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Digital Krushi Pal

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Abstract

Recent century is full of technology; none field can't be remain without use of technology. Agriculture is one of those fields. More than 42% of the total population in the world has chosen agriculture as their primary occupation. The existing system of farming is manual. The farmers have to do many works, such of them are also not good for their health like spraying fertilizers can causes cancer and skin diseases.

Smart IOT based technologies can be employed for the efficient farming. A smart IOT based Digital Krushi Pal project is proposed for this purpose. This system utilizes different types of sensors for collecting the data and that data can be viewed on android application or web browser.

Keywords: *Automation, Sensors, IoT, Temperature, Humidity, Soil moisture.*

INTRODUCTION

The main motive for developing autonomous agriculture robot is decreasing labor force. The technologies like Internet of Things (IoT) are used for automation that has improved communication and self monitoring [4].

Smart IOT based technologies can be employeed for the efficient farming [6]. A smart IOT based Digital Krushi Pal project is proposed for this purpose. This system utilizes temperature, humidity, soil moisture sensors to updating these values to the farmer [11].

Cloud computing is an internet based computing [6]. Firebase and Google cloud shares 3 products; that are cloud fire store, cloud function and cloud storage. These are exist in google cloud and simply exposed for client side developers via firebase. In our project, cloud computing is used store the data of temperature which is collected by the Temperature and Humidity sensor (DHT11).

Literature Survey for Problem Identification

P.Senthil surveyed that, monitoring the soil moisture in farm is an important activity. A human cannot measure the soil moisture continuously. Thus the robot is used to monitor the soil moisture. The robot consists of a sensor for monitoring the soil moisture. And whenever the soil will dry the robot will go there and provide water to it. It can be helpful for efficient farming [1].

Neha Kaushik surveyed that the agriculture field needs innovative technologies to increase effieciency in farming and to decrease the work load on farmers. Some robotics projects have been done before which helps in ploughing and seeding activities of agriculture. Some other concepts like flying robot is also implemented and the use of drones which helps in spraying pesticide. The main aim of such robots is efficient utilization of resources and reduces workload on farmers [2].

Ashwini Parepppady surveyed that, in today's century the smart farming is using the robots. The changes in agriculture field have made man to replace with machines. The automation in farming mainly saves the time and increases productivity of crops [3].

On Agri Farming site, the information about agribot or agbot is given. Agribot is an autonomous robot helpful in farming. Aim to reduce labour in farming and improves crop efficiency. This robot can be connected to wireless sensors and by using the drones which will collect large amount of data [4].

Kavita Zole surveyed an agricultural robot which is based on electronic and mechanical (Mechatronics) platform that performs agricultural activities using advance technologies. This robot can perform operations like automatic ploughing and seed dispensing. This robot is an electromechanical vehicle which is steered by DC motor to drive wheels [5].

Akshata Patil surveyed that, the agriculture plays an important role in the economy of every nation. India is country of agriculture and it is a back bone of Indian economy. Irrigation is an important activity in the agriculture. There are main 2 things i.e. when and how much water. The automation in irrigation will make farmer's work much easier and it also controls the wastage of water [6].

The above article says that, the automation that has been implemented in the field of agriculture is not so efficient and it is too complex and is difficult to implement. But our project overcomes this all. As it works efficiently as compared to humans and it can be implemented easily. It performs all the agriculture related tasks such as providing water to crops, fertilizing the crops, checking humidity, temperature and moisture of the soil. It is an automatic robot. So it works itself without any human intervention. So basically our project reduces the workload on the farmers. And the efficient farming can be done [7].

David Sanz surveyed that, goal of automation in agriculture is to maximize the productivity of crops and minimize the use of resources. Many robots are used to perform different activities of agriculture like sowing seeds, harvesting, ploughing, etc. But this robot is used to monitor the temperature and humidity in agriculture field using different sensors [8].

Kushagra Agrawal surveyed that in India, all the agriculture activities can be done using modern technologies like Internet of Things (IoT). This type of technology uses different types of sensors for collecting information like fertility of the soil, weather, growth of crops, temperature, rainfall and information regarding plantation of seeds, etc. which is helpful and efficient farming [9].

Dinesh Varma Kanumuri surveyed that, now a days, agriculture field is developing with the help of new technology and it became data centered and effiecient. This makes drastical changes in existing farming practices which creates new opportunities and challenges. In this article, the author explained application of IoT in farming using wireless sensors [10].

P.Baylou presented the art of agriculture robots. The agricultural robots mainly consist of sensors, microcontrollers and computers. The essential functions of this robot are mobility and task execution [11].

Mohammad Behmanesh surveyed that agriculture is an important field. As the some activties of agriculture are creating issues for humankind, the robotics technology is being used to overcome these issues. Robots are becoming useful for effiecient farming. Thses robots are mainly categorized into 4 main types; crop disease detector robots, harvesting robots, weed detector robots and path navigator robots [12].

Patrick M. Piper and Jacob S. Vogel et al designed an autonomous soil monitoring rover to expedite data collection This rover automatically navigate through a field and also avoids the obstacles. It collects the data of soil moisture and temperature and this data can be viewed by the farmer. So it will help to increase efficiency in farming. The hydra probe II used to sense the soil moisture and temperature. GPS is used to navigate through the field.

Shreyash Kulkarni has created an Agribot. It is a robot designed for agricultural purposes. This Bot can perform basic functions like ploughing, sowing, watering, fertilizing, pesticides and closing the dig. It also supports manual as well as auto control. The entire process is controlled by Arduino microcontroller. Seeding is one of the first steps in farming. Sunitha. M has carried out seeding robotics for the irrigation system. There are major problems in Indian farming such as accessibility of labours, lack of water, rising of input costs, etc. to tackle these problems the automation should be applied in agriculture field.

Objective & Scope

Objective

To automate the manual tasks such as the providing water to Crop, collecting Temperature and Humidity fertilizing the crops.

Scope

Continuous checking of temperature and humidity, provocation of accurate level of water and fertilizing each crop with equal quantity is automatically done by our robot.

System Design

Digital Krushi Pal is an automatic agriculture robot. It consists of ultrasonic sensor which is used to detect the obstacle, DHT11 sensor (Digital Humidity and Temperature Sensor) which is used to measure the values of temperature and humidity, soil moisture sensor which is uesd to measure the value of moisture in the soil [1] [8]. The collected value of temperature by DHT11 sensor is get stored

on cloud and can be viewed on an android application [6].

The data that we are going to collect is values of temperature, humidity and soil moisture. Temperature and humidity is being collected by DHT11 sensor and moisture of soil is being collected by soil moisture sensor which are connected to arduino microcontroller (Node MCU).The value of temperature get stored on cloud.

In this system the soil moisture sensor will measure the soil mositure. And depending on the value of soil moisture, the water will be provided to each plant by water pump. If the moisture is low then and then it will provide the water otherwise (If the moisture is ok) it will not provide the water [6].

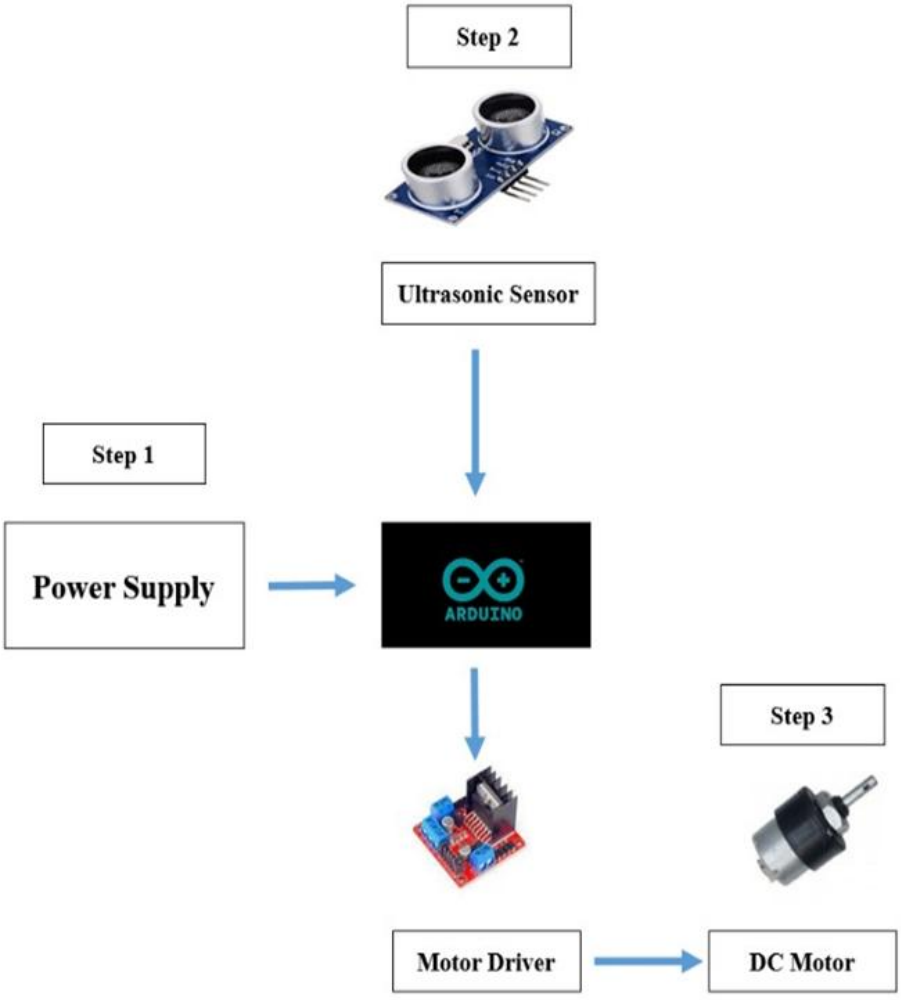

Fig1. Block Diagram for Robot

Step 1: Power Supply to Arduino

It supplies power to arduino.

Step 2: Ultrasonic Sensor

It detects the obstacle and distance from the obstacle and send this to arduino.

Step 3: Motor Driver

Motor driver rotates the DC motor.

Step 4: DC Motor

DC motor rotates the wheels of robot.

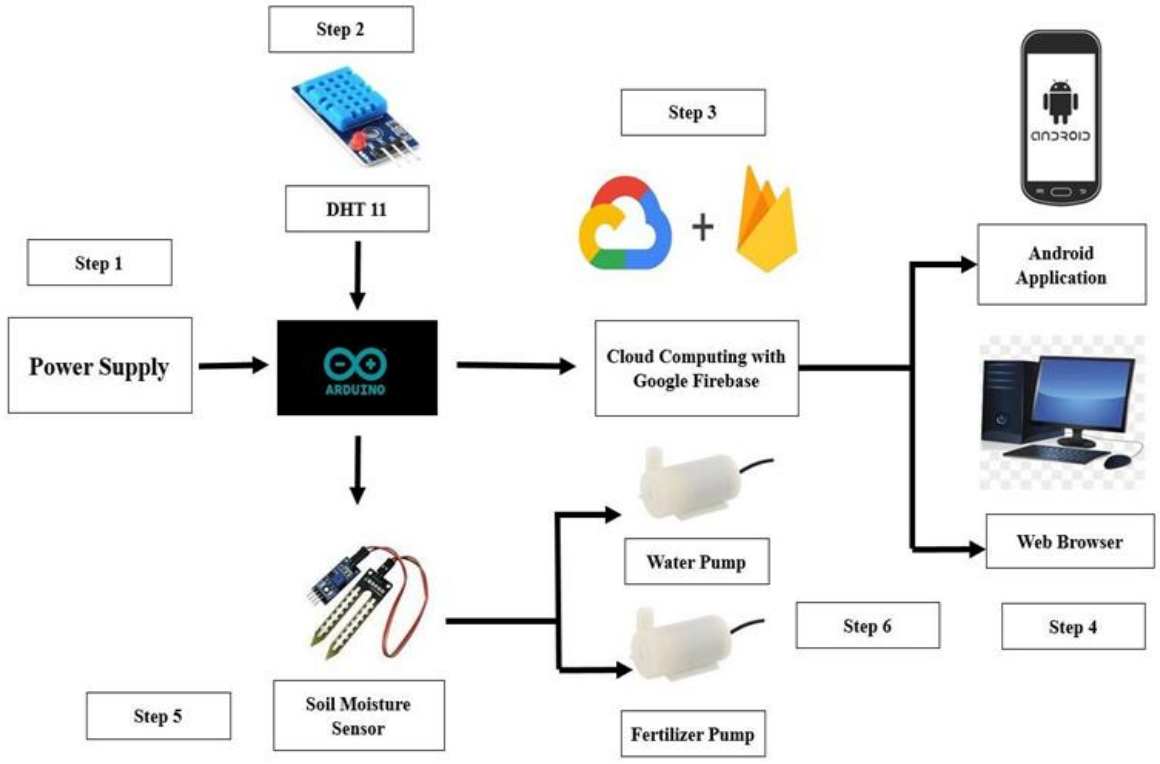

Fig2. Block Diagram for Sensors.

1. **Step 1: Power Supply to Arduino**
   It supplies power to arduino.

2. **Step 2: DHT 11**
   It detects the temperature and humidity and sends to the arduino.

3. **Step 3: Cloud Computing with GOOGLE FIREBASE**
   It stores the data comingfrom arduino.

4. **Step 4: Android Application or Web Browser**
   Cloud sends the collected data to Android application or web browser.

5. **Step 5: Soil Moisture Sensor**
   It detects the moisture in the soil.

6. **Step 6: Water Pump**
   According to soil moisture it supplies water to the crops.

7. **Step 7: Fertilizer Pump**
   It provides fertilizer to crops as nedded.

RESULTS

Steps	Description	Expected Results	Actual Results	Status
Step 1	Robot moved according to obstacle avoidance.	Successfully implemented obstacle avoidance robot.	Successfully implemented obstacle avoidance robot.	PASS
Step 2	Read data from DHT and soil moisture sensor.	Successfully read.	Successfully read.	PASS
Step 3	Providing water according to soil moisture sensor to crops.	Successfully implementing irrigation system.	Successfully implemented irrigation system.	PASS
Step 4	Uploading sensor value to cloud.	Successfully uploading.	Successfully uploading.	PASS
Step 5	Receiving sensor value on Android Application via Cloud Service.	Successfully Receiving.	Successfully Receiving.	PASS
Step 6	Showing graph on android application according to sensor value received via cloud service.	Successfully showing.	Its showing.	PASS

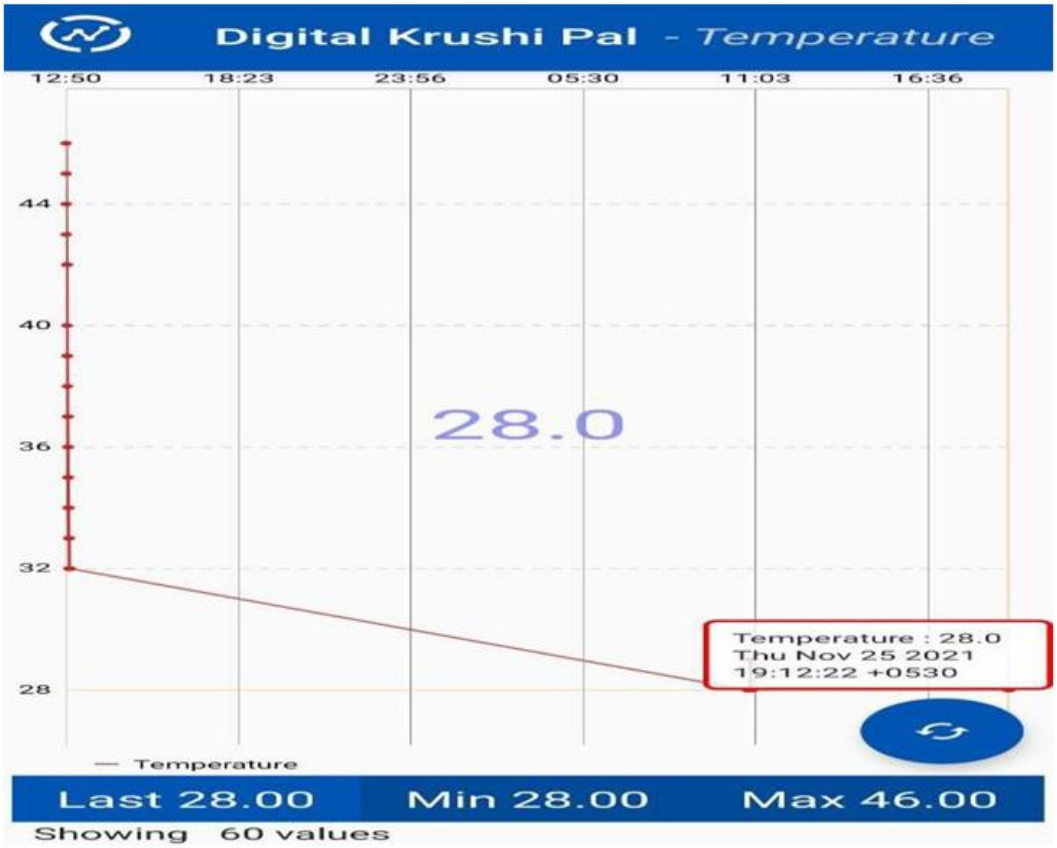

Fig. Chart View of Temperature

Applications

1. This robot can monitor the crops more efficiently than a human.

2. With the help of this robot, farming activities can be done smartly.

3. It will make digitalization in agriculture sectors.

4. It will make the farm more profitable.

CONCLUSION

This paper describes information about an automatic agricultural robot "Digital Krushi Pal". It helps the farmers in the real time monitoring of crops and also work load on the farmers is decreased and health problems also. The other problems associated with farm can probably be overcome with this technology. The use of robots in the field of agriculture has enhanced productivity as they perform all the tasks more efficiently and more consistent level of quality than humans.

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