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Lawn Mower Technology using PLC system

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Abstract: *In now days, renewable energy system and automation is basic requirement of world. Presently, manually and nonrenewable devices is commonly used for many system working. For cutting of lawn grass in time, the old grass cutters need person is available and needs to supply from which is available from state board. Now need to be replacement this system by automated one which is also renewable energy source where the system will work for guidance as well as automatically obstacle detection. This paper introduces the lawn mower and the different innovations developed from our side with the functionality of the different styles over the ages, especially the powerful mowers of today. We are designed a model using IR sensors, ultrasonic sensors which are used to cut grassing lawn automatically by obstacle detection. We developed hardware of same concept successfully using PLC system.*

Keywords: *cutter, DC Motor, PLC, solar panel.*

I. INTRODUCTION

A lawn mower system is used to cut a grass on lawn to a controlled height from earth. The cutting blades may be powered either by hand, may have an electric motor or an internal combustion engine to rotate their blades for cutting purpose. There are several types of mowers, each suited to a particular purpose. The smallest types are used for small residential lawns and gardens. For large lawns Riding mowers are suitable. The largest mowers systems are mounted to tractors for large expanses of grass such as golf courses and municipal parks. But with advancement in technology is needed in that system which being converted to renewable and automatic these days. Automatic lawn mower is a system which cuts the grass from lawn automatically. It can be stated as a machine or robot that helps people to do cutting grass work. The renewable automatic lawn mower will cut the grass in lawn with a preset setting done by the user. Some other lawn mowers available in market, this requires electrical supply operated on battery which further needs to charge from state board electricity. Through a using of sensors, this robot will not only work on the lawn, it will avoid and detect objects and humans.

II. PROPOSED METHOD

There is lots of labor charges are used for a work of simple grass cutting at lawn. Sometimes electric and labor charge both costs are gives a heavy expense. The working of or system solar powered grass cutter is based on Law of Energy Conservation. It has a solar panel mounted in such a way that it can receive solar radiation with maximum intensity easily from the sun. These solar panels convert solar energy into electrical energy. This energy is further stored in batteries by using a solar charger, for to increase the current coming from the solar panels while batteries are charging, it also isolates the solar panels from the batteries when fully charged. As well as supply to the system when sufficient sun light is available. For reducing human effort so many big and small equipment's are developed.

In our development solar panel charges the battery as well as supplies to system if we want to use it in day time. When we start the system it starts the cutting motor that motor cutting blades are already attached. And also starts moving forward even if any obstacle is not founding in the route. If any obstacle is fount to the sensor it stops to move forward move few second backward and move toward right hand side of lawn, after that again start moving toward forward even not finding any barrier or obstacle. Now if again obstacle found it turns towards left hand side and then goes forward the procedure is as same until all task will not completed. If you want to cut the grass at night time system will gate electrical power from battery which is charged by solar panel at day time.

III. TOOLS AND SOFTWARE

A. PLC

A programmable logic controller, PLC, or programmable controller may be a electronic computer used for automation of generally industrial mechanical device processes, like management of machinery on industrial plant assembly lines, amusement rides, or light fixtures. PLCs are utilized in several machines, in several industries. PLCs are basically designed for arrangements of digital and analog inputs and outputs, extended temperature ranges, immunity to electrical noise, and resistance to vibration and impact.

Programs to regulate operation are generally kept in battery-backed-up or non-volatile memory. A PLC is an appropriate example of a "hard" time period system since output results should be made in response to input conditions within a restricted time, otherwise unplanned operation can result.

1) *Features*

- a) Compact PLC
- b) Configurable LED display
- c) Window based software
- d) program for configuration
- e) Size: 48mm*96mm [18]



Fig. 1 PLC

B. *Solar Panel*

Solar panel which receives the light from sun which it further converts it electricity and heat energy. A photovoltaic module/array is designed by number of solar cells are connected together in series and parallel.

Solar energy is a renewable, freely and easily available, clean, energy source from nature. The sun daily produces a huge amount of energy of heat as well as light energy through sustained radiations which is used for heating and electrical energy production. Among the non-conventional sources of energy solar energy is the most promising. Hence we give priority to use the solar energy conversion to electrical energy to run a normal grass cutter.



Fig. 2 Solar Panel

C. *Battery*

The larger size of the battery, the more electrical energy can be stored. Look for a 12 V deep cycle battery that can withstand the numerous charges and recharge cycles. Mostly depending on the size of the battery, normally it will take a minimum of 05-08 hours to fully charge a dead battery from a solar panel that produces 7 Amp of current. In order to more effectively charge a battery within this time from a solar panel, you must need to maximize the amount of charging current by keeping the panel pointed directly at the sun and placing more numbers of solar panel connected with parallel to each other.



Fig. 2 Battery Source

D. Sensor

Ultrasonic/IR sensor is a device that can check the obstacle or an object by using either sound waves or light beam. It measures distance by sending out a sound wave or light beam at a specific frequency and listening for that signal wave to bounce back. By recording the elapsed time between the sending and receiving wave being generated and the sound wave bouncing back.



Fig. 3 Infrared Sensor and Ultrasonic Sensor

E. DC Motor

As we know motor is a device which converts the electrical energy form into mechanical energy form. There are lots of types of DC motors available in market from 5RPM to 5000RPM which is powered by DC current. And some are divided on voltage input for DC motor some common voltage inputs are starts from 3V, 5V, 12V, and 24V. There are advantages for DC motor is it provides excellent of controlling the speed. For better result on our system we used wiper motor of car which works on 12 V DC supply and provide best speed control as we required.



Fig.2 DC Motor

IV. BLOCK DIAGRAM

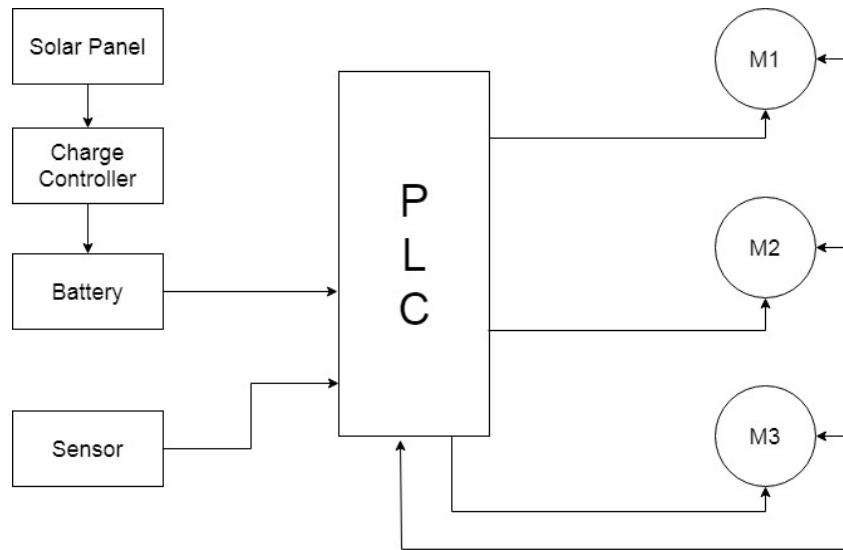


Fig 3. Block diagram

V. CONCLUSIONS

This paper based on renewable solar automatic grass cutter is successfully completed and the results obtained are very satisfactory. This paper is more helpful for a common man which thinking to develop new technique in same system have more advantages like no fuel/Electricity cost, no pollution, this can be operated by using renewable solar energy. This system has a facility of charging the battery while the solar powered grass cutter is in motion. So it is much more suitable and efficient product for grass cutting purpose. The same work can be done in night time also, as there we provide a facility to charge the battery in day time. This grass cutter will meet the challenges of environmental production and cost of operation since there is no cost of fuelling to implementing of the solar based automatic grass cutter machine.

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