IOT BASED SMART IRRIGATION MONITORING AND CONTROLLING

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Abstract: ***This project focuses on improving present agricultural practises by implementing contemporary technology to improve agriculture and modernise the conventional agricultural system. In smart agriculture, the Internet of Things (IoT) plays a key role. In terms of agriculture, the initiative will assist small-scale farmers in using smart irrigation.. Which provide greater service in less cost in irrigation and lowest man power. Because IoT sensors are capable of supplying information about their agriculture fields and making irrigation automated by the Internet of Things, smart irrigation is an empirical notion. The use of sensors to monitor temperature, humidity, pH, and water level in an agricultural field is a feature of this researchWireless transmission is used to send data from sensors to a Web server database. All of these activities will be controlled by any remote smart device or computer linked to the internet, and the operations will be subject to rain. It will be accomplished through the use of sensors, the IFTT app, the Smart Agriculture app, Wi-Fi, and a Raspberry Pi. Keywords: Internet of Things, Smart irrigation, Raspberry pi, Smart Agriculture.***

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I. INTRODUCTION

Agriculture provides a living for people all around the world, and it is critical to a country's economic success. It also gives them with a significant number of job options. Growth in the agriculture sector is essential for every country's economic prosperity. Unfortunately, many farmers continue to use old agricultural practises, which results in low crop yield. However, whenever automation has been achieved and humans have been replaced by automated machines, output has grown. Hence there is need to implement internet of things in the agriculture sector for increasing the yield. The majority of the publications discuss the usage of a wireless sensor network to collect data from various types of sensors and then transmit it. utilising wireless protocol to connect to the main cloud server The acquired data gives information on several parameters, which aids in the irrigation system's monitoring. As a result, this study provides a system that may be used to monitor real-time field data as well as control field activities, making the system simple and versatile. The major goal of this article is to use IoT technology to make irrigation smart. This paper discusses the advantages of using sensors to monitor temperature, humidity, pH, and water level in an agricultural field. Smart irrigation with smart control based on real-time field data is included. All of these procedures will be regulated by any distant smart phone or computer linked to the Internet, and they will be carried out.

II. LITERATURE REVIEW

In this work, there is a monitoring system in which data from sensors is sent to a computer through a Wi-Fi module, and information regarding water assets and soil quality is updated.

[1] It focuses on monitoring and controlling particular factors in a greenhouse agriculture field using a Bluetooth module. [2] It uses DHT11 to provide agriculture with smart access to temperature, soil moisture, and relative humidity data, and then sends the data to a cloud server for remote access. [3] Details regarding factors such as humidity and temperature readings are posted to the internet using the Arduino microcontroller and the ESP8266 Wi-Fi module at regular intervals in this study. [4] The most essential aspect of this study is that all information about the field condition is provided to the farmer's mobile application via sensors utilising a Wi-Fi Relay Module and an Arduino UNO R3 to manage the water supply automatically [5]

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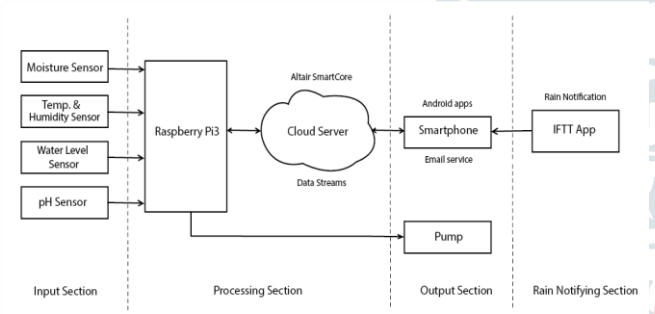
III. PROPOSED MODEL

Fig1: Proposed mode



1V. METHODOLOGY

This project is powered by a variety of sensors, which are then processed by the Raspberry Pi and the project's conditions. To begin, the moisture sensor must assess the soil's condition. The soil might be dry or wet. This sensor is close to a body of water. When the soil's dry level is high in such a condition, the pump will automatically turn on, and this information will be saved and stored in the free server Altair Smartcore. In the meantime, the user will receive information about the pump's status as well as information about the land's temperature and humidity, which will be obtained by the temperature and humidity sensor.

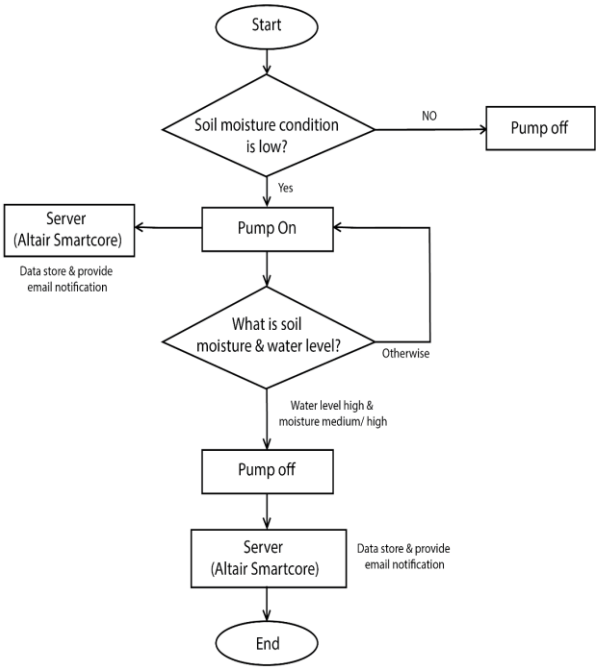


Fig2: Block diagram of this project

Second, the flow of water may be monitored using a water level sensor. This pump must be turned off when a particular amount of time has passed. When the pump is shut off, the moisture sensor's state and water level will be medium. The user's notification bar also displayed the notification of the pump being switched off. The user will receive additional temperature and humidity information as a result of using it.

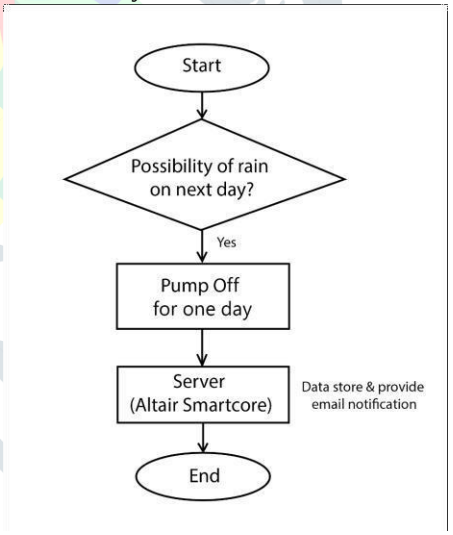


Fig3: Block diagram on rain condition

If it rains the next day, there is no need to water the field, even if the soil is quite dry, indicating that the moisture level is very low. The IFTT app is used in this scenario. This app will provide information about the weather forecast for the following day. The app will send a rain notification if there is a chance of rain the next day. We turn off the pump for one day when we receive a rain notice from the IFTT app. IFTT is a free web-based application that allows you to construct applets, which are sequences of basic conditional statements. The user's smartphone is connected to this IFTT app.

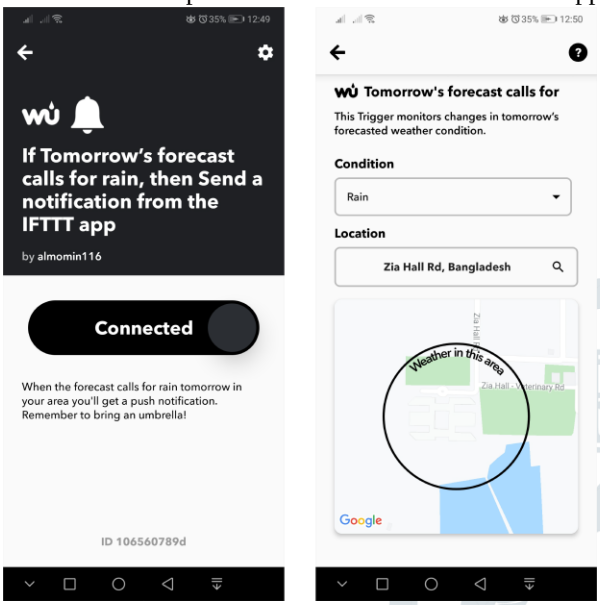


Fig4: IFTT app's connection and location setup

To gain access to the application, you must first generate an Id using your gmail account. The user must enable the rain notification connection after creating an IFTT user account. Send a notification from the IFTT app if rain is predicted for tomorrow. In the user area, he will be notified if the prediction for tomorrow calls for rain. To get user notifications, you must first find the field area. The user receives a start notification from the app server after the required connection between the app server and the user has been established. The app server sends the user a notice that reads, "Partly cloudy tomorrow!" A high of..F(..C) and a low of..F(..C) are expected (..C). It has a UV index of 0." When a user is notified that it is raining, there is no need to switch on the pump today because it will rain the next day. As a result, the user must utilise the smart agricultural app to switch off the pump for one day.

The information will be stored on the altair smartcore server with the date and time at the same time as the pump is turned off. The user will also receive an email on the status of the pump, as well as the current humidity and temperature of the land.

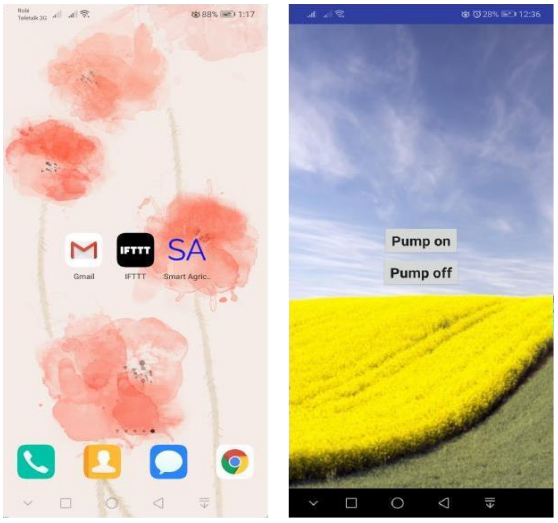


Fig5: Smart agriculture App to turn On/ Off pump

Soil pH: The pH of soil is a measurement of its acidity (sourness) or alkalinity (sweetness). pH is measured using a numerical scale. The scale ranges from 0.00 to 14.00, with 0.00 being the most acidic and 14.0 representing the most alkaline. 7.00 is a neutral number, meaning it is neither acidic nor alkaline. Several soil variables that impact plant development are influenced by soil pH, including (a) nutrient availability, (b) soil structure, (c) soil bacteria, (d) toxic substances, and (e) nutrient leaching. Because bacteria work best in the pH range of 5.5 to 7.00, soil pH has a significant impact on bacterial activity that exempts nitrogen from organic materials and some fertilisers. Plant nutrients are absorbed significantly more quickly from soils with pH values below 5.00 than from soils with pH values between 5.00 and 7.50. In soils with a pH below 5.0, aluminium may be hazardous to plant development. pH has an impact on the structure of soil, particularly clay. Clay soils are crushed and readily worked in the ideal pH range (5.5 to 7.0), but not if the pH is either highly acidic or extremely alkaline. A pH assessment will determine whether excellent plant development is possible or whether it will be necessary to change the pH level. The pH is not a fertility scale, although it does have an impact on fertiliser ingredients.

To correct soil pH: The pH sensor will detect the soil's pH level. Acidity or alkalinity may exist in the soil (for range 5.5 to 7.0). When the acidity of the soil is high in such a circumstance, the pH data is captured and kept in the free Altair Smartcore server, and the user receives an email with instructions on how to deliver Lime or Wood Ash, as well as the current pH value of his field. When the sensor detects a pH value greater than 7.0, indicating that the soil is alkaline, the value of pH is saved and stored in the free Altair Smartcore server, and the user is notified via email to provide sulphur, sphagnum peat, aluminium sulphate, iron sulphate, acidifying fertiliser, mulches, and compost in his field.

IV. RESULT AND DISCUSSION

(a) Pump turn on condition:

When the moisture level in the farm field falls below a particular threshold, the pump automatically turns on. The user receives an email including temperature and humidity date time information during the period when the pump is turned on. The

Data base:

Simply said, a relational database is one that contains connected data across numerous tables and allows you to query data from multiple tables at the same time. Altair SmartCore is a cloud-native platform with an integrated collection of services and capabilities to allow you connect your stuff to the digital world quickly and effortlessly. Altair Smart-Core, which is available as a PaaS or on-premises, can help you complete your IoT projects quicker in an easy-to-use, dependable, and highly scalable environment. This project requires a database to analyse for future work or a static view on which decisions may be made quickly. The

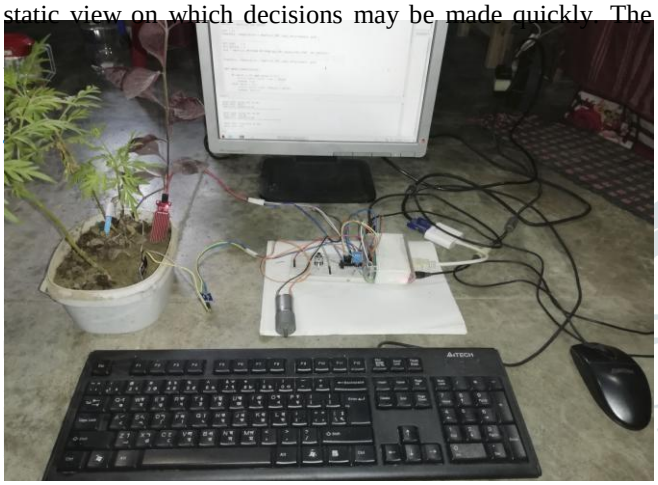


Fig10: Physical view of Smart Irrigation Monitoring & Controlling system in Agriculture

V. CONCLUSION AND FUTURE WORK

Our intention of this research work was to establish a flexible, economical, easily configurable and most importantly, a portable system which can solve our water wastage problem. It is a robust system and small in size.

Our proposed system for water level monitoring comes under the field of Internet of Things (IoT). Nowadays water level monitoring is vital in many industries too like oil and automotive etc. Using our smart system, we can analysis the usage and also detect the leakage in the tanks of these industries. In future this project can be implemented adding quality sensor and so on. That can give information about the soil which is less fertilizer andhow fertilize by using compost and which exact fertilizer has to use will be notified.

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