Tea Garden Automated Sprinkler System & Mobile App using Iot

Project report submitted in partial fulfillment of the requirements for the degree

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B.Sc Engineering in
Computer Science and Engineering

by

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CERTIFICATE

This is to certify that the project report entitled **Tea Garden Automated Sprinkler System & Mobile App using Iot** , submitted by **SHARIAR HASAN** (Student ID: 18701012 Session: 2017-2018) an undergraduate student of the **Department of Computer Science and Engineering** has been examined. Upon recommendation by the examination committee, we hereby accord our approval of it as the presented work and submitted report fulfill the requirements for its acceptance in partial fulfillment for the degree of *B.Sc Engineering in Computer Science and Engineering*.

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ABSTRACT

Human existence is dependent on water. In agricultural areas, water is used 80 to 90% of the time. Population growth and expanded globalization are both contributing to an increase in water use. Every country struggles to produce fresh, nutritious food while minimizing agricultural water consumption. Nowadays, automation has a big impact on people's life. The technology not only provides comfort, but also energy, time, and financial savings. These sensors recognize changes in the surrounding environment's temperature, humidity, or level of precipitation and transmit an interrupt signal to the Arduino. On the modern world, businesses employ automation and control technology that is pricey and unsuited for use in a farm or garden. So, in this project, we build a smart irrigation system based on IoT using the Arduino. The technique may be used to monitor the growth of the plant using a camera and automatically control the water motor. On our mobile phones, we can view live streaming of the farm if we use the right app and a Wi-Fi network. The system's beating heart is the Arduino.

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Chapter 1

Introduction

IoT creates connections between people, things, and other people. Connecting numerous different types of linked devices together to create a huge network is the aim of the Internet of Things. The Internet of Things places particular attention on three areas (IoT). The core elements of a system are automation, cost-cutting, and communication. One of the tools that the Internet of Things is giving farmers as it alters the agricultural sector is precision farming. In order to handle the issues at hand, we require sustainable agriculture. People are now able to complete things that they were before unable to because of the Internet of Things. People can be more productive by using the internet to do mundane jobs while saving time and money.

1.1 Backgound

IoT enables the remote detection and/or control of devices. a representation of a live network IoT use for environmental monitoring aids in situational awareness. Field temperature, water level, and soil conditions The Internet of Things is another potential factor (IoT).Precision farming is a key element in increasing agricultural output. Agriculture is the primary source of income for all developed nations. It presently absorbs 85 percent of the fresh water resources on earth and will probably continue to do so due to population expansion and increased food demand. Therefore, efficient water management is a major problem in many arid and semi-arid farming systems. For agricultural crops, an automated irrigation system is required to use the least amount of water possible. The purpose of an automated irrigation system is to avoid both overwatering and underwatering. Bangladesh was formed in a hamlet, and agriculture is essential to the growth of the country.

The monsoons, which are infrequent, are essential to our nation's agriculture. Therefore, agriculture makes use of irrigation. The need for rain can currently be reduced by using a range of irrigation technologies. Electricity and timing of ON/OFF are the driving forces behind this technique. In this technique, the gateway unit maintains the sensor data while soil moisture sensors are placed at the plant's root zone and close to the module. The goal of this project is to develop an automated irrigation system that uses the Internet of Things (IoT) to switch the pumping motor on and off based on moisture content and water level and transfer data to an IoT platform. Both mobile apps and websites use graphic displays.

1.2 Motivation

In practically every part of the world, irrigation have to be take place in a cultivatable land. This has a long process in normal analog ways of irrigation. Therefore, it can be made easy by making a automated system for such a land. If we understand how the cultivation needed to be done, we can prepare a automatic smart system for the irrigation.
Knowing the cause enables us to take the required actions to lessen it.Motivated by these, our project target is to make a smart way of irrigation in the cultivation sector.

1.3 Problem Statement

Our research's primary concerns are:
- How can different restrictions on these kinds of irrigation systems be reduced?
- Can a system of automatic irrigation based on IoT?
- Can multiple crops be grown on the same piece of land?
- What needs to change in order to leverage more feature sets in this model?
- What should be done to improve accuracy?
- How are the data obtained?
- How do you recommend the best crop to plant?

Chapter 2

Literature Review

Several research have been conducted using an IoT-based automated irrigation system. Some of them employed a lot of sensors, which is inefficient for our country, and these systems aren't totally automated; the system first asks the user for permission to turn on or off the motor through an app. For future automated decisions, they did not employ machine learning. After doing extensive research in the field, several experts determined that agriculture's area and productivity are declining by the day. Using different technology in the agricultural industry, we may increase production while minimizing physical work. This paper demonstrates how IoT and Raspberry Pi are being utilized in the agricultural industry.

A low-cost smart irrigation control system was demonstrated by Chandan Kumar Sahu [1]. It comprises of a number of wireless sensors positioned in different orientations over the agricultural area. The AT-MEGA318 micro-controller on the ARDUINO-UNO development board, which is connected with a wireless networking device, receives data from each sensor. Through internet access, the Raspberry Pi is utilized to transfer various types of data to the micro-controller process, such as text messages and images.

Supraha Jadhv [2] showed an automated irrigation system that uses a wireless sensor network and a Raspberry Pi to effectively regulate drip irrigation system operations.

Instead of the Raspberry Pi, Joauin Gutierrez [3] sought to develop an automated irrigation system utilizing a wireless sensor network and GPRS module citejoudin. Deweshvree Rane, Ms. Deweshvree Rane, Ms. Deweshvre[4] Proposed Automatic

Irrigation System is the subject of a review study. This device, which is based on the RF module, is used to send or receive radio signals between two devices. Because of the sensitivity of radio circuits and the precision of the components citerane, its design is complicated.
Karan Kansara [5] made a proposal. This sensor-based autonomous irrigation system with IoT uses a rain gun pipe with one end linked to the water pump and the other to the plant's root. It does not give water in the form of natural rainfall, like a sprinkler does, and it only employs the citekaran soil moisture sensor.

G. Parameswaran [6] presented an Aurdino-based smart irrigation system that uses the Internet of Things. Instead of utilizing a Raspberry Pi, the researcher employed an Aurdino controller and did not use soil moisture sensors. 'Problem Statement' is a phrase that is used to describe a situation. Each kilogram of paddy produced by farmers throughout our nation wastes almost 800 gallons of water. Even though 1 kilogram of paddy may be produced with 2,500 liters of water, they are now utilizing 3,300 liters due to a lack of understanding of specific strategies that might lower the quantity of water required as input.

Our agricultural is now experiencing a water shortage. For our harvest, we employ a number of pumps to extract groundwater. Almost all irrigation pumps in our nation are hand-operated. They pull water at random, with no regard for the amount of water or moisture in the field. Without knowing the water level, extra water is sometimes provided to the ground. It is really costly. The expense of using more water on the field than is necessary rises, and the crop's quality suffers as a result. As a result, we must build an autonomous watering system to cut crop costs while maintaining crop quality. Multiple sensors monitor the water level and moisture temperature, and the system collects this information and compares it to the standard necessary level. After analyzing the data, the pump or motors will be turned on or off automatically. This method will save us time, effort, and money.

Chapter 3

Methodology

Our proposed system contains multiple sensor devices and techniques.We have discussed here about our system in details in the following subsections

3.1 Proposed System

Water scarcity is causing a lot of challenges in the agriculture area these days. Smart irrigation systems have been employed to assist farmers in overcoming their challenges. Various sensors are linked to the Arduino 3 model in this system, including soil moisture, temperature sensor, andwater level sensor. The model is also equipped with a WiFi connection. The Arduino is connected to relays 1 and 2, which are then connected to the motor and pump, respectively. The relay 2 receives an LDR connection. The sensors' detected values are presented on an LCD. The pump will be automatically turned ON/OFF by the relay circuit if the measured value exceeds the threshold values established in the program. The relay circuit is linked to the driver circuit, which helps to switch the voltage. Through the GSM module, the farmer will be informed of the current field condition, which will also be updated on the web page. The farmer may get information regarding the state of the field at any moment using this technology. The user can observe the recent conditions of the field from the mobile app. If any error happened, user will be notified by the system trough application software.All kind of data collected the sensors and after analysing the collected data using machine learning methods, the processed report will be uploaded into the cloud and we can observe the reports via application software installed in mobile or computer.

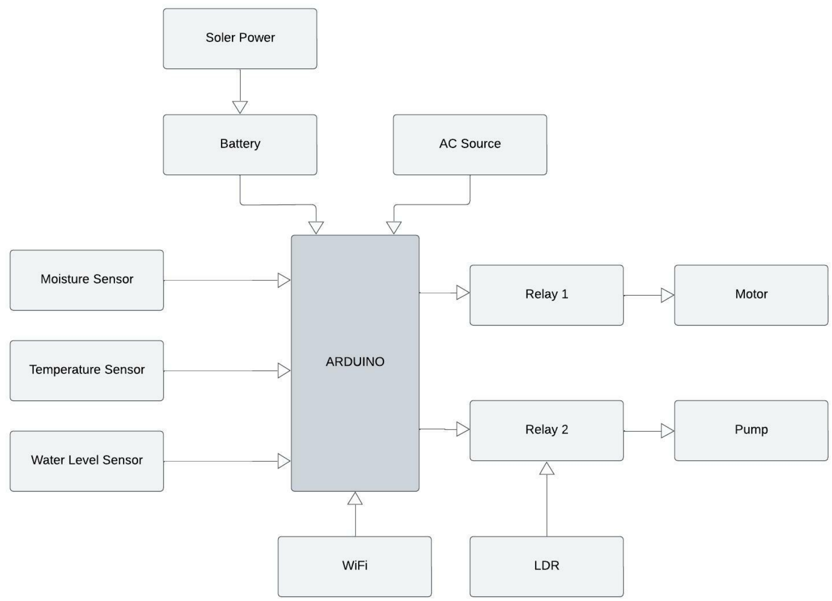

Figure 3.1: Irrigation Control System

3.2 Sensors

A sensor is an electronic device, a component, or a module that detects events or we can say changes in its environment and mostly relays the information to other electronics, mostly a computer processor. Sensors, to put it simply, are devices that convert physical characteristics into electrical impulses. A sensor's sensitivity relates to how much its output changes as the measured value changes. Our system contains multiple sensors are listed here-

1. Soil moisture sensor: this sensor normally used for measuring the soil moisture content.
2. Temperature sensor: this sensor will be used for detecting the temperature of the environment of our projected land.
3. Water level detector: this is a sensor for measuring the water level in the field.

3.3 The Systems Heart Arduino

A motor, an LED, or anything else may be started, switched on, or posted online using an Arduino board, which can receive inputs like light from a sensor, a finger on a button, or a tweet.

3.4 Relays (Motors Controller)

The relay module in the system is in charge of controlling the motors. The relay module is an electrically powered switch that lets you turn on or off a circuit with voltage and/or current levels that are far higher than what a microcontroller is capable of. As seen in the diagram, a relay connects the Arduino to the gadgets. In this situation, the relay might be utilized as a switch to turn the devices on and off.

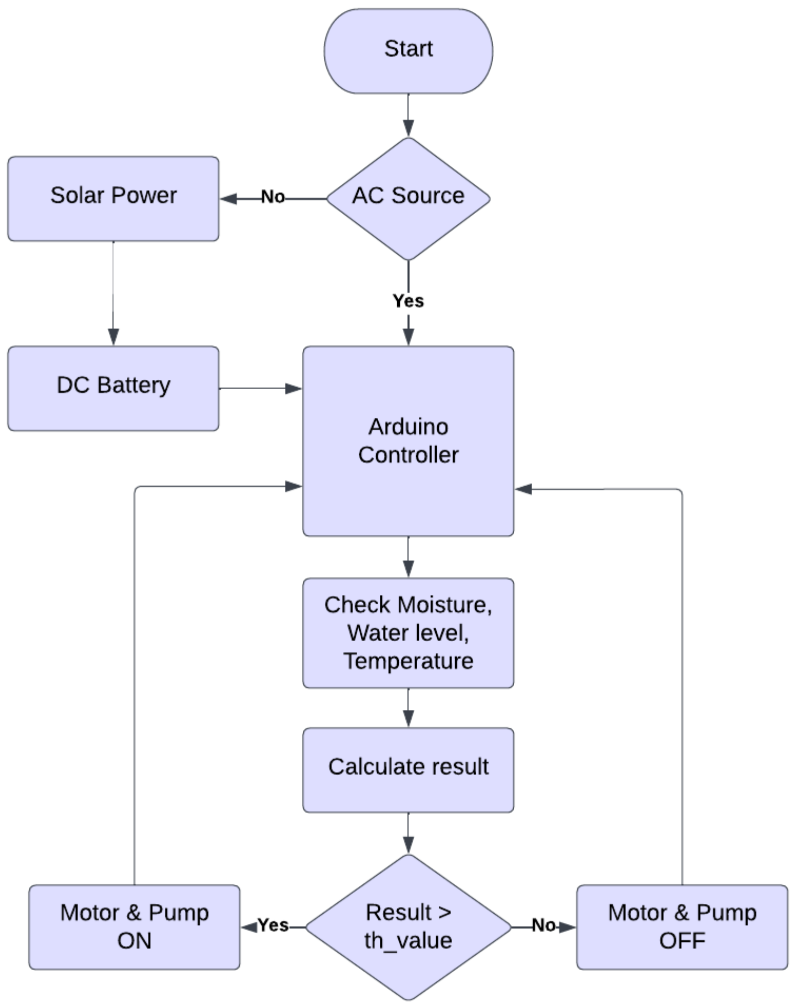

Figure 3.2: Flowchart for Irrigation Control System

Chapter 4

Result

Ours is a fully automated system. It is based on information gathered in the field. Multiple sensors monitor the water level and moisture temperature, and the system collects this information and compares it to the standard necessary level. The pump or motors will be turned on or off automatically once the data has been analyzed. As a result, there is no room for excessive water consumption. It is possible to save money by lowering the amount of water used. It takes fewer manpower since it is an automated system. It also saves money, time, and effort. there are also some challenges that our system may be faced. IoT is complex network to implement.Sensors are temporary they would be damaged frequently.It may consume high cost.Unskilled farmers in our country do not much about our system etc.

4.1 Preliminary Result

We have collected the sensors and controller needed to set up the automated irrigation system while we work on it. The sensors are :

- Water level sensor
- Temperature sensor
- Moisture Sensor

and the controller that is selected for the system is Arduino micro.

4.2 Future Work

We will explain to our readers where we believe the results can take us in the section on future work.
In this section, the future work of our automated system is about :

- Implementing the wired connection among sensors, Arduino, battery, power supply, relays, pump, motor etc.
- Adjusting the soler power panel with the battery system.
- Implementing a mobile app to control the irrigation system from online.

Moreover, we have illustrated a gantt chart for the visual representation of our future work at a glance.

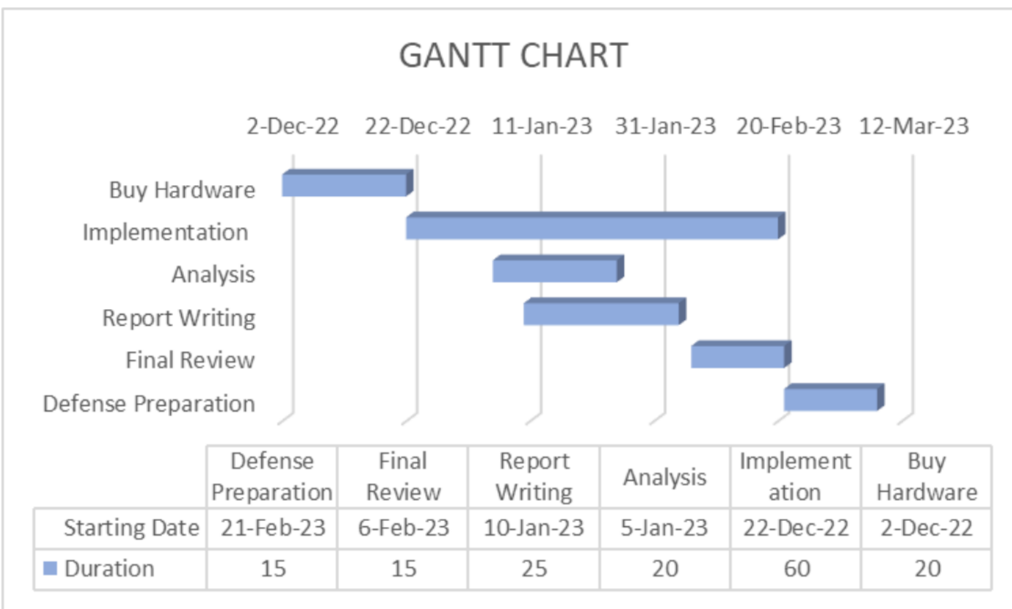

Figure 4.1: A Gantt Chart of our future work

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