

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 farmer 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.

The moving mechanism is constructed with motorized wheels, for this purpose 30RPM motors are used. The mechanism is designed to move in all directions including reverse direction. The plucking mechanism designed with spur gears is attached with another motor shaft. Two spur gears are used and are meshed with each other, when the vehicle is moving and when the gears are rolling, the grass or tiny weeds will be removed by the gear mechanism. The demo module is constructed with small spur gears, with this the basic concept can be proved and it is not a full fledged mechanism. With the help of a remote control unit constructed with 89C2051 Microcontroller chip & RF transmitter, entire machine can be controlled. The main processing unit arranged over the moving mechanism is also constructed with same controller chip. Relay is used to energize the spur gear mechanism and H Bridge IC is used to drive the wheel drive motors. Here both motors are controlled independently by which mechanism will be moved in all directions.

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: 89C2051 Microcontroller chip, RF transmitter, H Bridge IC

1.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 farmers 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.

2. Apparatus:

Equipment required to implement this idea are

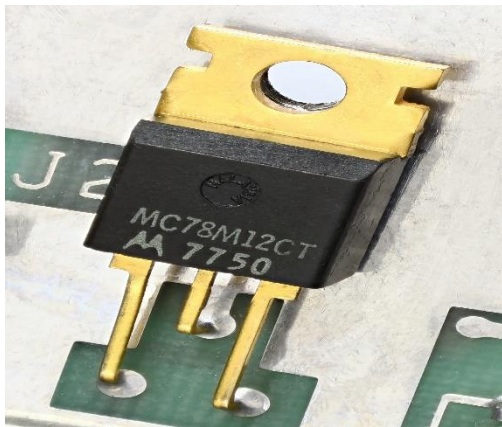
2.1) **89C2051 Microcontroller chips:**



www.mapits.com

The AT89C2051 is a low-voltage, high-performance CMOS 8-bit microcomputer with 2K bytes of Flash programmable and erasable read only memory (PEROM)

2.2) Voltage regulator



A voltage regulator is a system designed to automatically maintain a constant voltage. A voltage regulator may use a simple feed-forward design or may include negative feedback. It may use an electromechanical mechanism, or electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages.

2.3)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.

2.4) L293D IC:

L293D IC is a typical Motor Driver IC which allows the DC motor to drive on any direction. This IC consists of 16-pins which are used to control a set of two DC motors instantaneously in any direction. It means, by using a L293D IC we can control two DC motors. As well, this IC can drive small and quiet big motors.:

A sort of rechargeable battery is the lead-acid battery. Gaston Planté, a French physicist, invented it in 1859. We utilise it to charge and display the impact of footstep on sensors on an LCD in this.

2.5) Relay



A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals.

3. Weed Cutting Using Solar panel

According to our literature review, Sunlight based weed Remover is a machine that works on sun powered energy. Now, Solar energy is brilliant light and intensity from the Sun that is outfit utilizing a scope of steadily developing advances like sun based warming, photovoltaic, sun powered warm energy, sunlight based engineering and fake photosynthesis. It is an significant wellspring of environmentally friendly power and its advancements are comprehensively described as either uninvolved sunlight based or dynamic sun powered contingent upon how they catch and disseminate sunlight based energy or convert it into sun based power. Dynamic sunlight based methods incorporate the utilization of photovoltaic frameworks, concentrated sun based power and sun oriented water warming to outfit the energy

Fig 3.1: Block diagram of Solar-based weed/grass plucking robot with remote

The voltage values are given as various forces.

As a result, the rechargeable battery is charged for our next action. As a result, it gains the ability to specify other resources. Our programme uses an Arduino Uno to count steps and display how much voltage is generated in the LCD display by implementing a code that indicates the LCD interface pin to pass the required library modules of calculating voltage as well as led indicator to initiate the starting stage. Calculating steps is a necessary prerequisite for indicating the current stage at each interval.

4. Actual Progressive Work Till The Date:

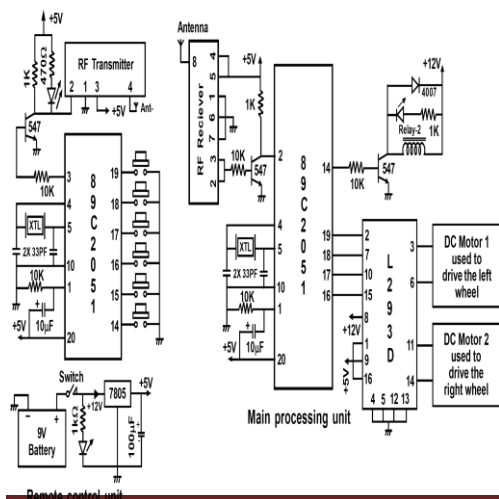


Fig 3.1: Solar-based weed/grass plucking robot with remote

As our project progressed, we completed testing of the circuit illustrated in the diagram above. In this way the issue meaning of the project is controlling the weeds in the agribusiness field. Additionally the work expected for weeding is expensive, time consuming and hard to organize, while the principal objective is to fabricate a machine that will beat the above bottlenecks. In this task we are going to set up a weed eliminating machine for farming area and to decrease the human exertion of weed end weed end furthermore, to make a machine for minimal expense utilizing sun oriented energy. Later model plan and manufacture will be finished.



Fig 4.1: Solar panel

5.Future perspective:

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. These vehicles should be capable of working 24 hours a day all year round, in most weather conditions and have the intelligence embedded within them to behave sensibly in a semi-natural environment over long periods of time, unattended, while carrying out a useful task. Moreover, such a system may have less environmental impact and therefore instead of using fuel energy such as diesel or petrol, it is better to utilize electric energy gathered from solar panels. Keeping all above points in mind, this specific special purpose machine in the form of moving vehicle is designed for cleaning the weeds in farm lands.

6.Conclusion:

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.

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.

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Architecture, programming &

Applications

