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OBSTACLE DETECTING MULTIFUNCTIONAL AGRIBOT DRIVEN BY SOLAR PANEL

Mr. Khatavkar Shubham V[*1], Mr. Taratearbaj R[*2], Mrs. Yadav Pranoti S[*3], Mrs. Patil Dhanashree S[*4], Mrs. Kumbhar Tejaswini D[*5]

[*1,2,3,4,5]Department Of Electrical Engineering, AMGOI, Vathar, Kolhapur, India.

ABSTRACT

This paper aims to develop an Agribot which can help farmers to perform various required farming techniques which refers to traditional farming using technology. The farming operations such as sowing, spraying pesticides, cutting grass, ploughing and obstacle detection. In earlier projects the techniques used were complicated and even high in cost. This Agribot is based on renewable energy supply i.e. solar energy. Which is harnessed solar panels and stored in rechargeable batteries. It consists of a visual obstacle detector and a Bluetooth which is used to connect wirelessly using an application. Which will help to operate the robots various operations with a single touch of android device. This means we do not need to visit the field which will be time saving and reducing the efforts. This agribot techniques will not be depended on any climatic condition irrespective of day and night. This Agribot is very useful as it is multifunctional and advance in techniques for smart farming.

Keywords: AGRIBOT, Renewable Energy, Solar Panel, Obstacle Detector, Bluetooth Module, Bluetooth Terminal Application, Arduino.

I. INTRODUCTION

Agriculture is the backbone of India. In India there are 70% of population select agriculture as a primary occupation. In the current generation we do not have any proper skilled man power in agriculture sector. A manual farming takes more time and increases more pollution. The main purpose for developing Agribot in agriculture field is reduces labor, time, and human efforts. The main outcome of our project has been to expand a solar operated Agribot which helps farmer to reduce effort. This Agribot performing water spraying, grass cutting, ploughing, seed sowing with obstacles detecting. The system uses basic components like solar panel, DC motor, Battery, motor driver L293D, Arduino Uno, Bluetooth, IR sensor etc. The agribot requires 5 motors where single motor is used to control wheels and remaining motors are used for sowing, ploughing, grass cutting, spraying. All motors are connected to motor driver. IR sensor and motor driver are connected to microcontroller. In this system, we used a solar panel to absorbs sunlight as a source of energy and convert it into an electrical energy which is used to charge a battery. Battery gives the supply +5V to Arduino and +12V to motor driver. In these system need to give command to the Agribot by using Bluetooth or wi-fi application from android mobile and this application operated manually. When the command is given to the Agribot, it receives command and perform the operation. The advantages of this solar powered multi-function Agribot is that it does not require any fuel or petrol to work, as it works on the solar energy.

BLOCK DIAGRAM

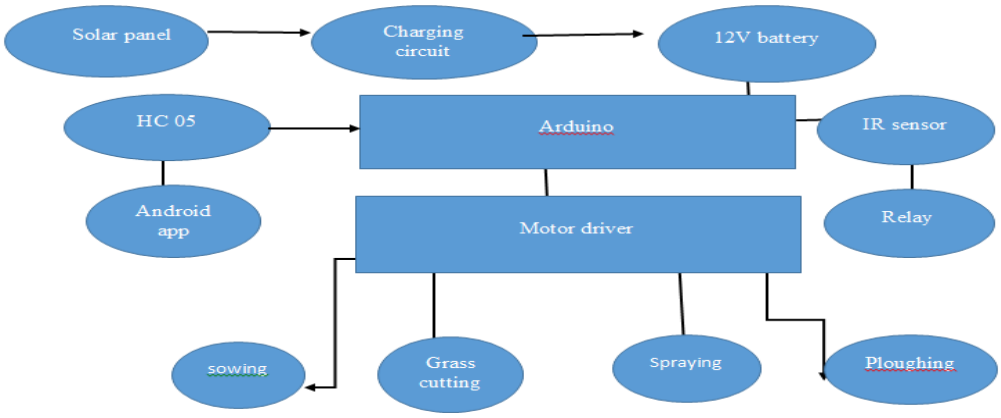

Fig.1: Block diagram

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II. METHODOLOGY

This multifunctional Agribot is designed for farming purpose and block diagram shown in fig.1 Block diagram of the obstacles detecting multifunctional Agribot driven by solar power. It consists of solar panel which absorbs sunlight and convert it into an electrical energy. This energy stored in a battery and +5V supplied to Arduino and +12V to DC motor driver. In this system 5 motors are used. Single motor is used for control the wheels and remaining 4 motors are used for ploughing, seed sowing, spraying, cutting. Two motor drivers are used in this system. All motors are connected to motor driver to maintain the speed. Android app is connected to the Arduino by using Bluetooth module HC05. The main wheels are powered by DC motor and whole system controlled by using android app. When the command is given to the Agribot through android app, it receives command and perform operation such as sowing, Ploughing, cutting and spraying etc. IR sensor connected to the Arduino and it detect the obstacles.

A. Arduino Microcontroller

Arduino Uno is microcontroller board based on 8 bit ATmega328P microcontroller. Along with ATmega328P, it consists other components such as crystal oscillator, serial communication, voltage regulator,etc. to support the microcontroller. Arduino Uno has 14 digital I/O pins(out of which 6 can be used as PWM outputs), 6 analog input pins, a USB connection, A power barrel jack, an ICSP header and a reset button.

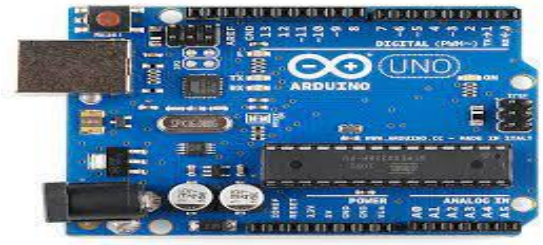

Fig.2: Arduino ATmega328

B. Solar Panel

Solar panels are those devices which are used to absorb the sun's rays and convert them into electricity or heat. A solar panel is actually a collection of solar (or photovoltaic) cells, which can be used to generate electricity through photovoltaic effect. These cells are arranged in a grid-like pattern on the surface of solar panels.

Fig.3: Solar Panel

C. Bluetooth model HC05

We has used Bluetooth module i.e.HC-05 for achieving wireless communication. HC-05 has red LED which indicates connection status, whether the Bluetooth is connected or not. Before connecting to HC-05 module this red LED blinks continuously in a periodic manner. When it gets connected to any other Bluetooth device, its blinking slows down to two seconds. This module works on 3.3 V. We can also connect 5V supply voltage as well since the module has on board 5 to 3.3 V regulator.

Fig.4: Bluetooth model HC05

D. Motor Driver IC L293D:

A typical motor driver which allows DC motor driver to drive on either direction is L293D. L293D motor driver IC has 16 pins which provides bidirectional drive currents at voltages ranging from 5V to 36V. The L293D has 8 pins on both sides with 2 DC motors and it have 4 input/output pins and 2 enable pins for the motors.

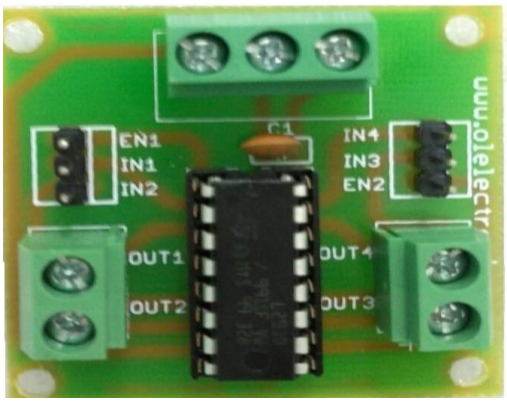

Fig.5: Motor Driver IC L293D

E. Relay:

A relay is an electrically operated switch which works on electromagnetism as relatively small electric current as it turns ON and OFF in huge amount of electric current. Relays are used where it is necessary to control a circuit by an independent low-power signal, or where several circuits must be controlled by one signal.

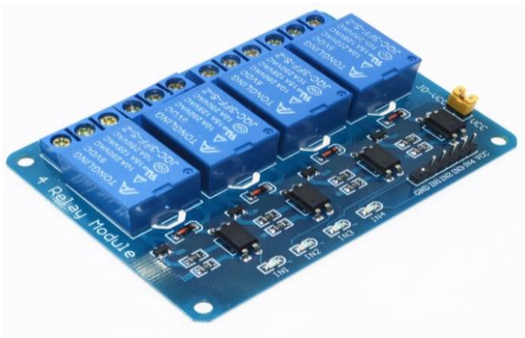

Fig.6: Relay

F. Battery:

Battery contains one or more electrochemical cell which can be charged, discharged into a load, and recharged many times. It converts chemical energy into electrical energy. They are mainly two types of batteries such as primary and secondary, the primary battery are non-rechargeable and disposal batteries, where as the secondary battery is chargeable and can be used many times. These batteries in different size, shape and capacity units. The battery used in this project is 12V and 1.3Ah which is sealed rechargeable lead acid battery.

Fig.7: Battery

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G. Obstacle detection:

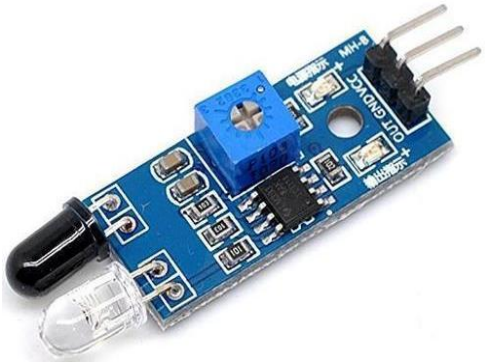

Fig.8: IR infrared obstacle avoidance sensor module

In this AGRIBOT the IR infrared obstacle avoidance sensor module is used for detection of obstacles in the field. This sensor consists of a pair of infrared tubes of which one is the transmitting tube and another one is the receiving tube. The receiver tube will receive the reflected IR waves when transmitting light waves are reflected back and the green light indicator turns ON. This module consists of three interfacing pins i.e. Vcc, ground and output pins.

H. Flow Chart :

In the figure below the flowchart of the proposed project which shows the multiple operations performed by the AGRIBOT through a Bluetooth application which is a user friendly application.

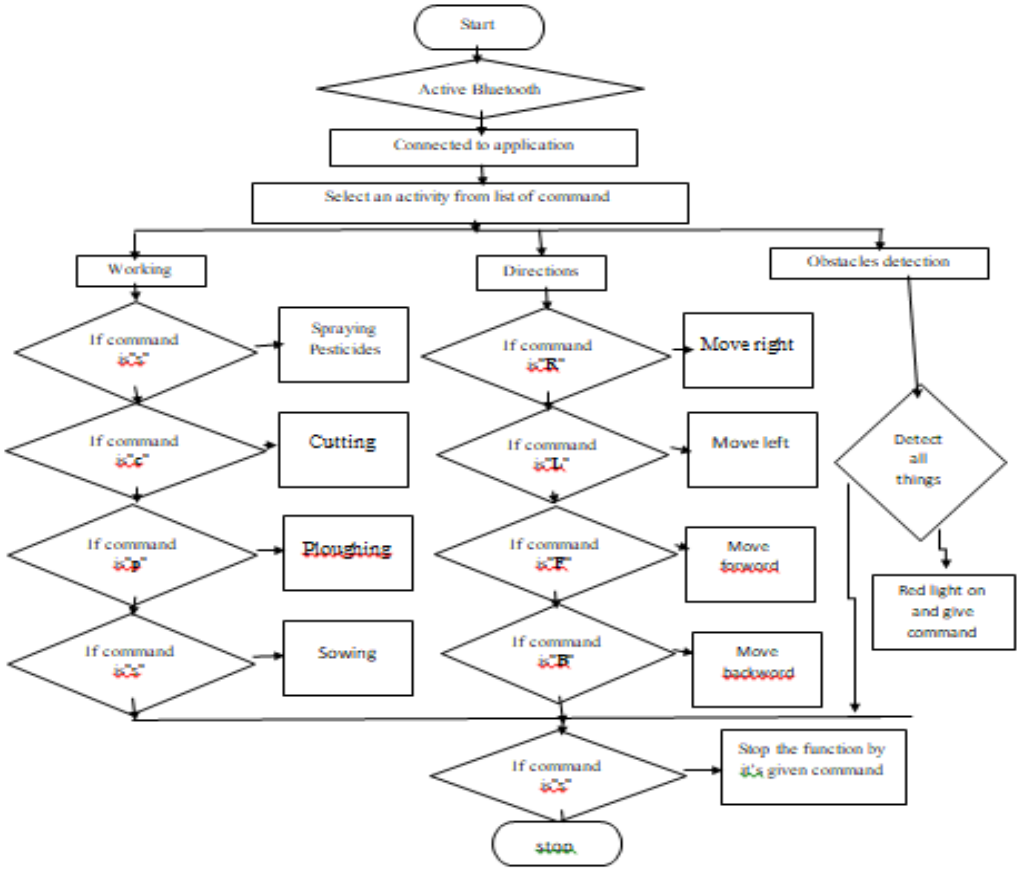

Fig.9: flowchart of proposed AGRIBOT

III. RESULT

We achieved various functions like sowing, ploughing, cutting and obstacles detection using motors and IR sensor. The accuracy of each function was as expected and appropriate the solar energy used was sufficient enough to work all the functions without any error

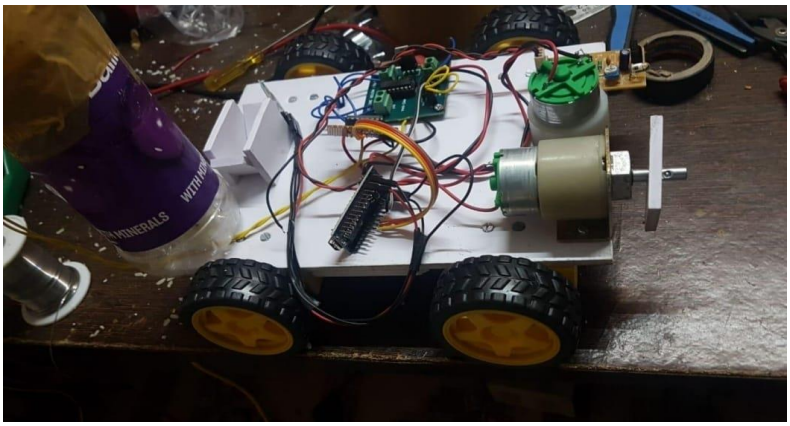

Fig.10

IV. CONCLUSION

Multipurpose agricultural robot is designed to perform the multiple tasks like seed sowing, grass cutting, spraying pesticides, ploughing and obstacles detection. This system is develop to accessible the farmers to easy their work and reduces human efforts, manpower and increase the production. Whole system is operated by using android app. Whole system and android app is connected by using Bluetooth device. These Agribot are the boon to taday's farmers for the effortless and time saving farming with increase in production. All the main points of the research work are written in this section. Ensure that abstract and conclusion should not same. Graph and tables should not use in conclusion.

FUTURE SCOPE

Agriculture occupation is the most tough occupation as it needs human efforts. As there are various operation to be performed as per the seasons. This Agribot can reduce some efforts of farmers using various modern techniques. Some of them are follows:

1. When the floods occurs in rainy season after that the land changes it's soil texture and it becomes difficult to farm. Where these Agribots are more beneficial.
2. We can improve the Agribot by including various functions as per the requirements as drip irrigation, GPS & GSM module for continuous monitoring, electric fencing, for various fields from birds and animals.
3. Cameras can be installed on the Agribot for keeping an eye on the farms and even to see the view.
4. Even soil moisture measuring device can be included on Agribot.

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