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MULTIPURPOSE AGRICULTURAL ROBOT

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Abstract: In the agriculture field, the farmers are facing so many problems in production, such as grass cutting, seed sowing, pesticides Spraying, water pumping, temperature and soil moisture sensing. Basically, farmers use manually operated devices such as grass cutters and water pumping devices that consume more time and that produce pollution due to burning of gas and petrol. For solving this type of problem, automation and renewable energy-based projects are very helpful for farmers in agriculture fields. For controlling the various functions of robot, use Arduino UNO microcontroller and also use moisture and temperature sensor respectively for detecting the temperature and moisture of, This is a fully automated and renewable energy-based project.

Keywords—Agriculture, robot, seed sowing, solar powered, soil moisture detection, humidity detection, electricity generation.

INTRODUTION:

Majority of the Indian people's occupation is agriculture. India provides second largest output in agricultural field. Indian agriculture is struggling with issues such as availability of skilled laborers, lack of water resources, rising labor costs and crop monitoring. In agriculture, automation technologies are used to solve these issues. Automation in agriculture helps farmers to reduce their efforts and increases production, which in turn increases the net profit. In this project, a robot is developed an efficient way to perform the functions autonomously. The proposed plan is to implement the Robot to perform the functions such as seed sowing, soil moisture sensing, and water supply. Some related work carried out so far is described below.

The robot is powered by a solar panel and controlled by a Bluetooth / Android app, which sends signals to the robot to control the necessary functions and movements. Solar Panel is generating electricity by the conversion of sunlight. send and receive signals from the microcontroller with the help of HC-05 Bluetooth module.

The robot reduces human efforts by spreading the seeds at equal intervals. The seeds are dropped from the seed chamber by using the fly wheel mechanism. The fly wheel mechanism is used because it reduces seed waste.

The sensors are operating and controlling the field by the use of IoT. With the help of IoT agricultural fields can be monitored from anywhere. The data of Sensor is shared with farmers via the thing speak Android app.

Thing Speak is an IoT analytics platform service that allow you to aggregate, visualize and analyze live data streams in the cloud . You can send data to Thing Speak from your devices, create instant visualization of live data, and send alert

A solar panel supplied power in the entire system. When the system is on resting mode, it Starte to charge using solar energy.

The grass cutter and all of these machines are available as separate machines, which take up more space and cost more to purchase. The main advantage of our project is that it requires less space, money, and manpower.

This robot will perform different operations such as seed sowing, pesticide spraying, water pumping, electricity generating and measuring the soil moisture and humidity. And also, this robot can move in any direction. The sensor continuously updated into thing speak app.

Electricity has been one of the most common problems in the rural areas /agricultural field, during the water pumping hydro turbine set on the head of water pump. So that we can generate electricity which utilize in other forms, and we can also store it in batteries.

OJECTIVE:

The objective of multipurpose solar based agriculture robot monitoring the agricultural fields is to, seed sowing, irrigation system ,temperature and soil moisture, also reduce manpower and crop production cost. While working through this robot we can increase production of crops by proper monitoring and reduce time consumption . The implementation of this robot a multitude of benefits, including enhanced production, irrigation system and soil monitoring system. As technology continues to advance, the project's future implications extend to the development of voice command control, ploughing and fruit plucking.

SYSTEM OVERVIEW OF MULTIPURPOSE AGRICULTURAL ROBOT:

The block diagram of the system consists of Arduino Uno, Solar Panel, Charging circuit, Relay module, water pump, hydro turbine, soil moisture sensor, temperature sensor, ultrasonic sensor, and Wi-Fi module. Robots are powered by batteries. Battery is connected to solar panel which is used to charge the battery with the help of solar energy.

The robot base is designed by using the Rocker bogie mechanism. The grass cutting operation is performed using 1000 RPM (Revolutions Per Minute) DC motor with sharp blades.

The operations like Grass cutting, Seed sowing, Pesticide spraying, and water pump can be operated through the ON and OFF relay channel.

Arduino Uno:

In the Arduino Uno has 6 analog 14 digital pins and pins. by using both digital and analog pins Sensor data is collected. Arduino Uno is interconnected with sensors. The operational voltage of Arduino Uno is 5V. Fig.1 shows the image of Arduino Uno used in the project.

Fig.1 Arduino

Relay Channel:

Relay is a type of electronic switch that is used to turn on and off high-voltage equipment. In the relay channel, ordinarily open, common, and normally closed are the output pins and also have Ground, voltage common collector, and active high pins are the inputs. The relay channel shown in fig.2

Fig.2 Relay

Solar Panel:

The solar cells are known as photovoltaic (PV) cells and converter that convert sunlight to electrical energy.In this project 10W solar panel will be used, shown in fig.3

Fig.3 Solar panel

BLOCK DIGRAM OF THE PROJECT:

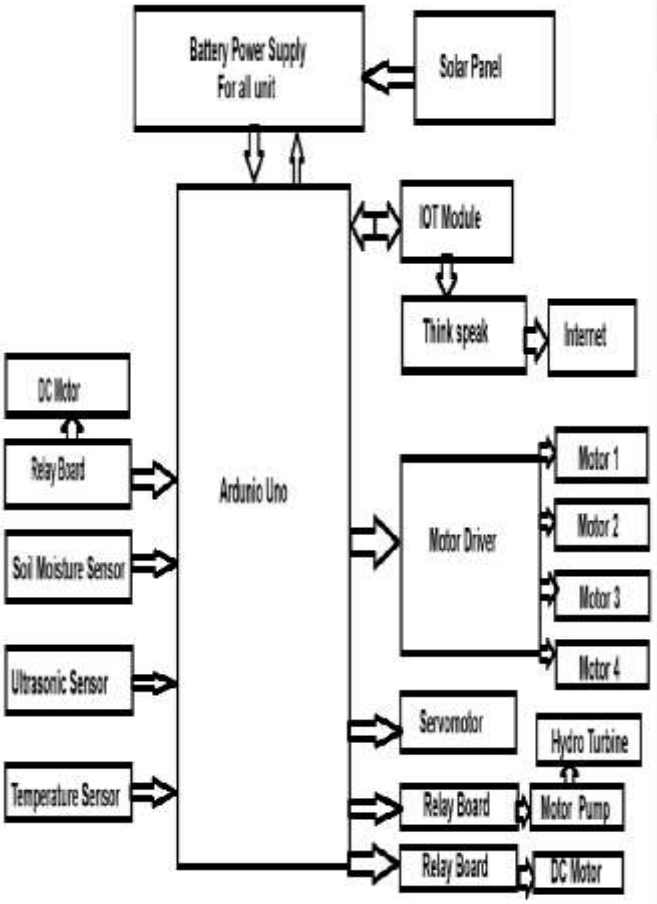

Fig. 4 Block diagram

ALGORITHM FOR ROBOT CONTROL:

The following steps describe the workflow of the Robot. The flowchart of the steps is shown in Fig.5

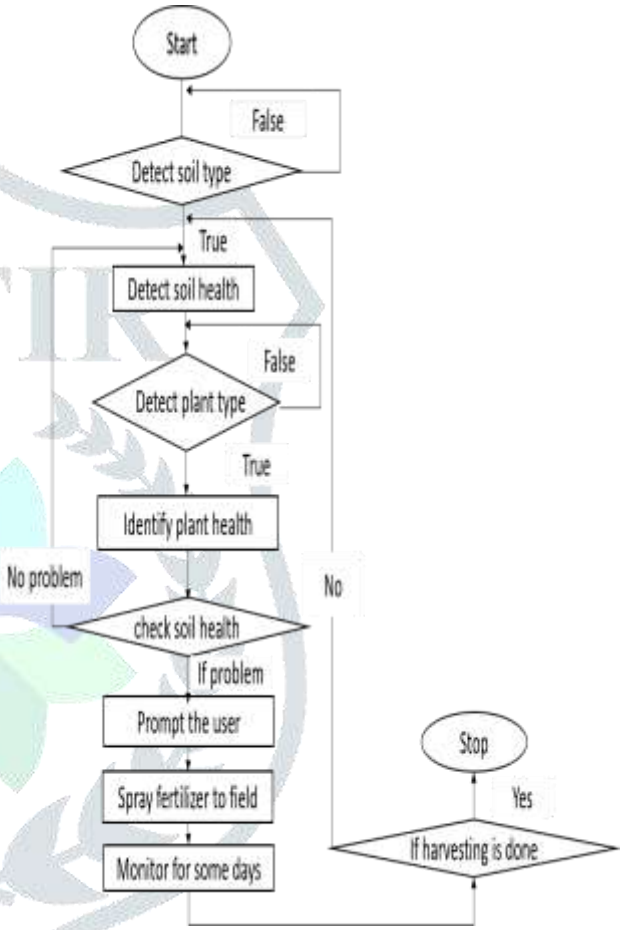

Fig.5Algoritham

HARDWARE COMPONENT USED :

1) ARDUINO UNO
2) RELAY CHANNEL
3) MOTER DRIVER
4) SEVOMOTER
5) DC MOTER
6) SOIL MOISTURE SENSORE
7) TEMPRETURE SENSOR(DHT11)
8) CUTTER BLADE
9) WATER PUMP
10) BLUETUTH MODULE
11) WHEELS
12) CONNECTING LEADS
13) 12V BATTERY
14) 10W SOLAR PANNEL

METHODOLOGY:

The Multipurpose solar based agriculture robot monitoring and field temperature detection follows a comprehensive methodology to ensure the crops production, reduce man power, consumption of time and also

production cost production. The project begins with IoT capabilities which allowing the collection real-time data and operating by remote. This robot are integrated Internet of Things (IoT) technology, enabling seamless communication between devices and the monitoring infrastructure. Additionally, the inclusion of GSM (Global System for Mobile Communications) technology facilitates monitoring, control and consumption data in real-time.The proposed project is provide real time status of soil health parameter and Temperature so that irrigated pesticide sprayed time to time. The live tracking of these parameters can be done by using IOT technology and remote control. This is cost effective in nature. Thus the authorised can access information of sensor.

RESULTS AND DISCUSSION:

These procedures are accomplished with the help of the Android app through user commands. With the use of the internet and IoT module, the user can send signals to the Arduino for doing the specific action. Using the thing speak user can access the real time data of sensors. Agricultural operations like seed sowing, grass cutting, humidity, temperature and soil moisture sensor, water pumping is performed using robots.

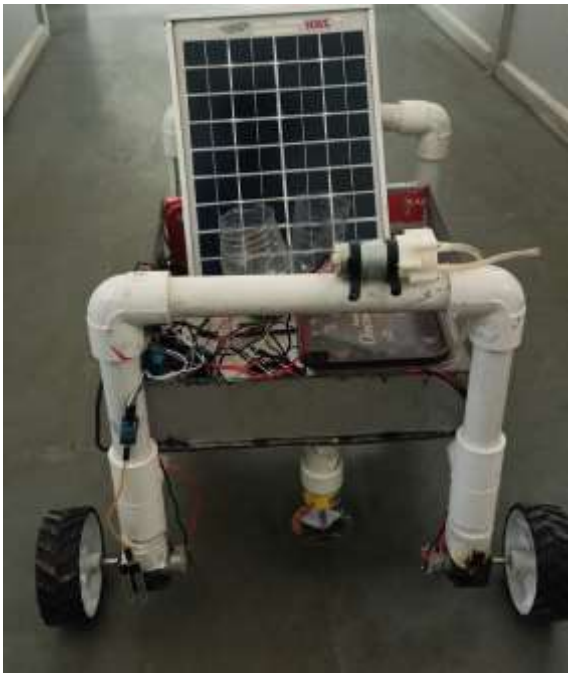

Fig.6 Project pic

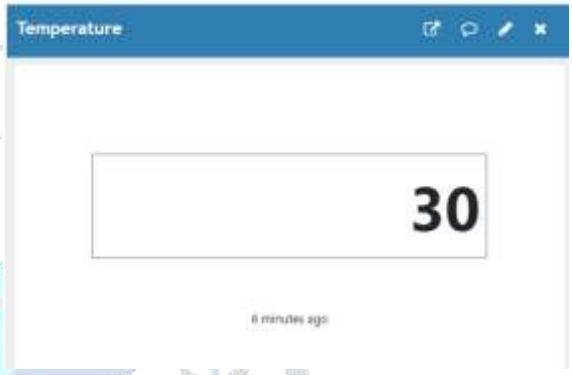

Fig.7 Temperature and chart analysis.

Fig.8 Humidity and chart analysis.

CONCLUSIONS:

A user-friendly agriculture robot can be designed and controlled remotely using IoT technology. Perform multiple tasks and increase production and profit. Solar power and electricity generation (by using water pump and the hydro turbine) will be effectively used which is an advantage for formers areas where electricity is not sufficiently available.

SCOPE FOR FUTURE WORK:

For operating and controlling the robot we can be use Voice commands. Pesticide spraying grass cutting and water pumping system can be extended automatically. operation can be made automatic.

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