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Smart Phone Operated Multipurpose Agriculture Robort

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ABSTRACT: Manycountries in Asia including are agrarian economies and most of their rural populations depend on agriculture to earn their livelihood. Aimed at increasing the productivity and reducing the labour involved, this robot is designed to execute the basic functions required to be carried out in farms. We aim to create a multitasking agriculture robot which will focus on basic work of plantation. To sow the seeds a robotic arm will dig to a precise depth with equal distance between the seeds. At bottom of robot water pump will be placed and as per the requirement water will be sprinkled. This project aims to design an agriculture robot, which helps the people to survive where it performs operations such as digging of soil, sowing of seeds, spraying water and cutting the plants. In previous projects the technique used were complicated as well as expensive.

KEYWORDS: Wi-Fi Module,Microprocessor, Arduino UNO, IP Camera, L293D-R1 Motor Driver.

I. INTRODUCTION

In India generally, the traditional seed sowing methods includes the use of animal drawn funnel pipes driller or drilling using tractor. The emphasis in the development of autonomous Field Robots is currently on speed, energy efficiency, sensors for guidance accuracy and enabling technologies such as wireless communication and GPS. Earlier method requires labor and a very time and energy consuming.Where as in tractor based drilling operators of such power units are exposed to high level of noise and vibration, which are detrimental to health and work performance. In olden days technology was not developed that much. So, they were seeding by hand. But nowadays technology is developed. By using robot technology, one can sit in a cool place and can do seeding by monitoring the robot motion. So now it's not necessary to do seeding insunlight.In recent years, robotics in agriculture sector with its implementation based on precision agriculture concept is the newly emerging technology. Designing of such robots is modeled based on particular approach and certain considerations of agriculture environment in which it is going to work. The main reason behind automation of farming processes are saving the time and energy required for performing repetitive farming tasks and increasing the productivity of yield by treating every crop individually using precision farming concept.

[1]Agribot is a robot designed for agricultural purpose. It is designed to minimize the labor of farmers in addition to increasing the speed and accuracy of the work. It performs the elementary functions involved in farming i.e. ploughing the field, sowing of seeds, covering the seeds with soil and water sprinkling. In India agriculture is the backbone of economy. 50% of the population is involved in farming activities directly appear on the plant leaves.

[2].In the current scenario most of the countries do not have sufficient skilled manpower specifically in agricultural sector and it affects the growth of developing countries. So it's a time to automate the sector to overcome this problem. An innovative idea of our project is to automate the process of sowing crops such as sunflower, baby corn, groundnut, cotton and vegetables like beans, lady's finger, pumpkin and pulses like black gram, green gram etc. to reduce the human effort and increase the yield.

[3]The plantations of seeds are automatically done by using DC motor. The distance between the two seeds are controlled and varied by using Microcontroller. It is also possible to cultivate different kinds of seeds with different distance. Also the project consists of sprinkler, which would be used for reducing the wastage of fertilizers that is done by spraying the senses from wheel movement and the on and off of the sprinkler would be controlled by Microcontroller. When the Robot reaches the end of the field we can change the direction with the help of remote switches. The

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whole process is controlled by Microcontroller. A general-purpose autonomous robotic control system designed for agriculture field applications has four core abilities: guidance, detection, action and mapping which are considered in the designing according to the application requirement. Some of the major operations in farming which are under research and automation are seeding, plugging, digging, leveling, pesticides spraying, water spraying.

[4].When it comes to designing a robot for automating these operations based on this for seeding process robot must be able to move in straightway properly on bumpy roads of farm field, soil moisture content may affect the soil digging function, sensors to be selected for the system must be chosen by considering farming environmental effects on their working. Apart these other requirements are in terms of accuracy required in the task and these are: digging depth, particular optimal distance between rows and plants foe certain type of crop, rows to be sown at a time and accurate navigation in the field.Whereas other processes like sprinkling weeding thesefunctions depends on seeding stage by knowing the exact location of crop and the making those operations on it accordingly. When considering the physical aspect of the vehicle or the robotic system, farmer's present condition in particular area plays a major role in designing these aspects.

[5].Considering facts of farming industry of India, system to be developed must have advantage over traditional methods and tractors in terms of cost, speed accuracy in operation for which it is designed, fuel consumption and physical energy required by human for it. By targeting these issues and considerations properly the end product will be real help for farmers. The idea of applying robotics technologyin agriculture is very new. In agriculture, the opportunities for robot-enhanced productivityare immense - and the robots are appearing on farms in various guises and in increasingnumbers. The applications of instrumental robotics are spreading every day to cover furtherdomains, as the opportunity of replacing human operators provides effective solutions withreturn on investment.We thus propose a automation system in agriculture that could help farmers to reducetheir efforts.

II. MULTIPURPOSE AGRICULTURE ROBOT

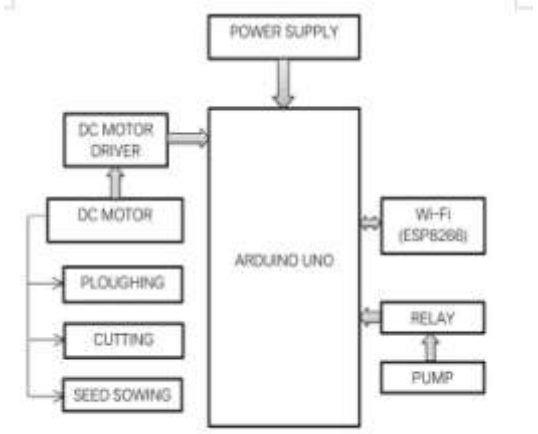

Fig: Block Diagram of System

In this block diagram microcontroller is the main part of the complete project without the microcontroller there is no working. Sinceworking of the proposed AGRIBOT, the power

[6].Supply of +5V is supplied to Arduino and +12v to DC motor driver. Moreover, in this AGRIBOT five dc motors are used, two motors are used for forward and backward, then the next two motors are used for ploughing and sowing, and other is used for cutting these are connected with motor driving circuit [L293D IC] which controls the speed of the AGRIBOT. It is controlled by a Wi-Fi device i.e. ESP8266 module for wireless communication. The RX-TX pin of Wi-Fi module is connected to TX-RX pin of Arduino then the power is shared from Arduino module to Wi-Fi module by connecting Vcc ground pin. The movements of robot is controlled by the BLYNK app by giving the instructions such as forward ,backward, left, right, ploughing, sowing, spraying, cutting. Each components power supply has different power all these are given by the design of the power supply.The main reason behind automation of farming processes are saving the time and energy required for performing repetitive farming tasks and increasing the productivity of yield by treating every crop individually using precision farming concept. Agriculture robot is specifically designed for seed sowing task only. It is a four wheeled vehicle. Its working is based on the precision agriculture which enables efficient seed sowing at optimal distances between crops and their rows.

A. HOPPER

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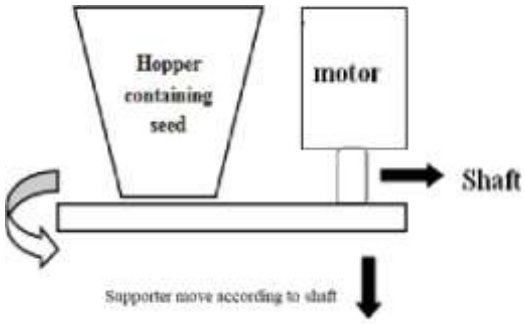


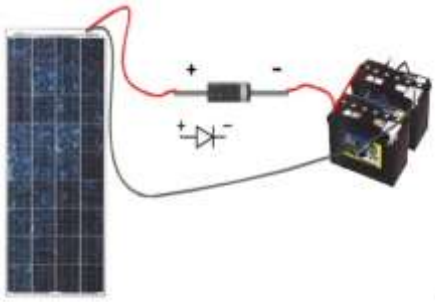
B. PUMP

C. ARDUINO UNO

D.WI-FI MODULE

E. RELAY

F. SOLAR PANEL



Hopper is used to carry seeds and to drop the seed at a particular hole that is being dig by agribot. And the dc motor and shaft is used which is used to convert energy from motor to the end use application.

Pump is lightweight, small size, high efficiency, low consumption and low noise water pump. It has been used widely in household include cooking, cleaning, bathing, space heating and water flowers etc.

Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts

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voltages between 7 and 20 volts. It is similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available.

ESP8266 is a low-cost **Wi-Fi microchip,**with a full TCP/IP stack and microcontroller capability, produced by Espressif Systems in Shanghai, China.

The chip first came to the attention of Western makers in August 2014 with the ESP-01 module, made by a third-party manufacturer Ai-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at first there was almost no English-language documentation on the chip and the commands it accepted. The very low price and the fact that there were very few external components on the module, which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, the chip, and the software on it, as well as to translate the Chinese documentation.

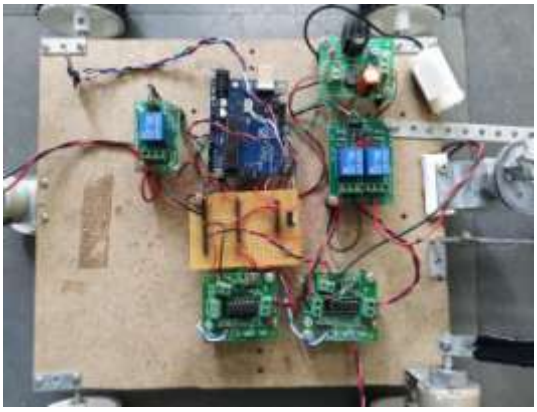
Relays are the switches which aim at closing and opening the circuits electronically as well as electromechanically. It controls the opening and closing of the circuit contacts of an electronic circuit. When the relay contact is open (NO), the relay isn't energize with the open contact. However, if it is closed (NC), the relay isn't energize given the closed contact. However, when energy (electricity or charge) is supplied, the states are prone to change. Relays are normally used in the control panels, manufacturing and building automation to control the power along with switching the smaller current values in a control circuit. However, the supply of amplifying effect can help control the large amperes and voltages because if low voltage is applied to the relay coil, a large voltage can be switched by the contacts. If preventive relays are being used, it can detect overcurrent, overload, undercurrent, and reverse current to ensure the protection of electronic equipment. Last but not the least; it is used to heat the elements, switch on audible alarms, switch the starting coils, and pilots the lights.

Solar cells that are seen on satellites and calculators are also called photo voltaic(PV) cells as shown in Figure, which as the name implies (photo meaning \light" and voltaic meaning \electricity"), convert solar energy directly into electrical energy. A module is a group of cells which is electrically connected and packed into a frame (most commonly referred as solar panel). Solar panels are a great way to cut your electricity that everyone wants to live on their own or at least reduce our home's carbon footprint, and solar panels make this dream possible. Solar panels are made of photovoltaic a (PV) cell, which converts sunlight into electricity.

III. WORKING

The smart agriculture robot can be directed to various directions like forward, reverse, left and right. These directions are commanded by the user by clicking on the respective options on the webpage. On receiving the command, the arduino will send it to the microcontroller. The microcontroller then drives the motor driver circuit to move the robot. In addition to these movements, several functions like ploughing, seed sowing, watering, obstacle detection and obstacle clearance are performed.

The Ploughing tool is interfaced with the Arduino. The ploughing tool can be operated in three modes namely on, off and mid. The microcontroller will receive the command to work on any of these three modes and it directs the ploughing tool to plough the field accordingly The seeds are stored in a small container and it is closed with a small flip. This flip is controlled by the servomotor to open and close the container. The servomotor is capable of rotating to 180 degrees. Meanwhile, when the servomotor is at 180 degree, it automatically opens the container and hence the seeds are sown in the field.The temperature sensor interfaced with the Arduino helps to send the information about the temperature to the user via WiFi module.After knowing the temperature,water can be poured on the field.This can be done with the help of relay and solenoid valve.The relay makes the solenoid valve to allow and stop the flow of water to the field.



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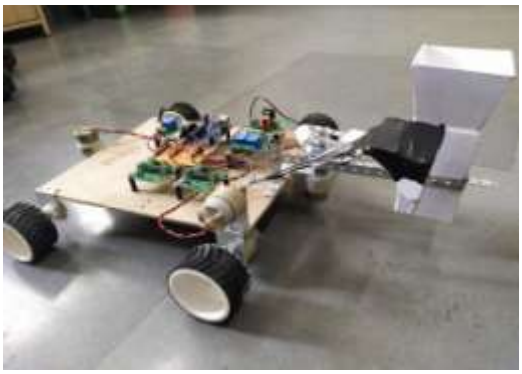
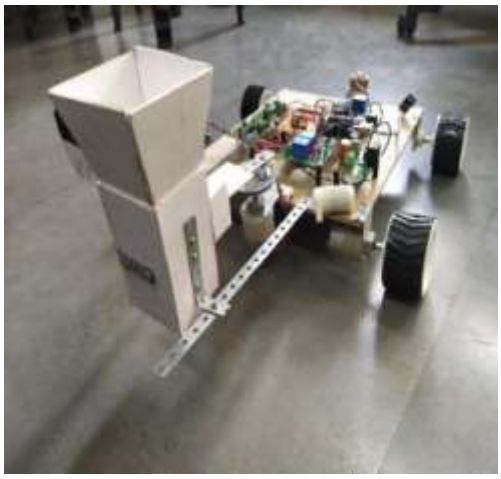


IV. XPERIMENTATION AND RESULTS



The hardware components are successfully interfaced with the microcontroller.Test results shows that the various field activities like ploughing, sowing seeds ,irrigation, obstacle detection and obstacle clearance are performed and controlled with the help of WiFimodule.

The results that have been produced from the improved agricultural robot are the following: increased biodiversity, increased productivity, and increased profits. Improved agricultural robot aim to produce food for consumers that are safe and wholesome

Crops	Humidity (%)	Moisture level
Corn	65	33
Yellow corn	65	15.3
Soybean	65	12.6
Wheat	65	13.8
Barley	65	19
Jute	65	13.7
Paddy	65	24

Fig: Data Sheet for Moisture Level Required

ALGORITHM

Step 1 - Power on the robot.
Step 2- Robot starts moving forward and all sensors powered on.
Step 3 - IR sensors senses for unwanted grass (or) weeds.
Step 4 - If IR sensor sense the presence of weeds (or) grasses then rotor starts rotating to cut
grass (or) weed plants.
Step 5 - Moisture sensor is used to check moistness in the soil to water the plants.
Step 6 - If moisture sensor is low, sensor turns on the water pump (or) if moisture is high,
sensor turns off the water pump.
Step 7 - Repeat Step 3 to Step 6 periodically.
Step 8 - Switch is used to turn on ploughshare for digging the field (or) farm.
Step 9 - Smart phone is connected to robot through Wi-Fi interface app.
Step 10 - Robot can operate during night using IP camera.

V. CONCLUSION

It has been concluded that, the main objective of this AGRIBOT is to facilitate the farmers to ease their work and increase the productivity with its multitasking working features such as seeding, sowing, ploughing, sprinkling, cutting with checking the intensity of light and the moisture level of soil these advanced features overcomes the difficulty of farmers in farming their land in any climatic condition irrespective of day and night, the main aim of this project is to initiate an embedded system based application for multipurpose working used for smart farming . It is being initiated by integrating features from all the hardware components uses, all the modules are being considered out and arranged carefully thus contributing to the best working of the unit. These

AGRIBOTS are the boon to today's farmers for the effortless and time saving farming with increase in production.

SOME OF THE ADVANAGES FROM THE ABOVE RESULTS

a. Time and manual power is reduced.
b. The robot will be able to expose in different weather conditions.
c. Used in various fields like agriculture, medicine, mining and space research.
d. The machines could easily work around trees, rocks, ponds and other obstacles

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