

Smart Solar Grass Cutter For Lawn Coverage

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Abstract— The present technology commonly used for cutting the grass is by using the manually handle device and gasoline powered. In this project we are going to automate the device for cutting the grass. The device consists of linear blade which is operated with the help of the motor the power supply for the motor is by using battery. The battery can be charge by using solar panel. In case of any obstacles in the path it is sensed by using an Ultrasonic sensor and two Infrared sensors.

Keywords—grass cutter, dc motor, linear sharp blade.

I. INTRODUCTION

In the time where technology is merging with environmental awareness, consumers are looking for ways to contribute to the relief of their own carbon footprints. Pollution is manmade and can be seen in our own daily lives, more specifically in our own homes [1]. Green technology initiatives are being support by both the government and cooperates business. New design for an old and outdated habit will help both the consumer and the environment [2]. A grass cutter is a machine consists of variety of components such as blades, rotor and motor used in household applications in order to cut the grass up to some particular height that can be varied according to the design criteria of grass cutter blades. The grass cutter run by electric source and comprising rotating cutters were emerged in early nineties [3]. Edwin Beard Budding invented the first type of lawn in 1830 which used the basic idea of a local cloth mill and operated for trimming cloth. The same idea to trim the grass was carried out by cutting wheel made of cast iron and mounted to the shaft [4]. Ransoms of Ipswich started manufacturing the Budding's lawn mower by 1832 which is today's largest manufacturer of lawn mower. Thomas Green developed a new kind of lawn which ran by chain drive and called 'silensmessor' because of low level of noise. By the end of 19th century, the heavy powered mowers were running the market. In 1919, the first gasoline powered motor was invented by Colonel Edwin George [5]. Nowadays, newest technologies are utilized and hover concept is used to lift the mower to different regions incorporate with catalytic converters in order to reduce the air pollution. In order to shut down all the problems, the RC-SOLAR type of mower is currently employing in grass cutting machine [6]. Grass cutters are broadly used in gardening, agriculture, sports, and public. The gasoline powered machines are the ones that cause health hazards and produces noise pollution and vibration. Moreover, it affects the human health irreversibly [7]. It is a big concern for the public users because an average grass cutter works for around 8-9 hours. In workplaces and job locations, the care is taken by the

authorities but for public, it becomes a worried situation because the sound level of irritating noise produces by the mower is greater than 85 decibels [8]. This project of a solar powered grass cutter will relieve the consumer from mowing their own garden and will reduce both environmental and noise pollution. This design is meant to be an alternate green option to the popular and environmentally hazardous gas powered lawn mower. Ultimately, the consumer will be doing more for the environment while doing less work in their daily lives.

II. SYSTEM COMPONENTS

Various components which are used to implement the grass cutter system are presented here. These components are readily available in the market and quite affordable.

A. Solar panel:

The solar panel is used to capture the solar radiation to convert into electric energy. For our designed system 12V solar panel is used.



Fig. 1: Solar panel

B. Rechargeable battery:

To store the electric energy produced by the solar panel the designed system consist of 12V 7Ah rechargeable battery which works around 6 hours.



Fig. 2: Rechargeable battery

C. Ultrasonic sensor:

The designed system main component is Ultrasonic sensor which is eye for the model. The range is set for 30 cm and less so that if any object present in front of the designed system.



Fig.3: Ultrasonic sensor

D. DC motors:

To movement of the designed system is done through four 12V DC motor of 3 Kg torque which is sufficient to move our model in gardens. The design is also provided with 2000 rpm 12 V DC motor with sharp linear blade.



Fig.4: DC motor

E. Single Channel 315mhz Rf Remote Control Switch Receiver Transmitter

To automate the design ON/OFF controller is used which is based on the radio frequency transmitter and receiver module.



Fig. 5: Single Channel 315MHz RF Remote Control Switch Receiver Transmitter

III. METHODOLOGY

The figure 5 shows the block diagram of “Smart solar grass cutter with lawn coverage”. This design contains a microcontroller, solar panel, rechargeable battery, DC motors and sensors. Adding these elements together, we get our smart solar grass cutter device. The sensors are the eye of our device. Here we used an ultrasonic sensor and IR sensor.

Ultrasonic sensor is a trans-receiver, it will detect the obstacles present in front of the device by receiving echo signals and take deviation until obstacles is cleared. IR sensor is also used for obstacle detection as it is placed side of Ultrasonic sensor, it detects the objects in front of the wheel if any object present the motor stops automatically till the obstacle is cleared. Solar panel receives solar energy from the sun and it converts solar energy into electrical energy by photovoltaic principle. Electrical energy is then stored in the battery. The battery used here is Lithium polymer battery because it gives a higher power for the motor and battery can be recharged by using power supply and solar energy. The heart of the machine is a battery-powered dc electric motor. The present technology commonly used for trimming the grass is by using the manually handle device. In this project we have automated the machine for trimming the grass. The device consists of linear blade which is operated with the help of the motor the power supply for the motor is by using battery. The brain part of the machine is Micro Controller. The grass cutter and vehicle motors are interfaced to a microcontroller that controls the working of all the motors.

IV. BLOCK DIAGRAM

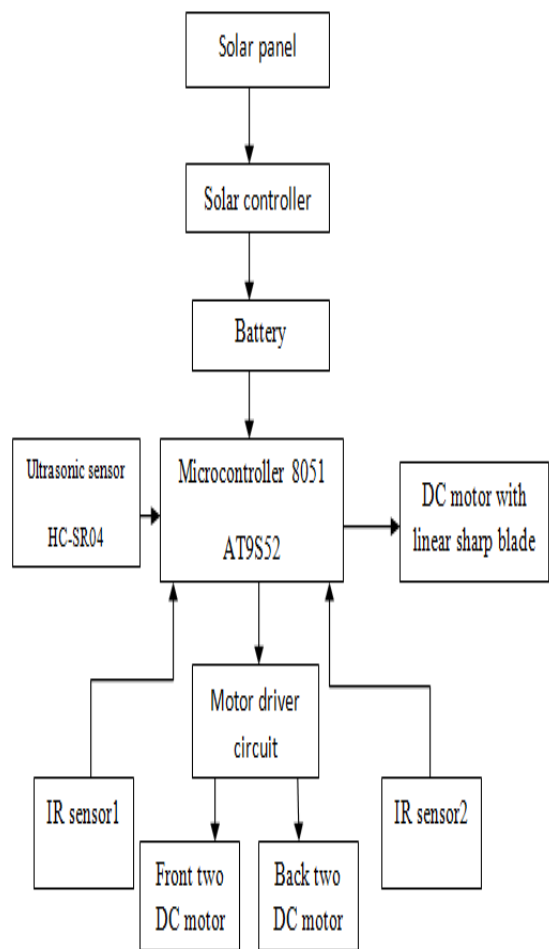


Fig. 5: Block diagram of solar grass cutter

V. FLOW CHART

The flow chart for robot control is presented in Figure 6.

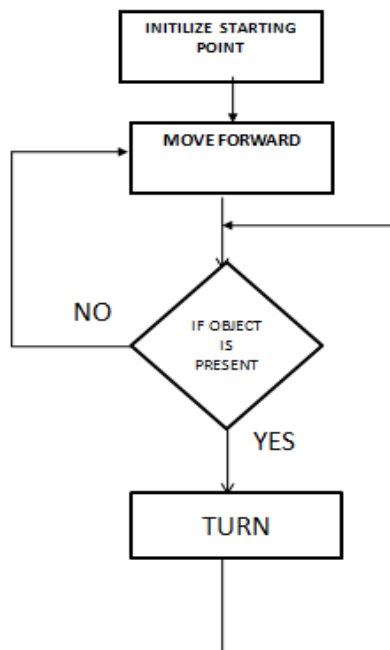


Fig. 6: Flow chart for the process



Fig. 7: Practically implemented solar grass cutter

VI. APPLICATIONS

- Home gardens
- College campus
- Botanical garden
- Lawn coverage
- Sports like cricket, football ground and gulf court etc...

VII. CONCLUSION

The device with different combinations of technology this will helps to reduce the human effort and give maximum efficient output for the work. The device proves the possible replacement for the gasoline powered grass cutter. In order to enhance the beauty of home lawns and gardens, smart solar grass cutter device is the best option. People can easily maintain and gardens without any problem. Now a days there

are of options starting from simplest push along grass cutter to most advanced solar grass cutter device.

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