

Smart Irrigation System





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**BANGLADESH UNIVERSITY OF
BUSINESS AND TECHNOLOGY**

IoT Project (CSE 426)

Supervised by

Md. Hasibur Rahman

Lecturer

Department of CSE

Bangladesh university of Business and
Technology (BUBT)

Submitted by

Syeda Nowshin Ibnat

17183103020

Mahmuda Begum

17183103030

Nusrat Jahan Anka

17183103008

Nawrin Zaman Prova

17183103043

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Introduction


IoT is transforming agriculture and allowing farmers to overcome the enormous challenges they face. Smart irrigation systems reduce the chances of over-watering the soil and waterlogging in the fields. In our system, the moisture level in the soil is monitored and the IR sensor is used for intrusion detection.





Problem Background

Since the dawn of civilization, humans have used numerous techniques to produce food and large-scale crops were required. The main issue occurred when insufficient human labor slowed agricultural development.





Motivation



Know about the agro-tech work using IoT.



Get more knowledge on Hardware and IoT.



Test feasibility of our work.





Objectives

- To develop an IoT-based Smart irrigation system having low-cost equipment.
- To monitor moisture contents at different conditions.
- To get accurate IR sensor value.
- To improve the system by storing data on the cloud and using Mobile Phone App.
- To do proper circuit design for the project.
- To do proper testing and debugging of the device configuration.

Project Schedule

TASKS	WEEK 1	WEEK 2	WEEK 3	WEEK 4
Topic Selecion	<div></div>			
Requirement Analysis	<div></div>			
Literature Review		<div></div>		
Development		<div></div>		
Testing			<div></div>	
Meeting with team members				<div></div>
Documentation				<div></div>

Working Process

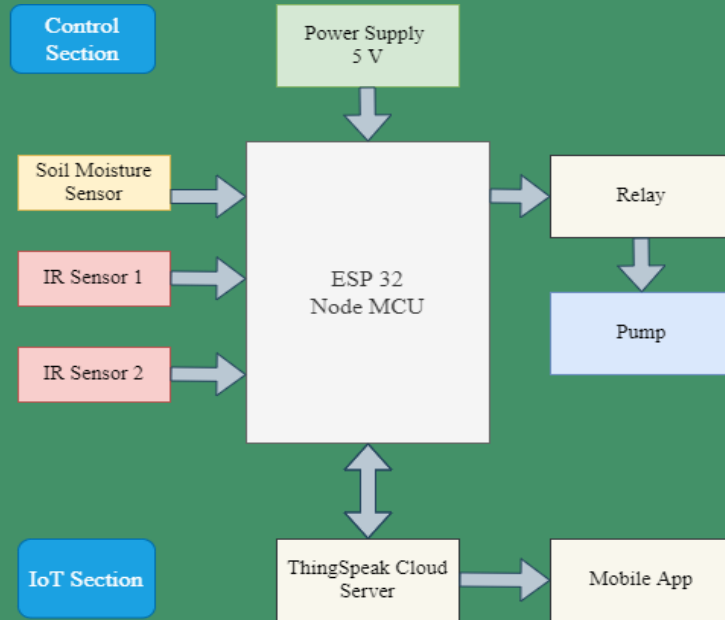


Figure 1: Block Diagram of Smart Irrigation System

System Analysis

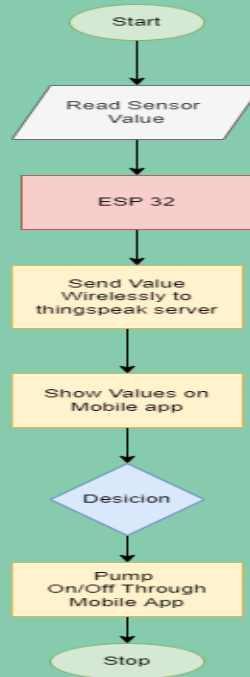
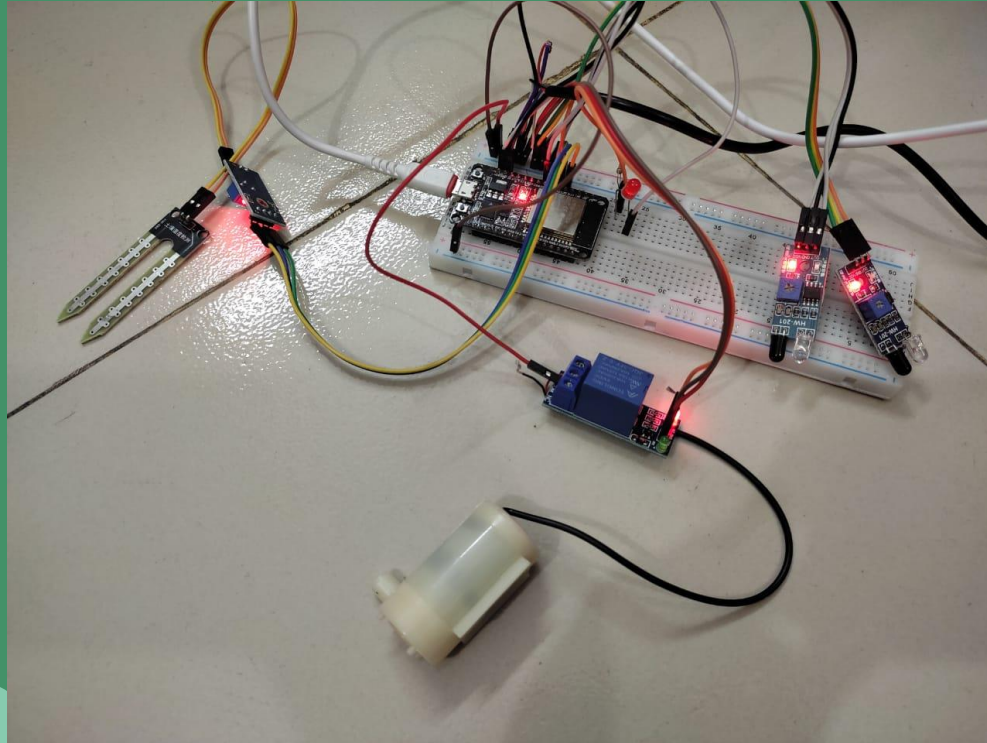


Figure 2: Flow Chart of Smart Irrigation System

Circuit Design




Experimental Setup





Project Features

- Our system can give accurate data of moisture sensor.
 - We can handle two IR sensor to detect intrusion.
 - Data store on ThingSpeak IoT cloud.
 - Mobile App for the user to see data visualization.
 - Switch to On/Off the Pump.
- 

Hardware Specification

No	Hardware	Unit(s)	Specification
1.	Breadboard	1	To set up the components.
2.	Jumper Wire	1	To make connection.
3.	Resistor	1	To control current flow.
4.	USB Cable	2	Power Supply.
5.	ESP 32 - 3.3V	1	System on Chip (Bluetooth and WiFi module integrated).
6.	Soil Moisture Sensor- 5V	1	Measure soil moisture.
7.	IR Sensor- 5V	2	Intrusion detection.
8.	Relay - 5V	1	Used as a switch for pump.
9.	Pump - 5V	1	Used for irrigation.

Hardware Specification Cont.

ESP32

ESP32, a low-cost System on Chip (SoC) Microcontroller with integrated Wi-Fi and Bluetooth. There are many ESP32 Boards based on ESP-WROOM-32 Module available in the market. The board which we have has 30 Pins (15 pins on each side).

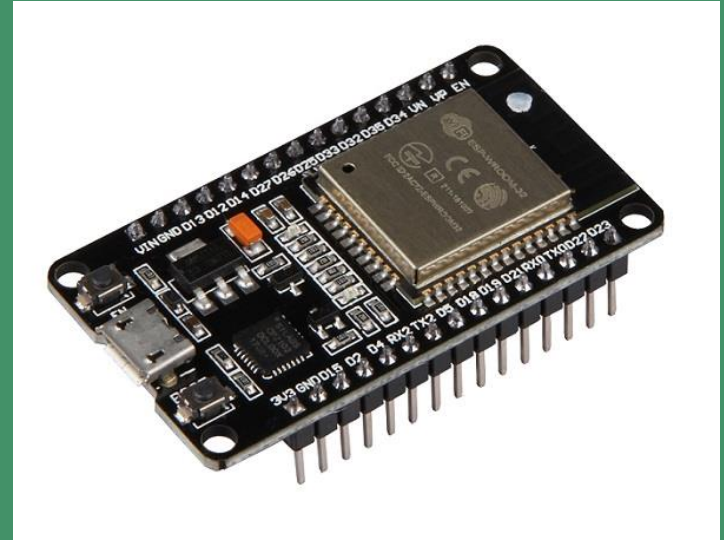


Figure: ESP32 MCU

Hardware Specification Cont.

Soil Moisture Sensor

The soil moisture sensor module is used to detect the moisture of the soil. It measures the volumetric content of water inside the soil and gives us the moisture level as output.

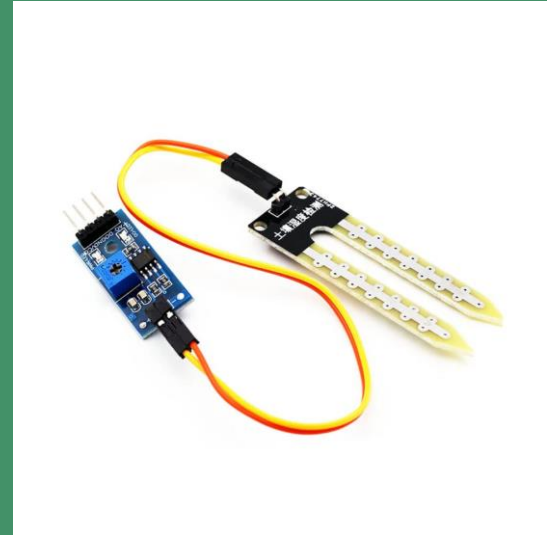


Figure: Soil Moisture Sensor Module

Hardware Specification Cont.

IR Sensor

An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion.

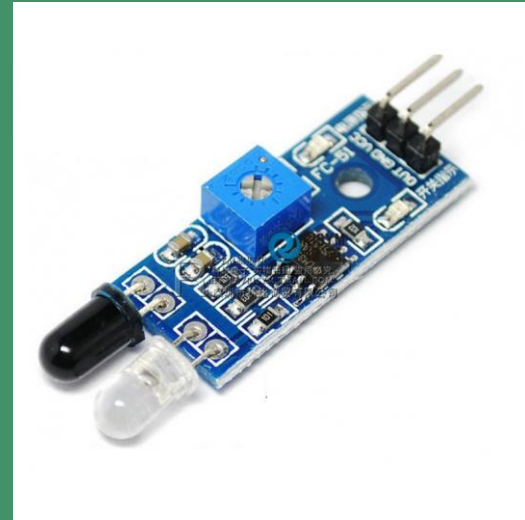


Figure: IR Sensor Module

Hardware Specification Cont.

Relay

Relay is an electromechanical device that uses an electric current to open or close the contacts of a switch.

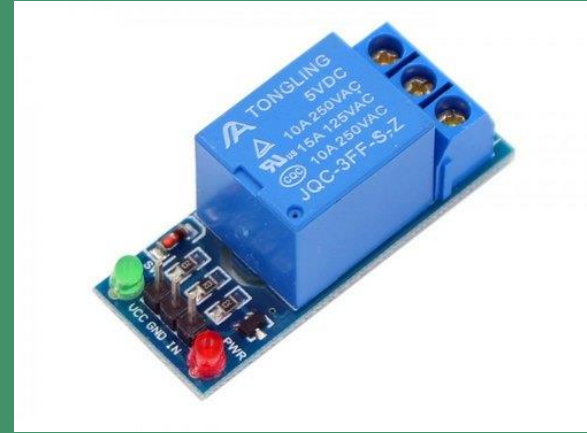


Figure: 5V Relay

Hardware Specification Cont.

Pump

It's a Low voltage water pump Using 5V voltage. It used for watering from time to time.




Figure: Micro Water Pump



Software Specification

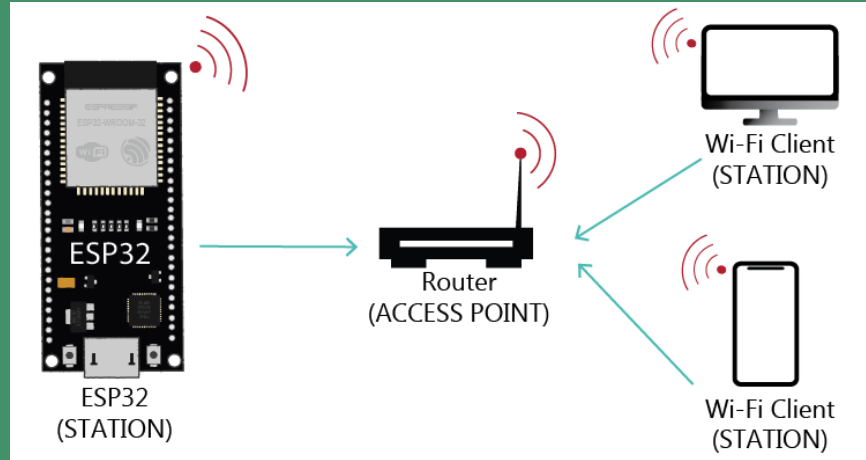


No	Code Development	Language used	Cloud Server	Mobile App
1.	Arduino IDE	Arduino C	ThingSpeak	MIT App Inventor

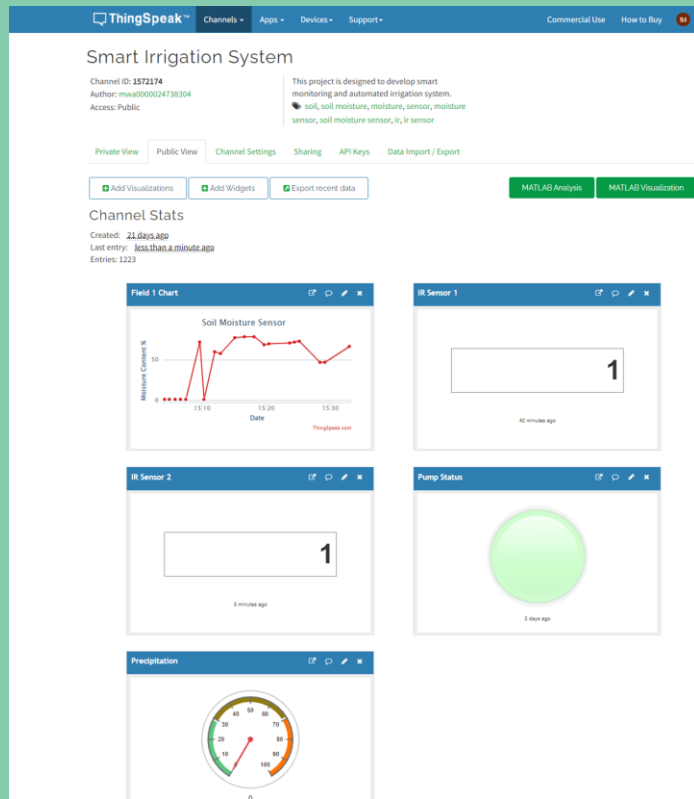


Network Connection

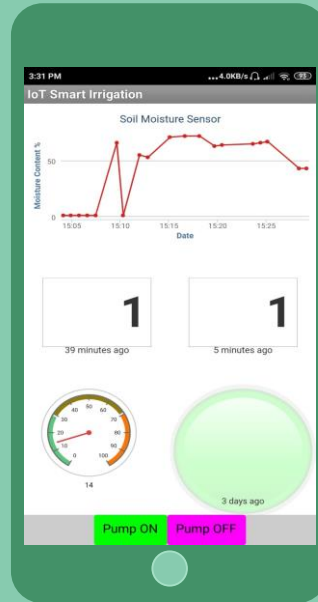
Connection with the ESP32 Wi-Fi network by using specific SSID and password.



IoT Cloud



Mobile App



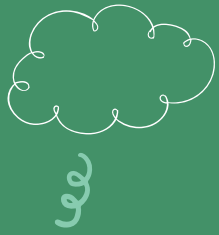
Limitations

- We can not notify the user for Intrusion detection.
- Slow data processing.
- Without WiFi we can not use this system.



Future Works

- Notification system for intrusion detection.
- Monitoring of soil moisture content
- Automatic Control system.



Conclusion



We developed a system by which users can get soil moisture values and can detect intrusion. Sensor values will store on Thingspeak. By using the app users can turn the pump on or off.



Resources

- [ESP32 Publish Sensor Readings to ThingSpeak \(easiest way\)](#)
- [ESP32 Arduino: Getting weather data from API](#)
- [ESP32 + MIT App Inventor Mini-Project Demo! | DIY Wifi RGB LED Controller - Part 1](#)
- [ESP32 + MIT App Inventor Mini-Project Demo! | DIY Wifi RGB LED Controller - Part 1](#)

Thanks!

Do you have any questions?

