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Design and Development of Smart Irrigation and Water Management System for Conventional Farming

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Abstract. The intention of this project is to develop a smart irrigation and water management system for conventional farming. The project is conducted mainly to improve the irrigation scheduling and also to solve the over watering and under watering issues in traditional irrigation system. These problems can be solved by implementing soil moisture sensor as a smart component in the irrigation system. Smart irrigation system with the implementation of sensory-based system will be able to provide a proper irrigation scheduling, by monitoring the soil and weather condition of the farm. In this project, the sensory system consists of soil moisture sensor, temperature sensor and light intensity sensor, which basically used to monitor soil moisture level, temperature level, and light intensity level at the separate test area. Arduino Mega 2560 microcontroller will process the data from these sensors and a proper irrigation scheduling will be developed based on the data collected. Type of irrigation system that been used in this project is a sprinkler system because it has high uniformity of water distribution to the plant, which able to spread water efficiency and further optimize the water usage during irrigation process. Ultrasonic sensor is also implemented in the system to measure the amount of water used in each irrigation process performed. An offline data storage will be implemented in this project using a micro SD card module, which all the essential information such as sensory system readings and the amount of water used will be recorded and stored into a micro SD card. Thus, it allows user to monitor their farm's condition, and also gives a better view on what is really happening at their farm.

1. Introduction

Most of the farmer all around the world has implemented an irrigation system at their farm especially in agriculture industry. One major problem arises when the irrigation system does not have an efficient watering schedule, which lead to over use of water. The vice president of The Toro Company and also a general manager of irrigation division, Phil Burkart has mentioned that over watering is one of the largest issues in agriculture industry [1]. The wasteful irrigation systems implemented in the farms are major contributors to water insufficient around the globe and Ute Collier emphasize that efficient irrigation system is the answer to this problem [2]. In addition, over watering also can decrease profits due to a negative yield response [3]. All this problem arises because the traditional irrigation system that been implemented by the farmer does not have the ability to measure the condition of the farm, which means that the system does not consider the plant needs and further leads to the over watering and under watering issues. In addition, the traditional irrigation system also cannot provide an efficient irrigation scheduling which leads to unnecessary irrigation process to occur. Therefore, smart irrigation system (SIS) is developed to overcome all these problems.