CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)	Project Number
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	34383

Project Title

Let's Save Water: Maximizing Crop Yield with 50% Less Water through Precision Irrigation Monitoring

Abstract

Objectives/Goals

One of the opportunities to save water is in Agriculture irrigation, which consumes almost 61% of total water consumption and there is wastage of > 50% due to runoff. This project focuses on testing the impact of precision irrigation, by testing the impact of the amount of water on plant yield. This experiment monitored the growth of Pisum Sativum (pea) plants from seeds to full growth and compare the produce yield for 5 treatments (50, 100, 200, 300 & 400 ml/day). The Pisum Sativum was used by Gregor Mendel the #father of modern genetics# and serves as the ideal winter plant for research. There are four replications with a total of 20 plants and a random block design was used to complete the analysis

Methods/Materials

Data was used to compare yield and impact of independent variable (water) on dependent variables plant height, number of leaves, stem thickness and number of flowers/pods. The constant factors included Soil pH, amount of light and very minimal impact due to wind. The experiment will demonstrate that up to 50% (60,000 million gallons per day) of water can be saved by comprehending key factors influencing crop yield that would help innovate the next generation automated precision irrigation system.

Results

The data collected, resulted in the notice of different aspects affected by the water.

Conclusions/Discussion

In conclusion, the experiment demonstrated that > 50% water conservation could be achieved through precision irrigation. Statistical analysis demonstrated that yield from 50 ml was the same as yield from 300 ml. The variance due to each treatment for plant height, number of leaves, number of flowers/peas was not significantly different As part of the future direction, we are able to successful demonstrate that we could build a low cost monitoring solution using an Intel Galileo board to collect moisture data and provide real time data in the cloud. Developed a functioning motorized robot with a switch that stops at each plant, it is integrated with a solenoid valve to deliver specified amount of water for specific duration of time and at the lowest flow rate for each plant. It could be automated to deliver water based on weather conditions and moisture level.

Summary Statement

This project is about conserving water in agriculture, with precision irrigation and monitoring, by studying the impact of water on plant yield.

Help Received

Dr. Aradhya helped experimental setup; Mr. Keshavmurthy helped with connecting to the cloud with the Intel galileo board.