# Implementation of Solar Powered Intelligent Grass Cutter

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***Abstract*- This is the new innovative concept mainly used for gardening and agricultural field. It is simple in construction and the working process is easy. And it is mostly used in the agricultural field for the cutting of grass. It is worked with help of motor, and it gets power from the solar energy. Solar panel consists of number of silicon cells, when sun light falls on this panel it generate the voltage signals then these voltage signals given to charging circuit. Depends upon the panel board size the generated voltage range is increased. In charging circuit the voltage signal from the board is collected together and stored in the battery.**

***Index terms*- Solar Panel, Arduino, Battery, Bluetooth Module, DC Motor, Grass Cutter**

## I.INTRODUCTION

Now a days there are lots of development work has been pending but there are still some labour power which requires lots of income distribution for a small work. So this is required that some work should have some other alternative so that the labour power wastage can be avoided. So in our project we are trying to make a daily purpose robot which is able to cut the grasses in lawn. The paper work will be done according to the proper application based fabrication. The system will have some automation work for guidance and other obstacle detection. The system will have a power source that is battery and a solar panel will be attached on the top of the robot. 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.

## II.BLOCK DIAGRAM

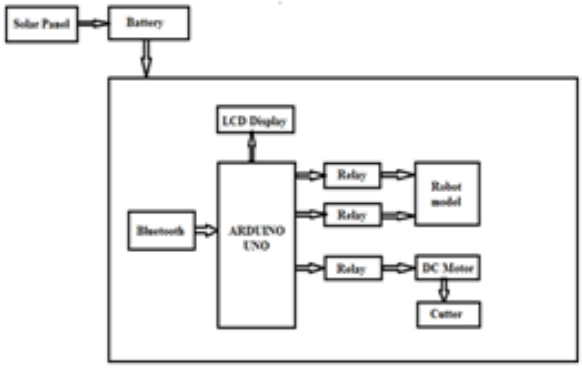


Fig.1. Block Diagram

## III.WORKING 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, are chargeable 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.

## IV.HARDWARE DETAILS

A. DC Motor

In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. A DC motor is any of a class of rotary electrical machines that converts direct current 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 change the direction of current flow in part of the motor.

Fig.2. DC Motor

*B. Solar Panel*

A solar panel is a device that collects and converts solar energy into electricity or heat. It known as Photovoltaic panels, used to generate electricity directly from sunlight Solar thermal energy collection systems, used to generate electricity through a system of mirrors and fluid-filled tubes solar thermal mechanism, used to generate heat solar hot water panel, used to heat water

Fig.3. Solar Panel

Photovoltaic, is in which light is converted into electrical power. It is best known as a method for generating solar power by using solar cells packaged in photovoltaic modules, often electrically connected in multiples as solar photovoltaic arrays to convert energy from the sun into electricity. A solar power technology that uses solar cells or solar photovoltaic arrays to convert light from the sun directly into electricity.

*C. Battery*

It is rechargeable Type. A battery is one or more electrochemical cells, which store chemical energy and make it available as electric current.


Fig.4. Battery

There are two types of batteries, primary (disposable) and secondary (rechargeable), both of which convert chemical energy to electrical energy. Primary batteries can only be used once because they use up their chemicals in an irreversible reaction. Secondary batteries can be recharged because the chemical reactions they use are reversible; they are recharged by running a charging current through the battery, but in the opposite direction of the discharge current. Secondary, also called rechargeable batteries can be charged and discharged many times before wearing out. After wearing out some batteries can be recycled.When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that will flow through an external electric circuit to the positive terminal.

When a battery is connected to an external electric load, a redox reaction converts high-energy reactants to lower-energy products, and the free-energy difference is delivered to the external circuit as electrical energy.

*D. Bluetooth*

Bluetooth is a wireless technology standard used for exchanging data between fixed and mobile devices over short distances using short-wavelength UHF radio waves in the industrial, scientific and medical radio bands, from 2.400 to 2.485 GHz, and building personal area networks (PANs). It was originally conceived as a wireless alternative to RS-232 data cables. Bluetooth is managed by the Bluetooth Special Interest Group (SIG), which has more than 35,000 member companies in the areas of telecommunication, computing, networking, and consumer electronics. The IEEE standardized Bluetooth as IEEE 802.15.1, but no longer maintains the standard.

Fig.5. Bluetooth Chip

The Bluetooth SIG oversees development of the specification, manages the qualification program, and protects the trademarks. A manufacturer must meet Bluetooth SIG standards to market it as a Bluetooth device. A network of patents applies to the technology, which are licensed to individual qualifying devices. As of 2009, Bluetooth integrated circuit chips ship approximately 920 million units annually. It is one of the best communication device to nearer communication.

*E. Control Unit*

Microcontroller is a computer on a chip. Micro suggests that the device is small, and controller tells you that the device' might be used to control objects, processes, or events. Another term to describe a microcontroller is embedded controller, because the microcontroller and its support circuits are often built into, or embedded in, the devices they control. It is temporary storage unit. Arduino is an open source microcontroller which can be easily programmed, erased and reprogrammed at any instant of time. Arduino uses a hardware known as Arduino development board and software for developing code known as IDE. The micro controller board used in our design is Arduino Uno.


Fig.6. Arduino UNO

The Arduino UNO ATmega328 microcontroller is the MCU used in Arduino UNO R3 as a main controller.

ATmega328 is an MCU from the AVR family; it is an 8-bit device, which means that its data-bus architecture and internal registers are designed to handle 8 parallel data signals. Most articles explain the software of Arduino. A good grasp of the electronic design of your Arduino hardware will help you learn how to embed an Ardiuno in the design of a final product, including what to keep and what to omit from your original design. Before we can understand the UNO's hardware, we must have a general overview of the system first.

*F. LCD Display*

A liquid crystal display or LCD draws its definition from its name itself. It is combination of two states of matter, the solid and the liquid. LCD uses a liquid crystal to produce a visible image. Liquid crystal displays are super-thin technology display screen that are generally used in laptop computer screen, TVs, cell phones and portable video games. LCD's technologies allow displays to be much thinner when compared to cathode ray tube (CRT) technology. we can see that there is a disadvantage of this project that some patch of the given area may be left uncut due to the obstacle present, in future, we may interface the bot with a wireless technology where we can control the kit manually and keep a check that it does not go out of the desired area.


Fig. 7. LCD Display

Liquid crystal display screen works on the principle of blocking light rather than emitting light. LCD's requires backlight as they do not emits light by them. We always use devices which are made up of LCD's displays which are replacing the use of cathode ray tube.

*G. Relay*

Fig.8. Relay

Electrical Relays however, are basically electrically operated switches that come in many shapes, sizes and power ratings suitable for all types of applications. Relays can also have single or multiple contacts within a single package with the larger power relays used for mains voltage or high current switching applications being called Contactors. As well as the standard descriptions of Normally Open, (NO) and Normally Closed, (NC) used to describe how the relays contacts are connected, relay contact arrangements can also be classed by their actions. Electrical relays can be made up of one or more individual switch contacts with each "contact" being referred to as a pole. Each one of these contacts or poles can be connected or thrown together by energizing the relays coil and this gives rise to the description of the contact types as being.

## V. RESULTS AND DISCUSSION

This project is more suitable for a common man as it is having much more advantages i.e, no fuel cost, no pollution and no fuel residue, less wear and tear because of less number of moving components and this can be operated by using solar energy. Especially no skill is required to operate the grass cutter machine. This system is having facility of charging the batteries while the machine is under motion. In this paper, the work done on lawn mower will meet the challenge of environmental production and low cost of operation. This lawn mower has been developed for the use of residences and establishments that have lawns where tractor driven mowers could not be used.

## VI. CONCLUSION

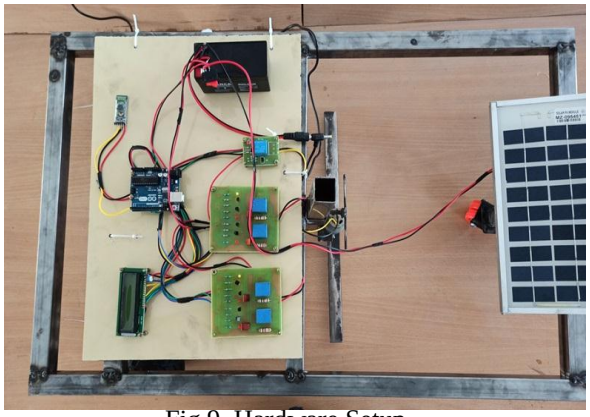

Fig.9. Hardware Setup

Our paper entitled solar powered intelligent grass cutter is successfully completed and the results obtained are satisfactory. It will be easier for the people who are going to take the project for the further modifications. This project is more suitable for a common man as it is having much more advantages i.e, no fuel cost, no pollution and no fuel residue, less wear and tear because of less number of moving components and this can be operated by using solar energy. So in future it is expected to run all equipments by using solar energy.The proposed grass cutter will meet each and every challenges of the environment. The same thing can be operated in night time also, as there is a facility to charge these batteries in day light.

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