SMART AUTOMATED IRRIGATION SYSTEM

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Introduction

Agriculture is the major backbone of India as it satisfies the need of food for the people. Though many agricultural lands are being destroyed, there are still many who are not willing to sacrifice agriculture as they provide basic requirement for the people.

The main problem that agriculture as an industry faces is inefficient farming practices and uncertain weather. This project aims to tackle this very concerning situation.

This project aims at making the irrigation system autonomous so that water which is scarce in many regions of India is utilised in the most efficient manner. Also, the energy for powering the water pumps and the smart systems is derived a clean energy source, Sun. Solar power is used for powering these systems and hence it completely eliminates the need for the farmer to depend on traditionally erratic state electricity boards for powering his/her farmland.

SCOPE of the Project

The project's main objective is to make the irrigation system autonomous. The farmer need not worry about plants withering or have to check it's condition regularly. The system including its power source is designed to be completely autonomous. The irrigation part is done with the help of Arduinos, Solenoid and soil and moisture sensor. These inputs of data from the sensors is fed into the Arduino which then using a fuzzy logic code determines whether or not to water the plants. The power to these components is fed by a solar panel through a battery and thus power supply is consistent. The solar panel rotates to ensure maximum sunlight incidence on it's surface. Sensor data is stored on cloud technology for analysing crop watering patterns.

Thus through the use of this smart technologies in farming, farmers who are facing extreme situations such as drought and electricity shortage can ensure survival of their crops for a better tomorrow.

Methodology

Solar panel assembly: The automatic solar tracking system using light sensors was made in this assembly. The solar panels are connected to Arduino which act as a power source for sensors. The servo motor is used for rotating the panel according to the solar intensity falling on the sensors and the output of the solar panel is connected to the battery for consistent supply to other arduinos and motors.

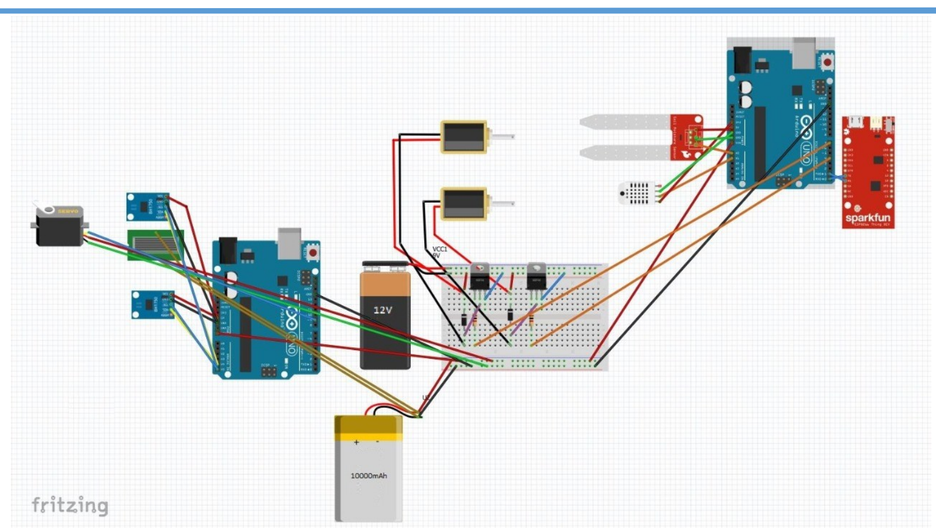
Arduino Assembly: The Arduino is connected to solar panel which act as the power source and it is connected to the three sensors namely soil moisture, temperature and humidity sensor. The Fuzzy logic code is writes and uploaded into the Arduino. These Arduino is connected to the solenoid valve. The input values are taken from the three sensors and output is given to the solenoid valve. Solenoid valve works with a principle of electromagnetic principle. When the current is applied the solenoid valve allows the valve to open and remains closed at remaining time.

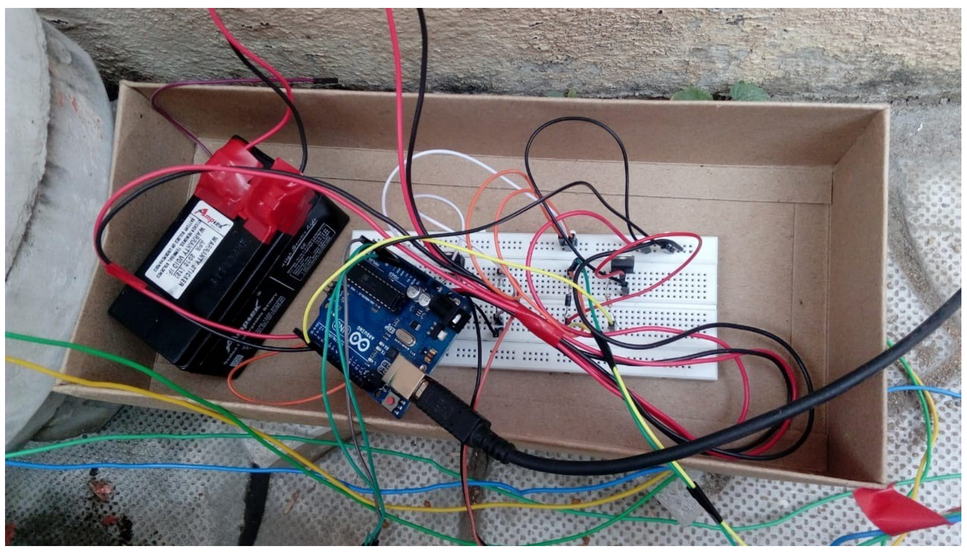
Fuzzy logic: The humidity, temperature and soil moisture sensors are the input values. Four functions of temperature namely "Very Hot", "Hot", "Cold" and "Very cold" are taken. For soil moisture and humidity sensors three functions are taken namely "High", "Medium" and "Low". Since the range of value is required, the sensor. Fuzzy logic uses "if" and "else" condition for operating the solenoid valve. There are total of 36 combinations possible from the above three sensors. Based on these conditions, the output value is either "True" or "False". "True" indicates the current to the solenoid valve and thus water is given to the crops and "False" indicates no current to the solenoid value and thus the valve remain closed.

Crop planting: The crops are planted in two tubs and are grown. The crop in one tub is grown using automated irrigation system and the other one is grown using normal irrigation. The amount of water given to the crops are noted and the quality of the crop are compared after growing. The growing time of plant is one week. A single tube is separated into two regions in order to have two fields of land. So we use two solenoid valve and the power is given to the respective solenoid valve using the fuzzy logic.

Cloud Analytics: The input data is stored on the cloud using NodeMCU. It is a Firmware on ESP8266 configured for Internet Of Things(IoT) applications. Data sent to the cloud helps to give watering information on further analysis.

Result





Conclusion

We expect that the growth of the plant by means of the automated irrigation system would not only save water but also improve the quality of the plant growth. We also expect that the solar power generated would also meet the sufficient amount of power supply for the Arduino.

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