SMART FENCING AND PLANT MONITORING USING IOT

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ABSTRACT

Irrigation system in India has given a high priority in economic development. The project irrigation control using Micro controller is designed to tackle the problems of agricultural sector regarding irrigation system with available water resources. Animals like wild boars, elephant, tiger and monkeys etc.. cause serious damage to crops by animals running over the field and trampling over the crops. In the crop fields trespassing of animals leads to destruction of crops. But now-a-days humans are busier and animals have become more intelligent.

Keywords: Solar Panel, Rechargeable Battery, Arduino Uno Board, Wi-Fi Module, LCD, Soil Sensor, Water Pumping Motor, Relays, Water Container, High Frequency Transformer, IC555, Mini Electricfence, IR Sensors, IC567, Buzzer, Etc.

I.   INTRODUCTION

The device designed here is very useful for farmer which is intended to protect his grown farmland eaten by the animals. The system designed with automatic electric fence can frighten the animals or humans such that they don't dare to enter in to the farm land by crossing the boundary line equipped with electric fence. This electric fence is automated by which in idle condition it remains in de-energized condition, means if any animal came near to the fence, than automatically the fence will be energized and it remains in energized condition for 30seconds & there by it is called "smart electric fence". The idea of switching off the fence after 30seconds is to save the precious electric energy acquired from solar panel by which the control system remains in energized condition continuously during knights also. IR sensors are used to detect the animals and whenever the sensors are interrupted, fence will be energized for 30 seconds & this time is enough to apply sufficient shocking pulses to the animals. The shocking pulses produced by the fence are not harmful, here low voltage & low current pulses will be produced for demo purpose, even though animals or humans doesn't know the severity, they don't dare to touch the fence In addition to this automated electric fence, an important feature of automatic irrigation system is also included which is aimed to feed water to the dry crops automatically. In general, in agriculture field, formers are facing many problems in watering their plants to keep their crops green. Sometimes they may forgot to supply water to their crops, this leads to poor quality crops, in this regard it is essential to monitor the soil condition continuously weather it is dry or wet. Observing the soil condition manually is very difficult activity, there by this system is designed to sense the soil condition, if it is dry automatically the pumping motor will be activated and remains in energized condition until the water reaches to the sensor point. If the sensor point becomes wet, then the pump will be switched off automatically. In this scenario of the smart irrigation & smart electric fence, the system using latest IOT technology is helpful for the formers to know the condition of their farm land through smart phone.Irrigation is the art of applying water to the plants/ fields to grow and to increase the quantity as well as quality of the fruits, food grains etc., Automatic irrigation system is a modern method of irrigating the vegetable, fruit fields, farms, gardens and land scraping areas as against the conventional method, which uses large number of men-hours and uncontrolled water quantity. The project work described here explains about the modern irrigation methods using IOT technology. The method employed in this project work is that the system itself detects the condition of soil and accordingly water pumping motor will be controlled automatically.

In this method, the agriculture form always remains in wet condition for which human involvement is not required. The advantage of using this technology is that the farmer need not visit the form frequently, the system itself take care of the form, in addition information about soil condition, motor condition & other data

related to the solar fence will be transmitted to the formers mobile phone. The main purpose of this project work is to minimize the water wastage by adopting automatic control system by which water will be delivered to the fields automatically when required & in addition the grown crop will be protected from animals. The advantage of precisely applying water for irrigation in both location and point is offering the potential of increased profit due to reduced water.

This project work is aimed to deliver water to the thirsty plants automatically. Soil condition near the plant or near to the part of a field will be monitored continuously through soil condition sensing probes and if it is dry, water pumping motor attached to the water tank will be activated and water will be delivered for specific time until the soil becomes wet near the sensor. The demo module will be constructed using water pumping motor, but for practical usage plenty of small motors can be used and all of them can be attached to the water tank. The same system with little modifications also can be implemented to the water sump. When sump is considered, submersible pumps can be used. The idea of using pumping motor is to apply water to the highest fields also.

In India agriculture is the most important occupation of the people. More than 60% of our total population depends for their subsistence on agriculture. After independence due to various development projects introduced in the field of agriculture, production of food grains has been continuously increasing. The entire Indian economy is depends on agriculture. Any fluctuation in agriculture income will directly affect the India's national income. In this regard, a thought is given to develop an Automatic Plant Watering System Using IOT technology.

In this project work importance is given for automation such that by sensing the soil humidity or soil condition, i.e., whether it is wet or dry, depending up on the soil condition water supply can be controlled automatically. For this purpose, electrically operated low voltage water pumping motor can be used which is rated for 12v dc. Since it is a prototype module and demonstration purpose, here only one motor is used, but for real time applications many more motors can be used to cover entire farm land in less time. The idea of using individual small pumping motors is, water can be supplied to the specific predefined area of the field or individual plants for which plants or field areas must be segregated and accordingly suitable motors must be used. These devices will be energized automatically when the soil is dry, similarly these will be de-energized automatically when the soil is in wet condition. For sensing the soil condition copper electrodes are used. Similarly using these same copper electrodes, water low level in the water tank or sump can be identified automatically, whenever the water level falls less than 20% of the tank, immediately alarm will be energized. This is additional feature, if required we can adopt this technique also, but here it is not implemented.

As described in the abstract, automatic irrigation system & smart electric fence is constructed with Arduino Uno board, LCD, ESP8266 Wi-Fi module, mini water pumping motor, construction of electric fence, solar panel, rechargeable battery, etc. WiFi module is used to upload the information to the concern smart phone, LCD is used to display the soil condition and motor status, pumping motor is used to supply the water and Arduino board is used as main processing unit. Entire system is designed to utilize free power source of solar energy.

II. METHODOLOGY

➢ The current livestock management systems mostly employ IoT and GPS sensors connected to satellite and GPRS for navigation and communication, respectively.

➢ In addition, the conventional tracking systems track the movements of livestock without any profound geographical boundaries that become challenging in case the animals go very far from the main access points.

➢ To address these issues, this research study proposes an enhanced management system that provides convenience to farmers to define a geographical safe zone for livestock.

III. MODELING AND ANALYSIS

➢ The smart fencing model is made up of an energizer circuit that creates high voltage impulses that are subsequently transmitted to the fence wires. By delivering a low voltage to the same fence wires, a breach is detected. The energizer and a low voltage detecting component should not function at the same time.

➢ Smart Plant Monitoring System using IOT Technology: Internet of Things technology is suitable for the smart plant monitoring system. This is also suitable to check the soil conditions as well, which may help to start a better growth of a plant. It may support to control water usage and wastage of water. Top Introduction

BLOCK DIAGRAMS
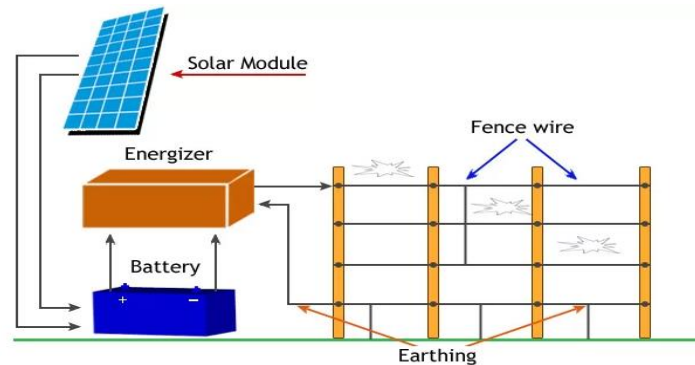
Smart Fencing
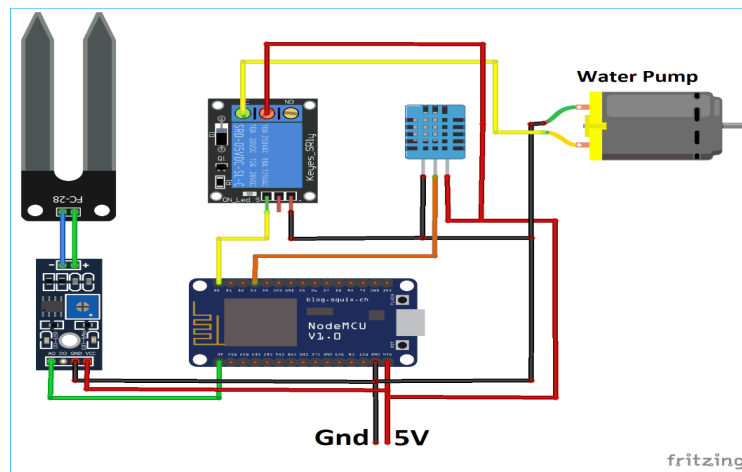
Plant Monitoring

IV.   RESULTS AND DISCUSSION

➢ Whenever the temperature is above the threshold value, the motor runs to supply the water also humidity will be detected. Whenever there is an object detected entering the land PIR sensor detects it and needle will be rotated towards the object and prevents entering the object into the land.

➢ When the rain water is accumulated in the land the water level sensor detects it and motor pumps the excess of water out of the land.

➢ All these notifications are sent to the mobile phones using blynk application.
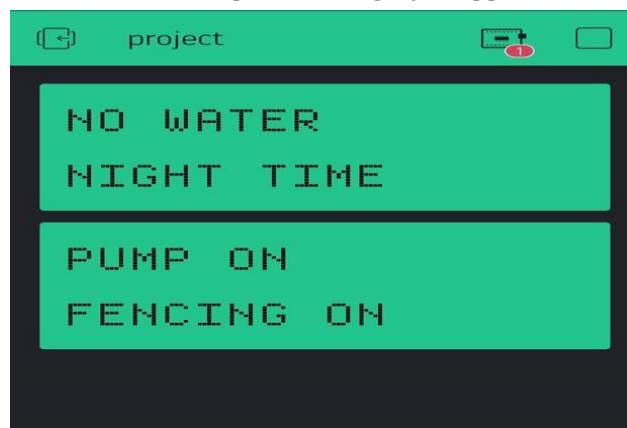
V.   CONCLUSION

The system of Automatic electric fence designed here is very useful for a farmer which is intended to protect their grown crops eaten by the animals. In general, this type of fence remains in energized condition continuously, thereby lot of electric energy is required to keep energize the fence by 24/7. To avoid such kind

of energy loss, here an unique system is designed such that the fence will be energized automatically by sensing the approaching animal. In this concept lot of energy can be saved and alternatively life of solar power system also can be increased significantly.

An automated irrigation system refers to the operation of the system with minimum of manual intervention beside the surveillance. Almost all systems weather it is a drip, sprinkler, or surface can be automated with help of timers, sensors or computers or mechanical appliances. In this project work with the help of a simple soil sensing circuit, system is automated. Most of the soil moisture sensors are designed to estimate soil volumetric water content based on the dielectric constant of the soil. Thus, measurement of the dielectric constant gives a predictable estimation of water content. But in this project work simple copper electrodes are used for sensing the soil condition, in this method the soil weather it is wet or dry conditions will be monitored and accordingly water pumping motor will be controlled.

The project work **"Solar based Electric fence with automatic irrigation system"** is completed successfully and results are found to be satisfactory. The main processing unit used in the project work is Arduino Uno board and it acts as the brain of the system and processes the data from the sensors. Also IDE (Integrated Development Environment) software is needed for Arduino based IOT projects. And we need to use ESP-8266 WiFi module to establish the WiFi communication between the Arduino and cloud platform. Arduino code is written in C++ with an addition of special methods and functions, which we'll mention later on. C++ is a human-readable programming language. When we create a 'sketch' (the name given to Arduino code files), it is processed and compiled to machine language.

IoT is a promising domain that offers exciting career options. It is profitable and has many learning opportunities. In fact, both the private and public sector companies have tremendous scope in this domain. Since digitalization is something inevitable, pursuing a career like this is highly beneficial. Most Arduino boards consist of an Atmel 8-bit AVR microcontroller (ATmega168, ATmega328, ATmega1280, or ATmega2560) with varying amounts of flash memory, pins, and features. Arduino microcontrollers are pre-programmed with a boot loader that simplifies uploading of programs to the on-chip flash memory.

IOT technology is one of the booming fields in forthcoming years and plays a major role in the field of health care & domestic security systems. IOT helps in connecting the people by empowering their health and wealth in a smart way through wearable gadgets. Recent improvements in wireless sensor networks have created a new trend in internet of things. The main aim of this work is to provide an extensive research in capturing the sensor data's, analyzing the data and providing a feedback to the house owners.

ACKNOWLEDGEMENTS

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