SOLAR GRASS CUTTER

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Abstract : **Traditional grass cutter which mainly runs on petrol emits harmful gases which pollutes the environments. This Traditional grass cutters have large engines which make them bulky and heavy. Also it causes air and noise pollution. It requires periodic maintenance and a periodic clean wash.**

Solar grass cutter is an innovative technology of cutting grass which is powered by solar energy. It is an Environment friendly device which does not cause any harm to the environment. In today's world the labour charge for cutting the grass is increasing. This project aims at developing a portable solar operated grass cutting device, as there is power shortage and it also focuses on reducing manpower. Automatic solar grass cutter will reduce the effort required for cutting grass in the lawns.

It consists of ESP8266 which is a low cost microchip and has a microcontroller capability. Solar panel is connected to the battery. Then this battery will run the motor. Belt drive is used to connect this motor to the blade shaft. This will rotate the blade in high speed, cut the grass. Sensors are provided which is used to detect and avoid the unnecessary objects in the field during operation.

Index Terms – Solar plate, ESP8266, Grass Cutter

I. INTRODUCTION

In today's modern world, Environmental Pollution is one of the greatest problems that the world is facing. Gas powered lawn mowers emits harmful gases that can pollute the environment. Solar energy is a renewable free source of energy unlike other fuels. Using this solar energy for giving power to the new high tech solar grass cutter will reduce cost of fuels. A grass cutter is a machine that uses revolving blades to cut a lawn to an even height. Traditional lawn mowers consists of large engines which make them very heavy and they require high human strength to move. Besides it makes lots of noise and may irritate the user. But with improvement in technology and things being converted to mobile and automatic these days, traditional grass cutters should be replaced by the efficient, power saving and smart ones.

Automatic grass cutter is a machine that automatically cut the grass. The automatic grass cutter will do the task of cutting grass with a preset setting which is set by the user. Unlike other traditional lawn mowers on the market, this design requires no perimeter wires to maintain the robot within the lawn. With the help of sensors this device detects objects and humans in its path and avoid any damage to the human, obstacle and animal.

The concept of grass cutter started during the 19th century. In the earlier period the design of grass cutter was such that it used to pull by an animal such as cow or buffalo. This animal will pull the grass cutter and the grass cutter will do its work cutting the grass along the way the animal walk. Due to animal cannot work for a very long period, human start to reduce the usage of animal and building a machine. So various types of grass cutter have been built over the period of time. Mostly theses have been manually operated but as there is improving in technology, latest lawn mowers work automatically.

Solar grass cutter runs on solar energy. It consists of sensors which detects and avoids obstacles. This device is automated and is capable of cutting grass without the need of any human interaction. So the traditional grass cutters are to be replaced by solar grass cutter which will be capable of cutting the grass in lawn without any human interference.

The reason for robotic lawn mowers are an interesting area of research and work because there are numerous real-world benefits of having a machine that autonomously cuts grass, these include:

- Aid elderly users or those with disabilities who are unable to fulfill this task themselves.
- For users with a busy schedule and rarely gets time to mow, etc.
- Working range is increased due to absence of main supply wires.
- It reduces human effort.

It is a device that can fit into just about everyone's lifestyle, therefore having a device that costs less, whilst accomplishing the same task as the higher end models is a great advantage in order to compete with the current market.

II. LITERATURE SURVEY

- Design and Implementation of Autonomous Grass cutter Robot Controller

This paper focuses on designing an automated grass cutter controller which can use to mower the grass at playground and lawn. It used the concept of sense-act where it does not fully depend on the surrounding workspace. The automated grass cutter has the

feature which can detect the grass. Besides this, it has some sensor such as sonar sensor which is used to detect obstacles, and an encoder to calculate the distance the grass cutter travel together with the GPS system. [1]

- Design and Implementation of a Control Algorithm for an autonomous lawn mower

This paper discuss on the way of implementing GPS system for automated grass cutter path flow. It also stated there they used PID controller which increase the performance of the motor speed which can provide better flow. Besides that, their project also included encoder to calculate distance but their encode was made by magnetic and hall sensor which placed around the wheel and it calculate the number of magnetic field strength while moving which will convert the number of magnet to distance travelled. The grass cutter performance is being watch throughout the whole working process at the base station using wireless transmission. [2]

- Design and Modeling a Prototype of a Robotic Lawn Mower

This paper discuss on how to develop a robotic grass cutter with several functions. It objective is to build a grass cutter that do not go out of workspace, do not leave any uncut area, able to avoid collision and the most important that is the robot must be cheap and affordable to everyone. Basically it used PIC microcontroller to perform the grass cutter working process or to run the lawn mower. [4]

- Survey of Robotic Lawn Mowers

This paper discuss on various types of lawn mowers available in market today. It discusses different companies and their products and compares them with others.

III. BLOCK DIAGRAM

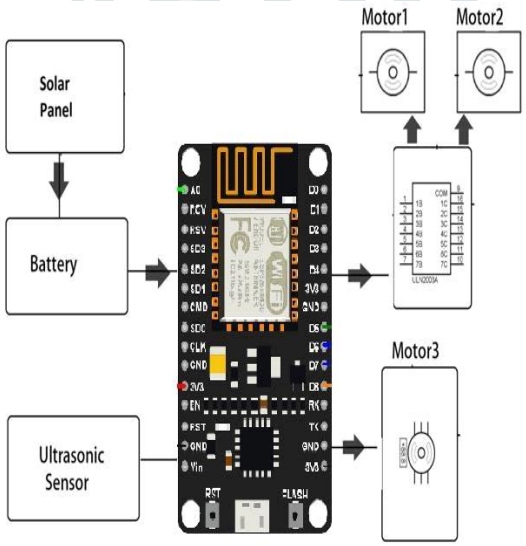

Fig 1. Block diagram

IV. WORKING

Solar powered grass cutter 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. This solar panel convert solar energy into electrical energy. Now this electrical energy is stored in batteries by using a solar charge. 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 a two motor, driver 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 rotate with high speed and this makes to cut the grass.

Component Used:

DC Motor

.DC motor is powered by DC current. There are various kind of DC motor such as DC motor, separately excited DC motor and self-excited DC motor. There are various voltage input for DC motor and the most common voltage input for DC motor are 3V,

5V, 12V, and 24V. There are various advantages of DC motor over AC motor where DC motors perform better than AC motors, and DC motor has excellent controlling of speed.

Fig 2. DC Motor

Ultrasonic Sensor:

Ultrasonic sensor is a sensor that uses ultrasonic sound to measure the distance to an object. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back. This sensor works at a voltage of 5V and its working current is 15mA. Maximum and Minimum range of this sensor are mainly 4m and 2cm. Sound wave travel at speed of 340m/s. Figure 3 shows the ultrasonic sensor concept used to calculate the distance.

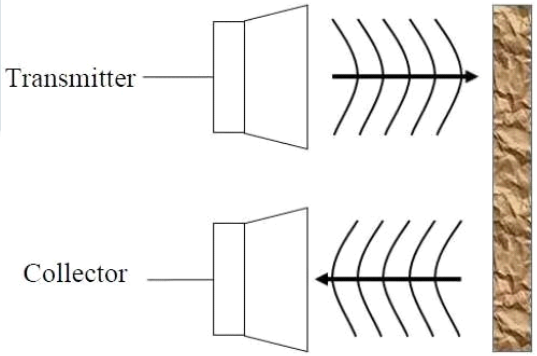

Fig 3: Ultrasonic Sensor Concept

Fig 4. Ultrasonic Sensor

ESP8266:

ESP8266 is a 32 bit Microcontroller. It is a low cost Microchip with full TCP/IP Stack. This small module allows microcontroller to connect to a wifi network It provides unsurpassed ability to embed Wi-Fi capabilities within other systems, or to function as a standalone application, with the lowest cost, and minimal space requirement.

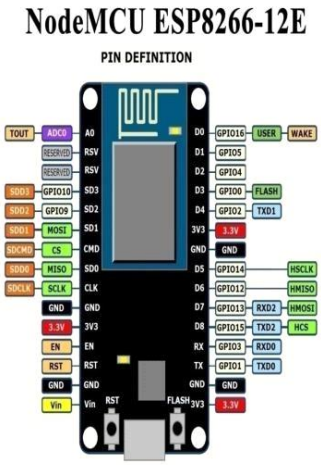

Fig 5. Wi-fi Module ESP8266

Cutter:
This will be used for the primary function of the mower i.e. to cut the grass. More than one cutter can be used in synchronization as well depending on the design.

Battery:
It will provide the energy for the working of the robot. The battery of a two wheelers will be able to provide enough power to drive the robot for its working or for better performance independent multiple batteries can be used.

Wheels:
These will be required for the motion of the body of the robot. The choice of the wheels mainly depends on the shape and size of the grass. It will also depend on the required ground clearance of the robot.

Fig 6. Wheel

V. RESULT

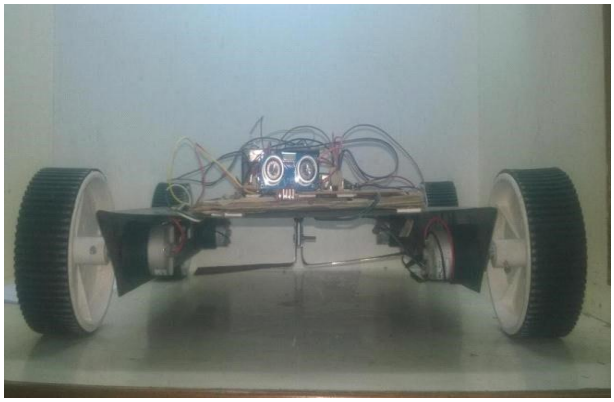

Fig 7. Model setup

VI. Advantages:

As an automatic device, this grass cutter has many advantages, some of which are:

- It reduces human effort and reduces labour cost.
- It has simpler design and construction than most commercial mowers.
- This type of mower is cheaper as compared to commercial mowers.
- It has wider range more than conventional mechanical mowers due to absence of main supply wire.
- It aids elderly users or those with disabilities who are unable to fulfill this task themselves.

VII. CONCLUSION

This project is more suitable for a common man as it is having much more advantages i.e., no fuel cost, no pollution and less wear and tear because of few number of moving components which is operated by using solar energy. An automatic grass cutter with several features has been proposed. Several related works has been studied in order to gain idea on how to build an automatic grass cutter. This grass cutter can also be operated at night time also, as there is a facility to charge these batteries in day light.

VIII. REFERENCES

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