

Solar based Multipurpose Agricultural Robot

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Abstract: Agriculture in India being the major source which provide food, feed and fuel for meeting necessary requirements, farmer play vital role in it. But today's conditions is unsatisfactory as far as production in farms is concerned. Due to lack of mechanization in the agricultural field and cost of machineries, farmers are still stuck to the conventional methods of farming leads to consumption of time, increase in labor work and decrease in efficiency. This paper aims to introduce a remedy against the tremendous manual efforts done by farmers, introducing a multifunctional machine. This multipurpose agricultural robot, implements function mainly as a sprinkler, grass cutter, plant cutter and a bird hitter. Triggering on the main problems faced by farmers except harvesting, that also affect production actually, this machine works as a solution reducing manual efforts thereby helps in earning profit.

Keywords: solar energy, Sprinkler, mechanism

1. Introduction

The main aim of agricultural robotics is apply robotics technologies on the field of agriculture as well as the agricultural challenges to develop new techniques. Now days, no one can end up the day without using any kind of embedded system products. It makes our human life very robust and makes work comfortable. The 21st century is said to be century of creation, progress, globalization and so much else, but the second side too, that is nothing but 21st century is century of the population, global warming, drought and cloud burst also helpless health factors! Automation in agricultural robotics system has been developed to implement a number of agricultural productions in many countries. Such as picking, harvesting monitoring, weeding, seeding, fertilizer, irrigation. But in this project functions included are soil based applications of Seeding, Fertilizer, and Irrigation. The purpose of this project is to design, minimize the labour of farmers in addition to increasing the speed of the work as well as increase the yield of agriculture. A robot which performs manual and automatic operation, this is useful for the humans. In this project, it is shown that the farm cultivation process in autonomous agriculture system which is controlled by ARDUINO.

The technique of seed operation in sowing is based on row per column depending on the types of cultivation. The irrigation process slowly applies water to the sown seeds in all the rows and columns of the farming plot. In fertilization process,

fertilizer is sprayed on all the plants.



Fig. 1. Front view of project



Fig. 2. Top view of project



Fig. 3. Side view of project

2. Proposed system

The project aims on the design, development and the fabrication of the robot which can dig the soil, leveler to close the mud and turn on and turn off the motor depending on water level in the ground and this whole system of the robot works with the battery and the solar power. The language input allows a user to interact with the robot which is familiar to most of the people. The advantages of these robots are hands-free and fast data input operations. In the field of agricultural autonomous vehicle, a concept is been developed to investigate if multiple small autonomous machine could be more efficient than traditional large tractors and human forces. Keeping the above ideology in mind, a unit with the following feature is designed:

Robot has rotor which will destroy the unwanted grasses while moving and also level the ground.

- All the operations are performed with the help of PICmicro controller
- Humidity sensor is used to sense the moisture content in the environment
- Moisture sensor is used to sense the water level in the ground and turn on and turn off the pumping motor depending on water level.
- The robot also has a digger to dig the vegetables from the ground
- Bluetooth is used to send the message to the farmer about the operation performed by robot

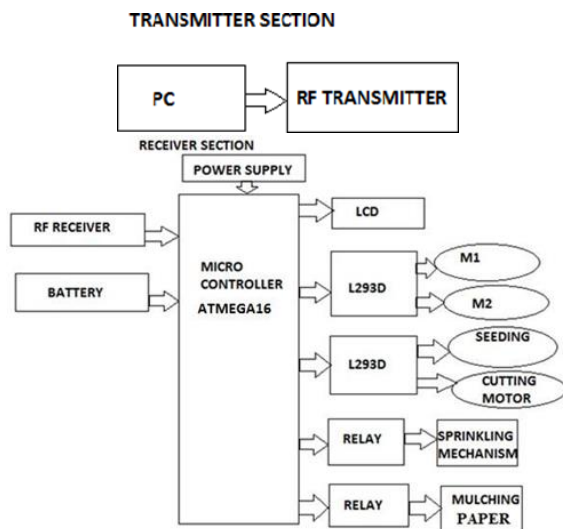


Fig. 4. Block diagram

3. Elements of system

A. Micro controller ATmega328P

ATMEGA328P is high performance, low power controller from Microchip. ATMEGA328P is an 8-bit microcontroller based on AVR RISC architecture. It is the most popular of all AVR controllers as it is used in ARDUINO boards.



Fig. 5. Microcontroller

B. 12V Battery System

This is used to provide adequate amount of power supply to the system components. Battery is used to store electricity generated by the solar panel.



Fig. 6. Battery

C. Solar Panel

A solar panel is a set of solar photovoltaic modules electrically connected. The source is driven from the solar energy using solar panel which receives energy and convert it into electric energy. Solar panel generates energy up to 12v.



Fig. 7. Solar panel

D. Bluetooth module HC-05

Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz [4]) from fixed and mobile devices, and building personal area networks (PANs). Bluetooth is used to pair our android device to micro controller for taking actions through wireless communication.



Fig. 8. Bluetooth module

E. DC Motors

There are total 4 DC motors employed in this projects. one is employed for cutter which runs at 3000rpm, two motors are of 10rpm which is used for vehicle motion and one motor is used for seeding operation.

F. Motor Driver L293D

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.



Fig. 9. Motor driver

G. Water Pump 3V

3V water pump is used for water sprinkling in the field. It is operated in 3V DC power supply.



Fig. 10. Water pump

H. Funnel System

In funnel System three funnel vertically feeded on vehicle is used to perform seeding operation. funnel motion is controlled by 10 rpm DC motor

I. Voltage Regulator 7805

The 78xx (sometimes L78xx, LM78xx, MC78xx...) is a family of self-contained fixed linear voltage regulator integrated circuits. The 78xx family is commonly used in electronic circuits requiring a regulated power supply due to their ease-of-use and low cost. For ICs within the family, the xx is replaced with two digits, indicating the output voltage (for example, the 7805 has a 5 volt output, while the 7812 produces 12 volts).

J. 12V SPDT Relay

The Single Pole Double Throw SPDT relay is quite useful in certain applications because of its internal configuration. It has one common terminal and 2 contacts in 2 different configurations: one can be Normally Closed and the other one

is opened or it can be Normally Open and the other one closed. So basically you can see the SPDT relay as a way of switching between 2 circuits: when there is no voltage applied to the coil one circuit “receives” current, the other one doesn’t and when the coil gets energized the opposite is happening.



Fig. 11. Relay

4. Conclusion

This project is aimed for reducing the human work and time. By this project farmer work will be enhanced to some extent. This can also reduce the human cost in purchasing different bulky machineries for different work because it can perform multi operations in one closed combined system. we conclude this work by hoping that it will help in improving farmer work and increasing the work efficiency

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