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SMART FARMING BASED ON IOT

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Abstract— **Agriculture plays an imperative role in the country's development. In our country, more than 72% of people depend upon farming which is one-third of the population invests in farming. Thus, the challenges and issues concerning agriculture need to be focused to hinder the country development. The only recommended solution to this issue is modernizing agriculture using smart technologies. IoT can construct agricultural and farming processes more efficient by tumbling human intervention through automation. In agriculture, irrigation is one of the processes which support crop production by supplying needed water to the soil. The irrigation methods involve a lot of time and effort in farming. A Sensor-based automated irrigation system provides a promising solution to manage agricultural activity. This research article provides a vast study on the irrigation system in smart agriculture.as agriculture is the backbone of Indian economy; it deserves to be modernized. To overcome backwardness of traditional methods of agriculture and to enhance the crop production, to avoid the risk of damaging crops, and to do efficient use of water resources, the latest technology of Internet of things (IoT) is playing a crucial role nowadays. So, this paper "smart irrigation system" is proposed where the soil sensor is used to collect large number of real-time data from the agricultural fields, this includes development of a system which can monitor temperature, humidity, moisture and even the movement of animals which may destroy the crops in agricultural field through sensors using Arduino board and in case of any discrepancy send a SMS notification as well as a notification on the application developed for the same to the farmer's smartphone using Wi-Fi/3G/4G. The sensors interact with each other through Internet connection. The data collected from the sensors sent to the Web server using wireless sensor network. IoT framework analyzes and processes the sensed data. Then, notifications are sent to the farmer's smartphone application periodically. The farmer can track changes in soil moisture. In this way, unnecessary wastage of water can be avoided. This paper discusses the various experiments done in this context and a comparatively low-cost system module with sensors and wireless networks for modernized irrigation is represented.**

Index Terms— **Smart irrigation - Internet of things - Arduino - Wireless sensor network – Sensors.**

1. LITERATURE SURVEY

Agriculture is the main source of food production in our country. In India, agriculture contributes 18% of the country's Gross Domestic Product (GDP) which employs more than half of the total population. The Indian government has stressed and highlighted the need of innovations to be in above mentioned criteria in agriculture, thus seeks an

indication of technology exposure and innovative implementation practices to enhance the productivity. **Smart farming** based on **IoT** technologies enables growers and farmers to reduce waste and enhance productivity ranging from the quantity of fertilizer utilized to the number of journeys the **farm** vehicles have made, and enabling efficient utilization of resources such as water, electricity, etc. Relative humidity is the ratio of actual moisture in the air to the highest amount of moisture that can be held at that air temperature. Irrigation is the fundamental need of agriculture, there are three classic irrigation methods channel irrigation, sprinkler irrigation and Drip Irrigation according to the need of crops these three methods are being used. Sensors are used to collect information from a physical environment. For implementation of wireless communication, industrial areas are necessary because of inaccessibility to remote location, to transmit the information gathered by the sensors and controlling them is not possible every time from a remote location.

Internet Of Things (IoT)is a shared network of objects which can interact with each other provided the Internet connection. IoT plays an important role in agriculture industry which can feed 9.6 billion people on the Earth by 2050. Smart Agriculture helps to reduce wastage, effective usage of fertilizer and thereby increase the crop yield. In this work, a system is developed to monitor crop-field using sensors (soil moisture, temperature, humidity, Light) and automate the irrigation system. The data from sensors are sent to Web server database using wireless transmission. This system will be more useful in areas where water is in scarce. This system is 92% more efficient than the conventional approach.

Climate changes and rainfall has been erratic over decade. Due to this, climate-smart methods called smart agriculture is adopted by many farmers. In the existing system, village farmers may have planted the same crop for centuries, but over period, weather patterns and soil conditions and epidemics of pests and disease have been changed. By using the proposed system approach, which senses the local agricultural parameters, identify the location of sensor, transfer the data crop fields and crop monitoring.

Recent researches hypothetically shown the potential of Internet of Things (IoT) to change major industries for a better world, which includes its impact towards the agriculture industry. Farming industry must grasp IoT to feed 9.6 billion of global population by 2050. Challenges such as extreme weather conditions and rising climate change shall be overcome to fulfil the demand for food. Smart farming based on IoT technologies will enable growers and farmers to reduce waste and enhance productivity ranging from the quantity of fertilizer utilized. In this paper, the hardware and software of the IoT for smart farming will be presented besides sharing the successful results.

Digital transformation of rural areas, these technologies can be leveraged to remotely monitor soil moisture, crop growth and take preventive measures to detect crop damages and threats to provide new insights and improved decision making there by enabling farmers to perform "Smart Agriculture". A solar powered remote management and automation system for agricultural activities through wireless sensors and Internet of Things comprising, to connect with a user device and accessed through the internet network. The data collection unit comprises a set of wireless sensors for sensing agricultural activities and collecting data related to agricultural parameters. This paper is a study and proposal paper which discusses the factors and studies that lead towards this patent pending invention.

Active soil moisture monitoring is an important consideration in irrigation water management. A permanent and readily accessible record of changes in soil moisture can be used to improve future water management decision-making. Similarly, accessing stored soil moisture data in near-real-time is also essential for making timely farming and management decisions, such as where, when, and how much irrigation to apply. Access to reliable communication systems and delivery of real-time data can be affected by its availability near production fields. These IoT systems were designed using low-cost hardware components and open-source software to transmit soil moisture data sensors.

2. PROPOSED SYSTEM

This smart agriculture using IOT system is powered by Arduino, it consists of Temperature sensor, Moisture sensor, water level sensor, DC motor and GPRS module. When the IOT based agriculture monitoring system starts it checks the water level, humidity and moisture level. It sends SMS alert on the phone about the levels. Sensors sense the level of water if it goes down, it automatically starts the water pump. If the temperature goes above the level, fan starts. This all is displayed on the LCD display module. This all is also seen in IOT where it shows information of Humidity, Moisture and water level with date and time, based on per minute. Temperature can be set on a particular level; it is based on the type crops cultivated. If we want to close the water forcefully on IOT there is button given from where water pump can be forcefully stopped. From the control room, data is uploaded into the cloud using ESP8266 Wi-Fi module and after analyzing data, it is sent in the mobile app.

1) Sensor data acquisition: - The sensor is interface with Arduino Uno such as DHT11 Temperature, Humidity, Soil moisture and Rain detection sensor is used.

2) Wireless data transmission: - The data acquired from sensors are transmitted to the web server using wireless transmission (WIFI module ESP8266).

3) Data processing and Decision making: - The data processing is the task of checking various sensors data received from the field with the already fixed threshold values. The motor will be switched ON automatically if the soil moisture value falls below the threshold and vice-versa. The farmer can even switch ON the Motor from mobile using mobile application.

4) Automation and irrigation system: - The irrigation system automated once the control received from the web application or mobile application. The relays are used to pass control form web application to the electrical switches using Arduino microcontroller. The circuits with low power signal can be controlled using relay.

5) Web application: - The web application will be designed to monitor the field and crops from anywhere using internet connection. To control the Arduino processing IDE is used, the webpage can be communicated using the processing IDE.

6) Mobile Application: - The mobile application will be developed in android. The mobile application helps to monitor a controlled filed from anywhere.

MODEL WEBSITE

WEBLINK: https://ucs19426.wixsite.com/rmdec

3. APPENDIX

```
#include <ESP8266WiFi.h>
#include <AdafruitIO.h>
#include <Adafruit_MQTT.h>
#include <ArduinoHttpClient.h>
// These are used to set the direction of the bridge driver.
#define m1 D0 //IN1
#define m2 D1 //IN2
const int fire=D5;
const int trace=D6;
AdafruitIO_Feed *command = io.feed("automation"); //
Set up the 'command' feed
AdafruitIO_Feed *analog1 = io.feed("moisture");
AdafruitIO_Feed *analog2 = io.feed("animal");
int firestatus=1,tracestatus=1,lightstatus=1;
// SETUP
void setup()
{
  // Configure pins
  pinMode(fire, INPUT_PULLUP);
  pinMode(trace, INPUT_PULLUP);
  pinMode(m1, OUTPUT);
  pinMode(m2, OUTPUT);
  digitalWrite(m2,LOW);
  digitalWrite(m1,LOW);

  Serial.begin(9600);
  Serial.print("Connecting to Adafruit IO");
  io.connect();
  // set up a message handler for the 'command' feed.
  // the handleMessage function (defined below)
  // will be called whenever a message is
  // received from adafruit io.
```

```
  command->onMessage(handleMessage);
  while(io.status() < AIO_CONNECTED) {
    Serial.print(".");
    delay(50);
  }
  // we are connected
  Serial.println();
  Serial.println(io.statusText());
  analog1->save(0);
 analog2->save(0);
}
// MAIN CODE
void loop()
{
   analog1->save(0);
   analog2->save(0);
  io.run();
  firestatus=digitalRead(fire);
  tracestatus=digitalRead(trace);
  delay(500);
  if(firestatus==LOW)

  {
      analog1->save(100);
   delay(5000);
  }
      if(tracestatus==LOW)
  {
       analog2->save(100);
       digitalWrite(m2,HIGH);

  delay(5000);
   digitalWrite(m2,LOW);
    }
}
// this part of the code runs whenever there's a new
message on Adafruit.io feed
void handleMessage(AdafruitIO_Data *data) {
  String commandStr = data->toString(); // store the
incoming commands in a string
  // received message
  Serial.print("received <- ");
  Serial.println(commandStr);
delay(3000);
  if (commandStr.equalsIgnoreCase(" on")){
    Serial.println("pump on");
```

4. OUTPUTS

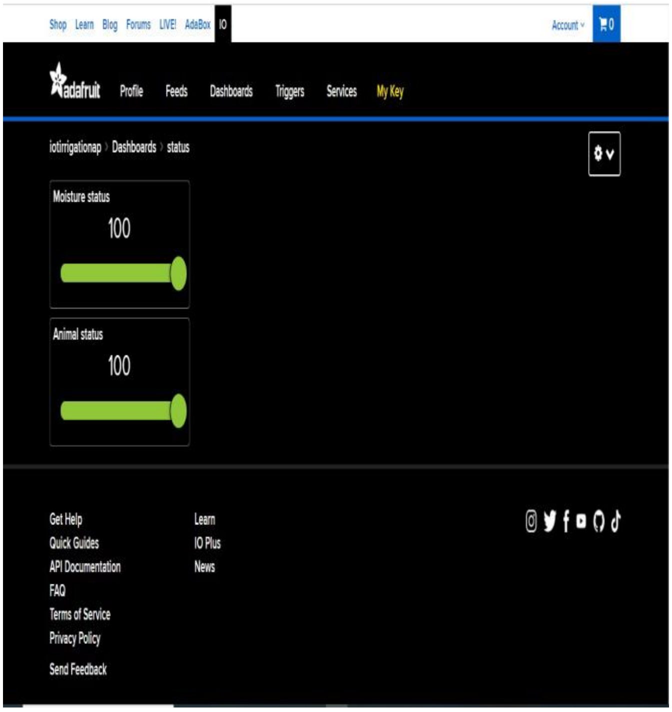


Figure 4.1 Output Screen

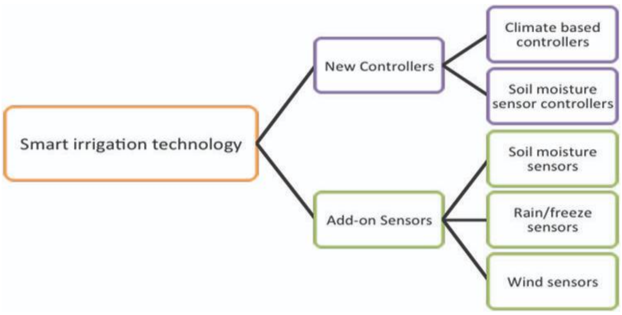
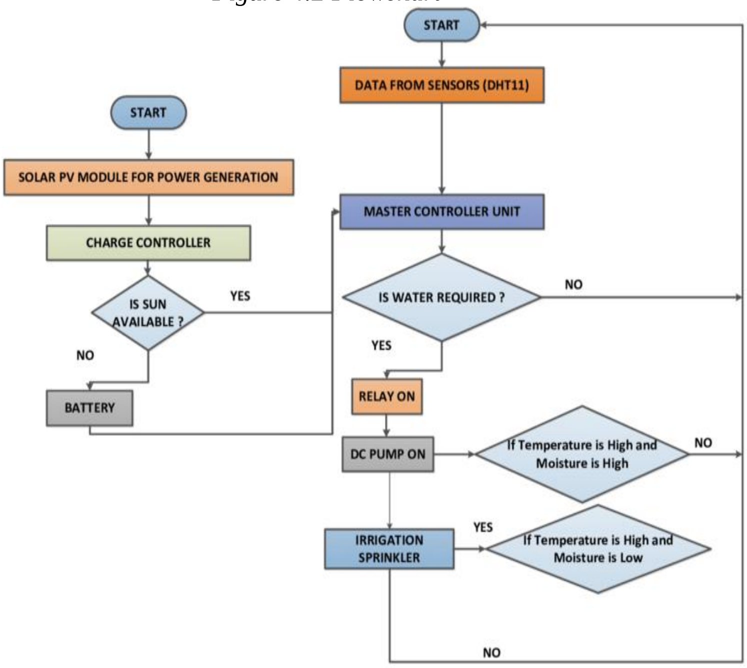


Figure 4.2 Flowchart



VIII. CONCLUSION

In this paper, we suggested an Internet of Things-based real-time automated dynamic and manual watering system for heterogeneous crop fields. The AgriSens keeps irrigation running dynamically.

As well as considering manual irrigation remotely depending on the inputs of the farmer or expert, treatments are based on the needs of various periods of a crop's life cycle. From the experimental results, it is clear that the AgriSens is advantageous for effective water management of heterogeneous crops, while improving network performance and system functionalities over the current systems. This improvement in yield productivity over the conventional manual irrigation method is at most 10.21%.
The impact of weather parameters including wind, humidity, temperature, and UV rays on the yield will be examined in the future utilising machine learning.

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