Smart Farm

## Introduction

This project was intended to apply Internet of Things (IoT) concepts in the agriculture sector; farming specifically as a means to phase away from traditional methods of farming that have proved to be inefficient and outdated. IOT serves as a powerful, reliable and cost-effective technology to implement the idea of smart farming that aims to empower farmers with advanced connectivity through measurement of environmental factors such as soil moisture, temperature, humidity and implementing computing along with real time monitoring.

## Objectives

* Introduce a reliable and cost-effective technology to improve farming.
* Empower farmers with advanced connectivity through automated methods of measurement of environmental factors such as soil moisture, humidity and temperature.
* Phase out inefficient methods of farming that require a lot of man-power.
* Introduce IOT to advance farming skills.
* Conservation of water used in farming.

## Literature Review

When you hear about smart farming, one of the things that comes into mind is a system that measures soil moisture and water your plants automatically.

Smart farming is an emerging concept that refers to managing farms using Information and Communication Technology to increase quality and quantity of products while optimizing the human labor required and for better utilization of resources throughout the irrigation process.

Due to abrupt weather fluctuations around the world, there is a need to come up with ways to conserve water; hence soil moisture for optimum production.

Our system aims at regulating the soil moisture levels in farms. We designed a program that will automatically detect a drop or surge in soil moisture level and activate a pump to irrigate the farm otherwise the pump will be turned off respectively.

This will automate the whole farming system and reduce the time that would take for the farmers to actually do the whole process of manually irrigating the farm even when the moisture content in the soil is the recommended one for the plants as such also conserves water usage. With this type of system, the farmer can water their plants only when needed and avoid over-watering or under-watering.

## Equipment - Bill of Materials

Full size breadboard

Arduino Mega 2560

Soil moisture sensor

SRD-05VDC-SL-C Relay

Amphibious submersible micropump

9V DC power supply

Jumper wires

## Methodology

### Schematics

<https://drive.google.com/file/d/1A5HTTZisYxS6DRvh8GC3ubxe5OzKSzHm/view?usp=sharing>

### Flowchart

SOIL MOISTURE LEVEL

IS MOISTURE LEVEL<=250X<=500?

SWITCH PUMP ON

X=X\*100%

IS SOIL MOISTURE LEVEL,X>=250?

IS SOIL MOISTURE LEVEL,X<=500?

SWITCH PUMP OFF

SWITCH PUMP ON

SWITCH PUMP ON

IS MOISTURE LEVEL,X>500?

SWITCH PUMP OFF

## CONCLUSION

### Scalability

With enough resources, one could acquire more soil moisture sensors and be able to distribute them all around a large farm and for the case of one specific type of plant, could get synchronized soil moisture data from the sensors. In the case of different plants grown, the programs controlling the sensors could be modified in a way that fits the soil moisture required by each type of plant.

### Challenges

In the case where the electrodes of the soil moisture sensor are copper based, when they are in contact with water (H20), the copper could easily ionize and some of the copper ions be directed into the soil. Copper is a metal and the farm products will absorb it from the soil. Being a carcinogen, it is not good for human consumption.

In addition to that, in a large farm, the system possesses a disadvantage since multiple number of sensors need be used for the system to work effectively. This would be costly to the farmer.