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Design and Development of Solar Grass Cutter

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ABSTRACT: A Solar grass cutter is a machine that uses sliding blades to cut a lawn at an even length. Even more sophisticated devices are there in every field. Power consumption becomes essential for future. Solar grass cutter is a very useful device which is very simple in construction. It is used to maintain and upkeep lawns in gardens, schools, college's etc. We have made some changes in the existing machine to make its application easier at reduced cost. Our main aim in pollution control is attained through this. Unskilled operation can operate easily and maintain the lawn very fine and uniform surface look. In our project, —Solar grass cutter is used to cut the different grasses for the different application.

KEYWORDS: Solar Grass Cutter; sliding blades; grass cutting

I. INTRODUCTION

Moving the grass cutters with a standard motor powered grass cutters is an inconvenience, and no one takes pleasure in it. Cutting grass cannot be easily accomplished by elderly, younger, grass cutter moving with engine create noise pollution due to the loud engine, and local air pollution due to the combustion in the engine. Also, a motor powered engine requires periodic maintenance such as changing the engine oil. Even though electric solar grass is environmentally friendly, they too can be an inconvenience. Along with motor powered grass cutter, electric grass cutters are also hazardous and cannot be easily used by all. Also, if the electric grass cutter is corded, mowing could prove to be problematic and dangerous. The prototype will also be will be charged from sun by using solar panels. The hydrogen atoms in the sun's core combine to form helium and generate energy in a process called nuclear fusion. During nuclear fusion, the sun's extremely high pressure and temperature causes hydrogen atoms to come apart and their nuclei (the central cores of the atoms) to fuse to become one helium atom. But the helium atom contains less mass than the four hydrogen atoms that fused. Some matter is lost during nuclear fusion. The lost matter is emitted into space as radiant energy.

The lawn mower or grass cutter is made up of an induction motor, a battery, an alternator, three collapsible blades, and a link mechanism. The power and charging system comprises of an alternator which charges the battery while in operation. The D.C. motor forms the heart of the machine and provides the driving force for the collapsible blades. This is achieved by the combined effect of mechanical action of the cutting blades and the forward thrust of the mower. The system is powered by an electrical switch which completes the circuit comprising the induction motor and the battery. The IR sensor is finding the path to avoid the obstacles and machine damage. The shaft fitting mechanism with which the height of cut is altered.

• What is Solar Energy?

Solar energy is radiant energy that is produced by sun. Every day the sun radiates, or sends out, an enormous amount of energy. The sun radiates more energy in one second than people have used since the beginning of time! Where does the energy come from that constantly is being radiated from the sun? It comes from within the sun itself. Like other stars, the sun is a big ball of gases- mostly hydrogen and helium atoms.

II. PROJECT DESCRIPTION

- Solar Operated Lawnmower
- Our project is a battery powered automatic lawn mower



- The user will wirelessly control the mower along a desired path

Function:

- Mower will have the ability to be controlled remotely
- It will be able to store the desired mowing path in memory
- It will have wheels that control forward and backward movement as well as turning
- Wireless interaction between mower, base station, and control unit

III. WORKING

Coming to the working of solar powered grass cutter, it has panels mounted in a particular arrangement at an angle of 45 degrees 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 as studied earlier. Now 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 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.

Main Parts:

- Solar panels
- Wiper motor
- 12 V Battery
- 9 V Battery
- Chain drive
- Blades
- Frame
- Wheels
- Sprockets

Advantages:

They can be installed and pulled by hand.

- Low maintenance
- Unattended operation
- Long life
- Compact size and portable
- Easy to move from one place to another place
- Operating principle is simple.
- Non-skilled person also operate this machine



Disadvantages:

Solar energy makes use of a renewable natural resource that is readily available.

- Large time required to remove the grass
- Manually operated
- Difficult to operate in rainy seasons

IV. DESIGN OF SYSTEM

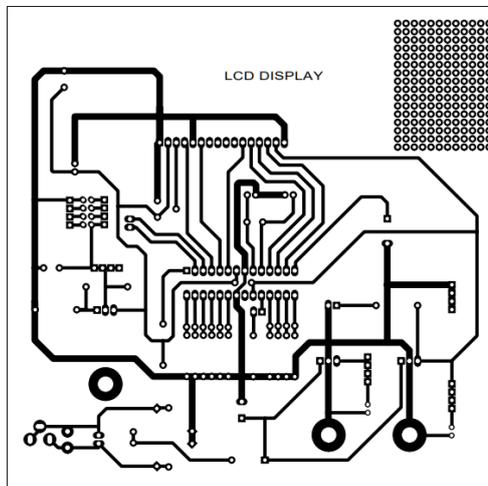


Fig. 1 PCB Layout

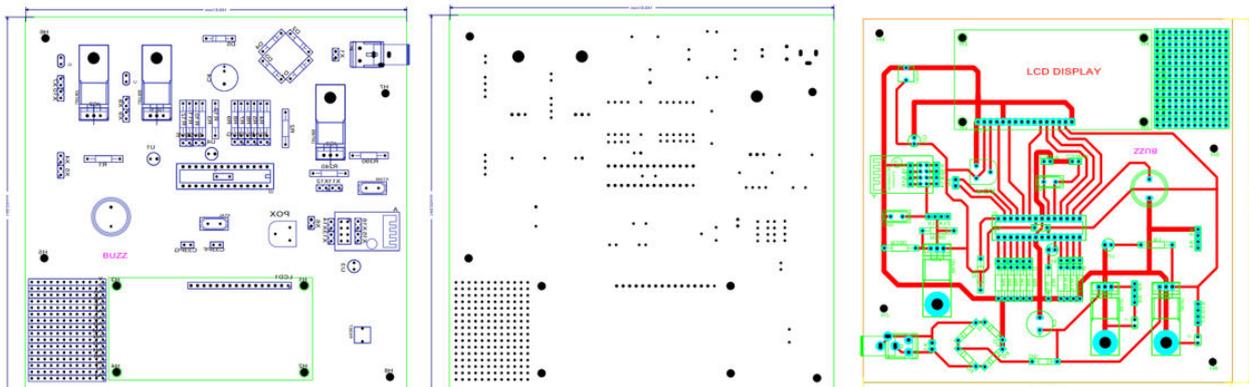


Fig. 2 LCD Display

- **Selection of component:**

Power is a fundamental factor for this project we have to draw the power from two lead acid batteries. Those lead acid batteries get charged by a solar panels.

- **Specification of battery**

Two Lead acid batteries connected in Parallel. Each battery capacity 8Ah.



- **Electronics:**

This Solar Grass Cutter is equipped with many electronic components like sensors, actuators, micro controllers. For supplying they power through battery and for various applications we designed many electronic components.

- **Micro controller circuit:**

A microcontroller circuit was built for controlling of sensors, GPS, etc. also tested the interface of microcontroller and sensors. Only required number of DI, AI and PWM are added as required for this circuit.

- **Step-down circuit**

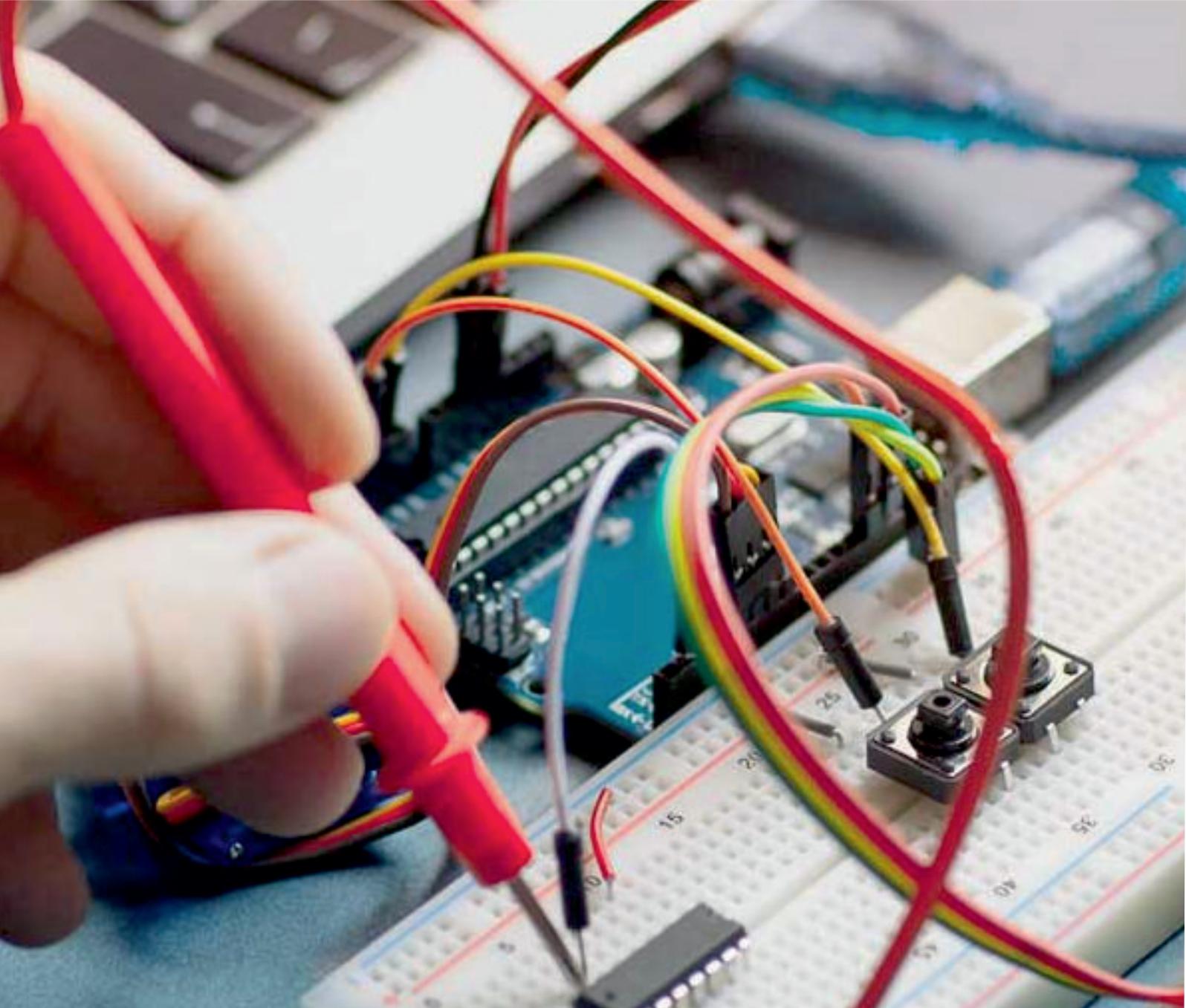
There was a need of 5V to power up the microcontroller and the battery gave an output of 24V. We needed to design a circuit which would convert 24V to 5V. Using NI Multisim the required circuit is designed as seen in figure7, the circuit was tested with a liner IC which converts 24V to 5V efficiently with a negligible drop in it. Simulation the circuit in Multisim was done for betterment before building it for real application.

V. CONCLUSIONS

In this project an efforts are made to design and develop a durable and low-cost solar grass cutter which makes it easy for city people as well as for farmers to cut grass easily. It saves lot of time and energy.

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