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SOLAR BASED AGRICULTURE ROBOT

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Abstract:
This paper discuss about development and creation of a robot which is used for various purposes of the agriculture. This Robot can do the multiple tasks regarding agriculture. The various functions done by robot in this project are Water spraying, Pesticide Spraying[1], Grass Cutting , Seed Sowing[1] .These are the tasks done by the robot. This robot mainly used in the agriculture to reduce the labour cost to the farmers, automating the agriculture and provide a good yield to farmers. These tasks are controlled by the farmer through the Bluetooth in which we interfaced a HC-05 Bluetooth module[3] to Microcontroller. Based on the commands given by the farmer the microcontroller processes the command and provide the function needed by the farmer.
Key words: Development, Agriculture, Robot,Microcontroller, Wifi module.

Introduction

The most significant and dynamic sector in India is agriculture. In India, between 50% and 60% of the population work in the agricultural industry. Because of this, agriculture is referred described as the "Backbone of India". Over 17% of the country's GDP comes from agriculture. India, behind China, is the second-largest food producer in the world. In different states of India, agriculture is practised according to varied traditions. Each state has its distinct agricultural tradition, and Indian agriculture is currently advancing by utilising contemporary methods.
The agriculture industry is plagued by a variety of issues. For example, seasonal water shortages, the development of weeds, and the high cost of seed-sowing and pesticide-spraying equipment. So, we created a solar-powered agriculture robot to address these issues.
Solar based Agriculture robot is a new innovation in the agriculture sector which is interfaced with various equipments to control certain tasks of the agriculture like seed sowing, water spraying , grass cutting, pesticide spraying.
For this project, we have connected a number of DC motors to govern how the robot responds to commands from the farmers. A Wifi module that is interfaced to the controller allows it to receive the farmer's command. This solar-powered agriculture robot thereby automates the tasks of the farmer. Therefore, this automation technology can aid farmers in minimising their effort and fieldwork time.In comparison to the conventional ways, this automation will be more effective.

LITERATURE REVIEW

The agriculture robots have been the subject to various researches, which helped to innovate new ideas to farmers in order to provide an efficient yield.

1. A single study “An automatic seed sowing system utilising Arduino” was proposed by SugatBhalshankar, Meghna Bramhe, Priyanka Kumle, Madhuri Mandhare, SanjyoktaKamble, Varsha Dighore, and Smita Matte. Which is used to automatic seeding and ploughing in agriculture through a wifi module.
2. A “solar-powered agriculture robot “that sprays pesticides and waters plants has been proposed in a study by Prof. Adhapure D, Saurabh Mohan Bhosale,Sachin Bharat, JagtapVishal, Atul Deshmukh, and Navin Madhukar Deshpande. “This paper proposed a work which can do the tasks like weeding operations, digging operations, seed sawing operation , levelling operation.”

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3. According to a study by Ammangi Pradeep Kumar and Aradani Rama Satya Balaji, a "wireless agribot for plough seed and sprinkler".This paper proposed a work which is capable for seed sowing. Obstacle detection, water sprinkler, automated Ploughing, robot direction control through a Wifi module

4. A study by Simon Blackmore , Bill Stout , Maohua Wang , Boris Runov has presented a" Multitasking robotic machine for agriculture". This paper has provided information about the robot which can do multiple tasks of the agriculture like seed sowing and weed removing with fully automated process. They proposed their work on seed bedding, seed mapping , seed placement, reseeding. And crop care like crop scouting , weed mapping, robotic weeding , micro spraying , robotic irrigation.

5. The paper known as "improved agriculture system" was proposed by Shrinivas R. Zanwar and R. D. Kokate. Proposed a project which can be used for cultivation and direction control interfaced with infrared sensors for obstacle detection for changing its direction during cultivation.

6. In a study, a "versatile agribot employing solar panel" was suggested by HareetaMalani, Abhishek Gautam, and Ranveer Singh, Proposed a solar agriculture robot which can sow seeds, will do digging operation , direction control and mud level control through a Wifi module , which used solar as main power source.

7. The study "Autonomous farming: modelling and control of agricultural machinery in a unified framework" by Ray Eaton, Jay Katupitiya, Kheng Wah Siew, and Blair Howarth made this suggestion.

8. According to a study by Amritanshu Srivastava, Shubham Vijay, Alka Negi, and Akash Singh titled "DTMF Based Intelligent Farming Robotic Vehicle,". This project proposed a work with various tasks like water pump , compost pit unit , pest control unit, seed sowing unit, and sensor are interfaced to detect metals and obstacle and turn ON buzzer also interfaced with soil moisture sensor.

9. A method termed the "Micro Controller Based Automated Plant Irrigation System" was suggested in a study by Venkata Naga Rohit Gunturi. In this project irrigation system is controlled through a temperature sensor and humidity sensor which displays the sensor values in a display.

10. A method called "DESIGN AND IMPLEMENTATION OF SEEDING AND FERTILIZING AGRICULTURE ROBOT" has been suggested in a paper by Shivaprasad B S, Ravishankara M N, and B N Shoba , have proposed a work by using camera module to watch live field robot movement and monitors the parameters like soil moisture , Soil Ph values, seed sowing, fertilizing the field.

METHODOLOGY

The goal of the project is to develop a robot which can do multiple tasks to lower the labour costs for the farmers and provide a good yield .

In this project, the embedded C programming of the robot was controlled by the PIC16F72 microcontroller. We connected the Esp8266 WiFi module to the PIC16F72 microcontroller, which is how the controller receives commands. The controller performs the desired action in accordance with the received command.

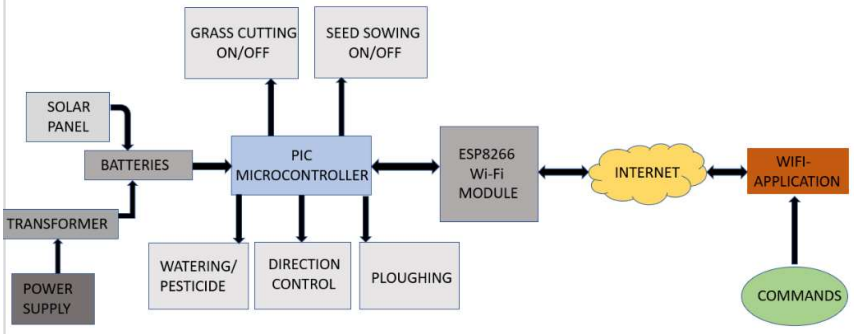

Figure -1 : Block diagram

The batteries that power this project are charged using both solar and ac power through a transformer using a step-down procedure. Depending on the situation, we can charge the batteries using solar power or a 240v AC supply that is then converted to 12v via a transformer. The batteries generate a

12V DC power supply, which is rectified into a 5V DC power supply using a bridge rectifier and voltage regulator. The Microcontroller and other Relay modules get this 5V Dc supply to regulate the function.

We use a Wifi module to send commands to the PIC16F72 microcontroller with the mobile application juise SSH. The command obtained over WiFi is processed, and action is taken.

The robot's movement may be controlled in all directions, including forward, backward, right, and left. We interfaced a motor Driver in order to control this movement. The robot's mobility can be controlled in a variety of ways with this motor driver. The controller carries out the specified action in accordance with the command it has received.

Table -1 :Code and action performed.

Code	Action performed
F	Move Robot to Front
B	Move Robot to Back
R	Move Robot to Right
L	Move Robot to left
S	Stop the robot.
A	Turn ON water / pesticide spraying motor
a	Turn OFF water/ pesticide spraying motor
C	Turn ON Grass cutting motor
c	Turn OFF Grass cutting motor
D	Turn ON Seed sowing motor
d	Turn OFF seed sowing motor

RESULTS

The results of the solar based agriculture robot have shown.

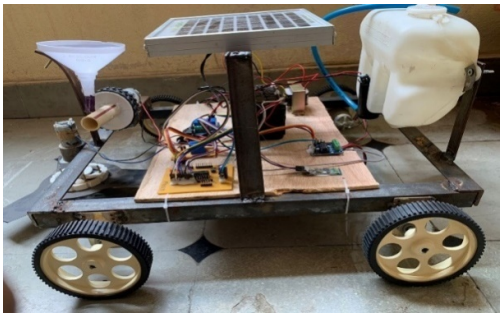

Figure-2: solar based Agriculture robot interfaced with seed sowing motor, Grass cutter, Water/pesticide Sprayer, Direction control

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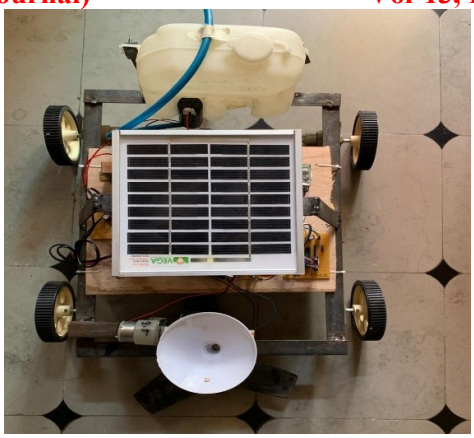

Figure-3: Solar panel are interfaced to charge the batteries.

Figure-4: Seed sowing section

Figure -5 : Motor Interfaced with blade for cutting of the grass and any other unwanted plants.

Figure -6 : Tank to store water and pesticide for spraying

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CONCLUSION AND FUTURE SCOPE

CONCLUSION:

The proposed work is very helpful for the farmer in terms of time, labourcost and energy usage.This project can solve the problem of finding the labour for work.And reduces man power for the field .

FUTURE SCOPE:

In future we can develop the project with some more tasks to automate the agriculture sector.We can use Rasberry PI instead of microcontoller which gives more advantages like inbuilt wifi module , server , better community. We can also interface a camera module to the rasberry PI board to watch the area when the robot is moving through field.

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