical soil properties. We focus on sensor for measuring pH value and moisture of the soil. The output of these sensors is given to the analog input of the arduino board. The data collected from these sensors is sent to the thingspeak cloud platform with the help ofin-built Wi-Fi Module present on the board. Using the data , machine learning algorithms will determine the crops that are matured or immatured.

The manual irrigation technique has been replaced with automated techniques. The project is designed to develop an automated irrigation system, which switches the pump motor ON/OFF on sensing the moisture level in the field with the help of moisture sensor. The moisture sensor output is given to the analog input of the Arduino board. The output of the arduino is given to the L298N Motor Driver Controller Module attached to the pump. With the help of arduino programming the board is programmed to switch the pump ON/OFF based on the input given by the moisture sensor.

We also use the motion sensor to protect the crops from animals and birds. Motion sensor will sense the changes in the surrounding and a sound alert is given, if any significant changes occur. The sensor mainly detects the Infra-Red radiations emitted by the livingorganism or in simple words the body heat of the animal/bird that is in the vicinity of the field.The output of the sensor is given to the digital input of the arduino board. Its output is given tothe buzzer. The board is programmed in such a way that, whenever there is change in the inputfrom the PIR motion sensor, the buzzer is activated.

To connect all these sensors Arduino Nano 33 IoT board is used. Arduino boards are the most utilized nodes for the implementation of IoT irrigation system. In the Fig.6.1.3 the schematic representation of the system is shown.

Conclusions

In recent days, the Internet of Things has acquired its broad prominence. Thanks to its diverse sources of applications that have paved the way for human beings to live in a smooth, healthy and simpler way. The proposed system is very helpful in the field of agriculture. This system will make the lives of the farmer easier and helps to improve the yield. This project helps in modernizing the agricultural sector and helps in increasing the production significantly. Thereis minimum human interference in this system which reduces the possibility of errors. It also helped in introducing smart irrigation system with the help of wireless sensor networks. Also, it gave an effective solution for the animal intrusion problem faced by majority of the farmers.

This project gives a creative approach that uses IoT, Arduino, and machine learning technology to increase crop yield and decrease water waste. The irrigation system is automatically triggered by the system after a machine learning technique detects crop maturity, ensuring that the crops receive the appropriate amount of water at the appropriate time by using an IoT approach like Thing Speak. As the main piece of hardware, the Arduino board controls the irrigation system and uses serial connection to connect to the IoT platform. Especially in regions with limited water supplies, the idea has a lot of potential to improve agricultural techniques. The use of IoT and machine learning technologies can lead to significant improvements in water efficiency, crop yields, and profitability.

In terms of future scope, the project can be extended to include other sensors to provide a more comprehensive picture of the crop environment. This would enable more accurate predictions of crop maturity and water requirements, leading to even more efficient irrigation practices. Additionally, the system can be further optimized by incorporating real-time weather data to adjust irrigation schedules based on rainfall and other environmental factors. Overall, this initiative offers a viable path toward utilizing cutting-edge technology to enhance crop yield and resource management in agriculture.

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