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SOLAR BASED WEED/GRASS PLUCKING ROBOT

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ABSTRACT

The concept presented here is innovative & introduced in the field of agriculture. The main function of this robot is to remove the unwanted tiny plants or grass from the main crop, this system is very useful for former which avoids lot of manual work. Plucking weeds manually is very painful activity and also consumes lot of time and therefore this mechanism is designed. Since it is a prototype module, basic version of grass or tiny weeds plucking mechanism is designed with spur gears. Entire system is designed to utilize free power source of solar energy, for this purpose, 12V – 0.8 Amps panel is used and it is arranged over the top of mechanical structure. The output of the panel is used to charge the battery and here 12v, 2Ah battery is used.

Keywords: Grass Plucking Robot, Assembly Language, L293d H Bridge, Relay, Battery, Spur Gears, Remote Control.

I. INTRODUCTION

The weed plucking robot designed here is nothing but a remote-control vehicle which can be defined as a vehicle that is remotely controlled, which moves in all directions according to the command signals received from its corresponding transmitter. The main purpose of this vehicle is to serve the formers in their agriculture fields to remove the unwanted tiny weeds. Often a radio control device and RF modules operates at a high frequency will be used. A remote-control vehicle or RCV differs from a robot in that the RCV is always controlled by a human and takes no positive action autonomously. This project work mainly focuses about controlling of a robot or land rover using remote using RF technology. These kinds of radio-controlled vehicles/robots are quite useful for many applications. To prove the concept for one useful application here this vehicle is designed to pluck the weeds. The weed plucking mechanism is designed with spur gears. In addition, these vehicles can be equipped with other agricultural tools like plough, seed planting, etc, but since it is a prototype module and to reduce the cost, here a simple robot is constructed with weed plucking mechanism for the live demonstration which moves in all directions according to the instructions passed from the transmitter i.e., a remote. The system is designed as efficient, cost effective & easy to operate and flexible for further improvements.

II. LITERATURE REVIEW

Agricultural machinery is machinery used in farming or other agriculture. There are many types of such equipment, from hand tools and power tools to tractors and the countless kinds of farm implements that they tow or operate. Diverse arrays of equipment are used in both organic and non-organic farming. Especially since the advent of mechanized agriculture, agricultural machinery is an indispensable part of how the world is fed.

With the coming of the Industrial Revolution and the development of more complicated machines, farming methods took a great leap forward. Instead of harvesting grain by hand with a sharp blade, wheeled machines cut a continuous swath. Instead of threshing the grain by beating it with sticks, threshing machines separated the seeds from the heads and stalks. The first tractors appeared in the late 19th century.

Power for agricultural machinery was originally supplied by ox or other domesticated animals. With the invention of steam power came the portable engine, and later the traction engine, a multipurpose, mobile energy source that was the ground-crawling cousin to the steam locomotive. Agricultural steam engines took over the heavy pulling work of oxen, and were also equipped with a pulley that could power stationary machines via the use of a long belt. The steam-powered machines were low-powered by today's standards but,

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because of their size and their low gear ratios, they could provide a large drawbar pull. Their slow speed led farmers to comment that tractors had two speeds: "slow, and damn slow."

III. METHODOLOGY

The working principle of solar grass cutter is it has panels mounted in a particular arrangement at an in such a way that it can receive solar radiation with high intensity easily from the sun. These solar panels convert solar energy into electrical energy. This electrical energy is stored in batteries by using a solar charger. The main function of the solar charger is to increase the current from the panels while batteries are charging, it also disconnects the solar panels from the batteries when they are fully charged and also connects to the panels when the charging in batteries is low. The motor is connected to the batteries through connecting wires Between these two mechanical circuit breaker switch is provided. It starts and stops the working of the motor. From this motor, the power transmits to the mechanism and this makes the blade to slide on the fixed blade and this makes to cut the grass.

The designed solar powered lawnmower comprises of direct current (D.C) motor, a rechargeable battery, solar panel, a stainless steel blade and control switch. Mowing is achieved by the D.C motor which provides the required torque needed to drive the stainless steel blade which is directly coupled to the shaft of the D.C motor. The solar powered lawnmower is operated by the switch on the board which closes the circuit and allows the flow of current to the motor which in turn drive the blade used for mowing. The battery recharges through the solar charging controller. Performance evaluation of the developed machine was carried out with different types of grasses. Agricultural robots have great potential to deliver weed control technologies that are much more adaptable even down to the plant scale. They potentially could direct chemical or cultivation tools to directly target weed plants. Agricultural robots can have these characteristics because they bring recent advances in artificial intelligence (AI) to bear on the control of weeds in crop fields. However, bringing AI and robotics technology to weed control has several challenges that may limit robotic weed control robustness, at least with the current state of technology.

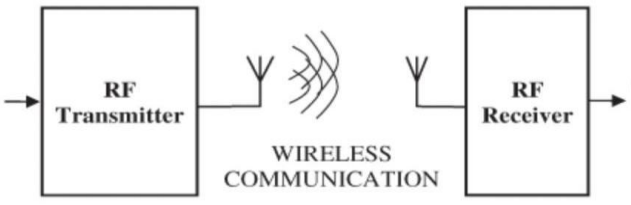
The methodology for this project is similar to the prototype analysis process. In this project we are fabricating a prototype of the solar powered grass cutter.

IV. THE HARDWARE

RF Communication:

RF communication works by creating electromagnetic waves at a source and being able to pick up those electromagnetic waves at a particular destination. These electromagnetic waves travel through the air at near the speed of light. The wavelength of an electromagnetic signal is inversely proportional to the frequency, the higher the frequency, the shorter the wavelength.

The RF communication system then utilizes this phenomenon by wiggling electrons in a specific pattern to represent information. The receiver can make this same information available at a remote location, communicating with no wires.



2051 Microcontroller Chip:

The micro-controller is a chip, which has a computer processor with all its support functions, memory (both program storage and RAM), and I/O built in to the device. These built in functions minimize the need for external circuits and devices to be designed in the final applications. Most micro-controllers do not require a substantial amount of time to learn how to efficiently program them, although many of them have quirks, which you will have to understand before you attempt to develop your first application.

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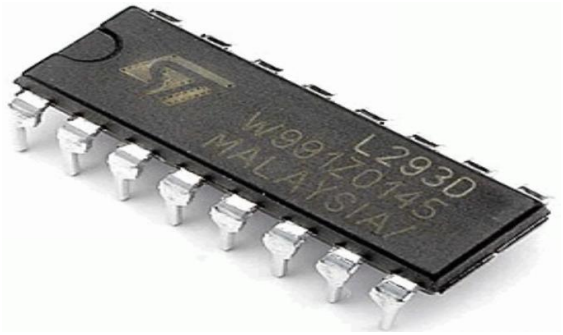
L293D H Bridge IC:

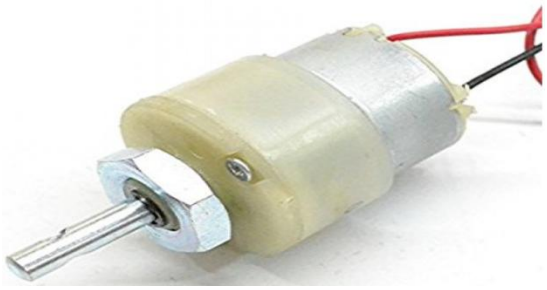
The L293 and L293D are quadruple high-current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications. Whenever a robotics hobbyist talks about making a robot, the first thing comes to his mind is making the robot move on the ground.

DC motors are always preferred over stepper motors. There are many things, which we can do with DC motor when interfaced with a micro controller. For example, we can control the speed of motor, we can control the direction of rotation, we can also do encoding of the rotation made by DC motor i.e., keeping track of how many turns are made by the motors etc. So, we can see DC motors are better than stepper motors.



DC Motor:

A DC motor is any of a class of rotary electrical motors that converts direct current (DC) electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor. A DC motor is any of a class of electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor. Most types produce rotary motion; a linear motor directly produces force and motion in a straight line.



Relay:

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from

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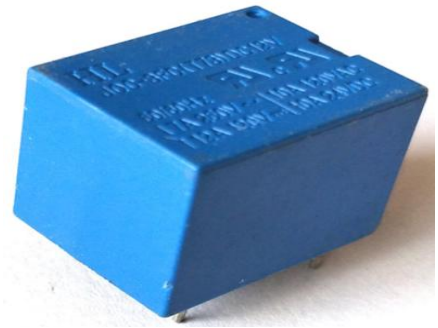
one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.



V. SOFTWARE

Assembly Language

When we look at the different types of programming languages, we have to understand the "pay menow, pay me later" rule that exists with programming costs. Assembly language programming is generally the cheapest way to get into microcontroller programming, but it is the most difficult to learn, requires the most effort, and is the least portable to other platforms.

Conversely, using a high-level language (such as BASIC or C) can make it much easier for a beginner to program a Microcontroller, but it is the most costly option. Code written for a high-level language is, by definition, portable to other platforms. Where the " pay me now, pay me later" rule comes into effect is if we are developing 8051 applications professionally. Spending time on assembly language programming is probably costing you money over doing it in a high-level language.

For learning the 8051 or any other Microcontroller or computer processor, assembly language is, as per the author opinion, the best way of doing it. Before going to an experiment, we will get a good feeling for how the 8051 processes instructions and how it works. Assembly language programming is the process of writing code that uses assembler statement, which are the actual instructions the 8051's processor executes (the smallest unit of granularity).

Along with assembler statement, directives are added to the source file to control the operation of the assembly process. Macros and conditional assembly statements are types of directives that can help you develop code unique to our application. Macros are labels that are replaced with code; they're similar to subroutines, except the subroutine code is copied directly into the source before the assembly operation. Conditional assembly statements are "if/else/end if" statements that execute during assembly and, depending on the conditions, not allow certain sections of code to be assembled.

A completed assembly language source file is assembled into a listing file (showing how the assembly program converted the source into bits for the processor) and an object, or hex, file, which are the actual bits and bytes to be burned into the 8051. Assembly language programming is the lowest form of: "human-readable" source code-processing possible. Interpreters and compilers take high-level language statements and convert them directly into processor instructions without the programmer being involved.

VI. RESULTS AND DISCUSSION

DEVICE:

The project which we have done surely reaches the average families because the grass can be trimmed with minimum cost and with minimum time. Finally the project may give an inspiration to the people who can obtain better results.

By doing this project we conclude that, we can reduce the human efforts and this will be helpful for farmer. As it is operated on solar energy so the it is best application that does not affects on environment.

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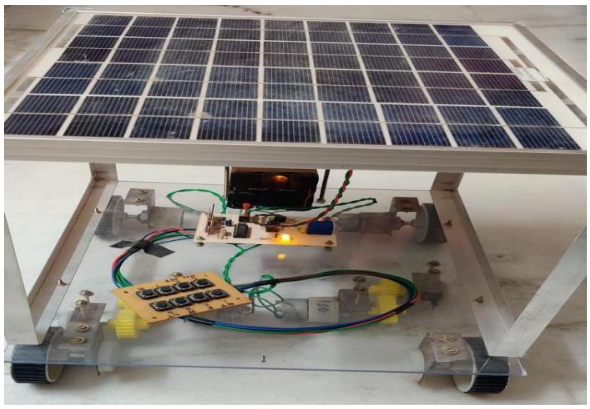
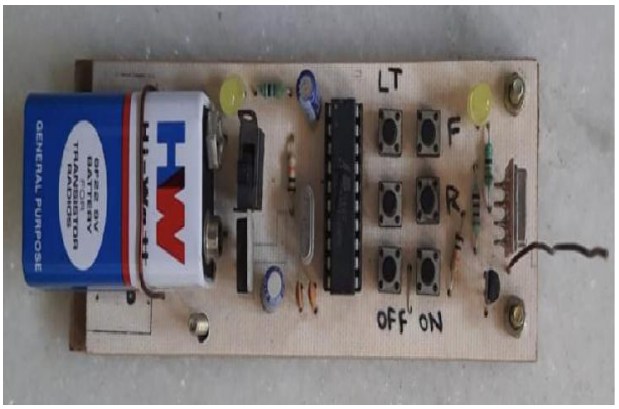


Robot when it is in on state



Remote Control

APPPLICATION:

1. It can be used in garden at home.
2. It can be used in Public Park.
3. It can be used in college.
4. It can be used in party plots.
5. It can be used for all playgrounds.
6. It can be used for small farms.
7. It can be used for nurseries.
8. It can be used for agriculture purpose.

VII. CONCLUSION

To make the project work more realistic, much importance is given for practical orientation, therefore a prototype module is constructed for the demonstration purpose. This module simulates the real working system & based on this technology with slight changes in the structure & motor ratings, the system can be converted for real applications by using a sophisticated weed plucking mechanism. The method of converting rotary to linear motion is implemented in the mechanism. The machine is designed to move in all directions including reverse direction also.

There are wide variety of agriculture machines are in use these days, but all of them are heavy also they are very costliest machines, in this regard a thought is applied to develop a low cost simple machine that can pluck the weeds. The concept presented here uses remote control unit to control the machine from certain distance

In recent years, the development of automatic machines in various fields has experienced increased interest. This development has led many researchers to start developing more rational and adaptable vehicles. In the field of farm lands, a concept is being developed to investigate if multiple small autonomous machines would be more efficient than traditional large vehicles.

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