

# Smart Irrigation System using IOT

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**Abstract** - There are many problems associated with the waste of huge amount of water using the wrong techniques of plants irrigation, by giving the plants too much water or the lack of observation and monitoring, which kills the plants. These problems forced the researchers and interested people in this field to develop new techniques, to discover solutions for this problems using Internet of Things. In this research, we will develop a system to monitor and fulfill the plants' exact need of water. This research significance came with the solution to the waste of huge amount of water. In addition, to improve the irrigation harvesting result. Smart irrigation contend soil moisture to measure the moisture level, the water pump works to pump the water to the plants, and the Wi-Fi model to send and retrieve the data from the server to be displayed in the mobile application.

**Keywords** – Wi-Fi mode, internet of things, soil moisture, and water pump.

## i. INTRODUCTION

Agricultural production, is one of the most important issues that concerns the whole world, especially with the expand of the productivity gap, which leads the developers and researchers to think of modern solutions to the increasing productivity by using modern technologies in the process of agriculture and production[1]. Some reports discovered that the concept of smart agriculture depends on the Internet of Things, and benefits from several items like soil moisture and Wi-Fi model. In this project, all irrigation sources will be controlled by Internet of Things technology, and a moisture sensor will be used to monitor the performance of the soil and the plant's need for water. As well as a motor to control, the flow of water around the plant, and a device will be used to control all sensors in order to reduce labor and ensure increased productivity.

## ii. RELATED WORKS

After a lengthy research in the agricultural field, many researchers found agricultural productivity is decreasing continuously due to many natural factors. That affect agriculture and the traditional methods used to irrigate agricultural products. However, by using modern technologies it is possible to avoid many of the problems facing agriculture, and to increase the amount of productivity, also to reducing human labor to reduce costs. In this project, we will focus on the aspect of smart agricultural irrigation, using modern Internet technologies, such as the Internet of Things. And from previous studies in this field. [2] Chandankumar Sahu proposed a smart irrigation system that focuses on reducing costs using Internet of Things technologies using a group of sensors and wireless devices placed in different areas in the agricultural area, and each sensor is connected with a wireless

device to connect it to the Internet and control it and its outputs. [3] Suprabha Jadhav proposed a computerized irrigation management system using sensors and wireless devices, managing water drip by RASPBERRY-Pi, and connecting the network via the Internet efficiently that helps in continuous control of the water level. Soil and temperature sensors were introduced.

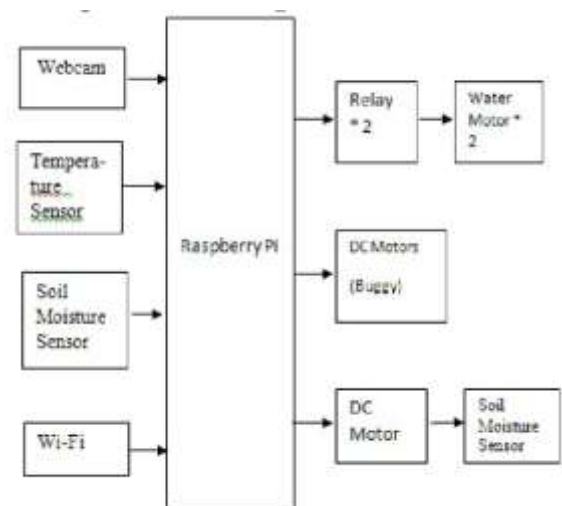


Fig 1: this figure puts the structure of the previous system.

The Vice Dean of Supporting Studies at Taif University, Dr. Hisham Al-Hamyani [4], proposed a smart project to irrigate agricultural crops and control water levels by designing a system that helps in making an appropriate decision for agricultural irrigation, by using the Internet of Things. Using a number of sensors that study the state of the plant as required, such as soil moisture, temperature, air humidity, and rain, and based on the reference numbers of the sensors, the flow of water on plants is controlled, and also several years ago an irrigation system using Internet of Things

technologies was proposed in Tunisia. The system determines the quantities of water needed by the plant by high precision sensors. A system was designed by Joithy Surish [5], which contains an electronic device used to measure the soil contents of nitrogen, phosphorous and potassium in order to ensure the purity of the soil. For the use in the agricultural field and its suitability for the production of crops of various kinds with the help of soil sensors, and the device contains several advantages including wireless connection to the Internet.

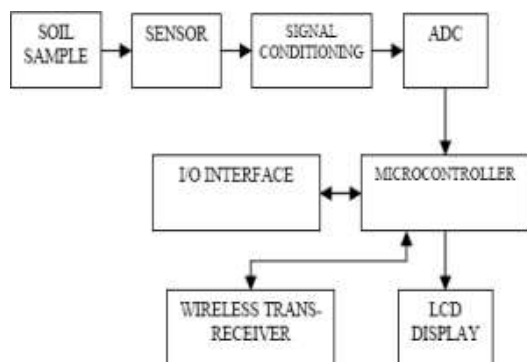
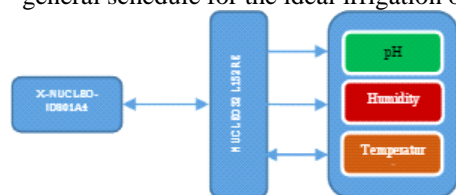


Fig 2: this figure puts the structure of the previous system.

The scientist Abdullah and Isaac William [6] proposed a system based on soil monitoring, with the aim of increasing production. Through the help programs, sensors were developed and manufactured that measure the general properties of the soil and determine a general schedule for the ideal irrigation of the soil.



The Indian scientist Ayan Kumar established this system [7] and he was interested in this project on soil monitoring and the use of electric guide motors.

### iii. SYSTEM COMPONENTS

Waste management System using Internet of Things contains two basic components:

- Smart Irrigation
- Monitoring and security

#### 1- Smart irrigation section

In this section, three components are used:

- NodeMcu controller

A device contains a central control unit that connects all components of the study and issues commands to it.

- Soil Moisture

A device that measures the degrees of soil moisture and dryness according to the electric currents that pass through its front, and the degrees are between 1024 and 0.

- Water Pump

2- In this part, the soil condition is monitored and the soil sensor data is sent to the databases, stored and sent to the user in the phone application.

### iv. SYSTEM ARCHITECTURE

Architecture of smart irrigation system is categorized into two parts are smart irrigation and monitoring and control system the following fig.4 illustrate the system architecture:

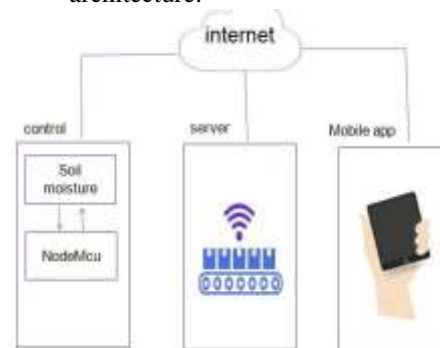


Fig.4: smart irrigation system architecture

The following fig.5 illustrates the process flow of smart irrigation system using Internet of Things:

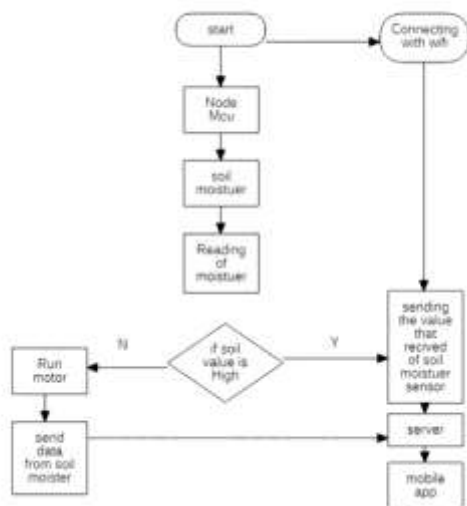


Fig.5 smart irrigation system algorithm

v. My difference

1. The mobile application is using two forms of description to the data.
2. The application contains a notification system to alert the user that the water pump are (ON or OFF) and describe the soil data.

vi. RESULT

In this system, a soil moisture sensor is used to determine the condition of the soil. It is divided into two parts: (low and high) and based on the condition of the soil, the water motor will be opened and a Wi-Fi device will send the soil condition to the server and stored, that data will be returned on the phone application when it is needed.

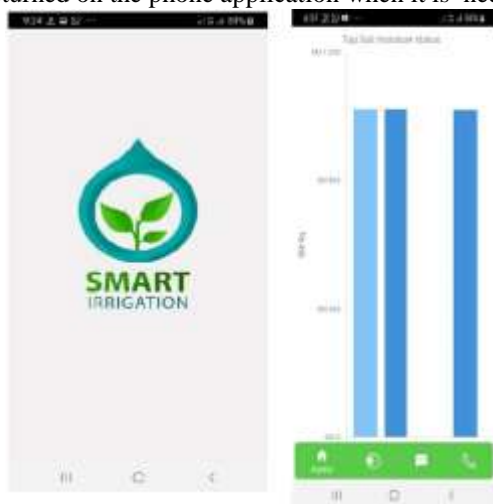


Fig 6: shows the outputs of the soil moisture sensor in charts.



Fig 7: shows the outputs of the soil moisture sensor in tables

vii. CONCLUSION AND FUTURE WORK

The Smart Irrigation System is one of the important systems in rationalizing water, stabilizing plant growth, and monitoring the condition of the plant. This system can be improved by adding:

Rain sensor to improve water consumption

- The addition of surveillance cameras that warn the user when insects are approaching or a specific disease is spreading in the plant.
- Complete the process of fertilizing plants by linking the sources that contain fertilizer to the system

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- [3] Suprabha Jadhav, Shailesh Hambarde. Automated Irrigation System using Wireless Sensor Network and Raspberry pi, International Journal of

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[4] Hisham Alhemiany Smart irrigationSystem and water control using soil monitors

[5] Surish Joithy created system to monitor the Nitrogen and Phosphorus and potassium on the soil

[6] Abdulla and Isaq William propose system to automate irrigation using pumas for water

[7] Ayane Kumar proposed system to control irrigation over plants.