AUTOMATED SOLAR GRASS CUTTER

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ABSTRACT *These days we are facing the problems like pollutions, power cut problem etc. In order to overcome these problems, we have thought about the device, which can be performing its functions without causing any of these problems. So we have thought of doing the project on cutting grass, this uses the renewable source of energy for its operation like solar energy. This project aims at developing a portable solar operated grass cutting device, as there is power shortage. So we have decided to make a solar energy operated device. Solar panel is connected to the battery. Then by connecting inverter to battery DC current is converted to AC current. This will run the AC motor. This motor is connected to blade shaft by the help of belt drive. This will rotate the blade in high speed, cut the grass. This device will help in building of eco-friendly system. Current technology commonly used for cutting the grass is by the manually handled device. In this paper used novel technology. So in this paper we are trying to make a daily purpose robot which is able to cut the grasses in Lawn. The system will have some automation work for guidance and other obstacle detection and the power source that is battery and a solar panel will be attached on the top of the robot because of this reduces the power problem.*

1.INTRODUCTION

he first lawn mower was invented by Edwin Budding in 1830 in Thrupp, just outside Stroud, in Gloucestershire, England. Budding's mower was designed primarily to cut the grass on sports grounds and extensive gardens, as a superior alternative to the scythe, and was granted a British patent on August 31, 1830. [1]in 1995, the first fully solar powered robotic mower became available. The mower can find its charging station via radio frequency emissions, by following a boundary wire, or by following an optional guide wire. This can eliminate wear patterns in the lawn caused by the mower only being able to follow one wire back to the station. A robotic lawn mower is an autonomous robot used to cut lawn grass. A typical robotic lawn mower requires the user to set up a border wire around the lawn that defines the area to be mowed. The robot uses this wire to locate the boundary of the area to be trimmed and in some cases to locate a recharging dock. Robotic mowers are capable of maintaining up to 20,000 m 2 (220,000 sqft) of grass. Automated solar grass cutter are increasingly sophisticated, are self-docking and some contain rain sensors if necessary, nearly eliminating human interaction. Robotic lawn mowers represented the second largest category of domestic robots used by the end of 200Possibly the first commercial robotic lawn mower was the MowBot, introduced and patented in 1969 and already showing many features of today's most popular products. In 2012, the growth of robotic lawn mower sales was 15 times that of the traditional styles. With the emergence of smart phones some robotic mowers have integrated features within custom apps to adjust settings or scheduled mowing times and frequency, as well as manually control the mower with a digital joystick

II.LITERATURE SURVEY:

Husqvarna Husqvarna,(1) a Swedish manufacturer, this year is also introducing its Automated grass cuterto the U. S. market (it's been sold in Europe for about three years). It works much the same as the Robomow with a boundary wire implanted at the border of your lawn. The Husqvarna model, however, takes care of itself. Whereas the Robomow has to be taken out and set up and watched by the owner, the Husqvarna Automated grass cutter lives outside, mows when it's programmed to mow and automatically returns to its base for recharging. The Husqvarna model is also significantly lighter than the Robomow (15 pounds vs. the Robomow's 42 pounds). According to Husqvarna, this not only makes it safer, but it leaves no tracks on the lawn. This complete freedom from even the thought of

mowing, however, does have its price -- $1,995 plus $200 to $300 for installation.
Edwinbeard(2). The lawn mower was invented by Edwin Beard Budding in 1830 in Brims combeand Thrupp, just outside Stroud, in Gloucestershire, England. Budding's mower was designed primarily to cut the grass on sports grounds and extensive gardens, as a superior alternative to the scythe, and was granted a British patent on August 31, 1830
John Ferrabee, el.al (3) :Two of the earliest Budding machines sold went to Regent's Park Zoological Gardens in London and the Oxford Colleges.In an agreement between John Ferrabee and Edwin Budding dated May 18, 1830, Ferrabee paid the costs of enlarging the small blades, obtained letters of patent and acquired rights to manufacture, sell and license other manufacturers in the production of lawn mowers. Without patent.
Thomas Green & Son of Leeds (4) : the 1850s, Thomas Green & Son of Leeds introduced a mower called the SilensMessor (meaning silent cutter), which used a chain drive to transmit power from the rear roller to the cutting cylinder. These machines were lighter and quieter than the gear-driven machines that preceded them, although they were slightly more expensive.The rise in popularity of lawn sports helped prompt the spread of the invention. Lawn mowers became a more efficient alternative to the scythe and domesticated grazing animals

III.METHODOLOGY

The 10 watts solar panel is used to charge the batteries which are rechargeable. the solar panel gives maximum 18v and 580mA current .we need charging circuit between solar panel and batteries .The charging circuit has voltage regulator which regulates voltage to 15v and one transistor to amplify the maximum current to circuit and diode is used .we use 12 voltage battery for entire circuit and another 12v volts for cutting blade. The microcontroller 8051 takes the input from the ultrasonic sensors , when any interrupt or obstacle occurs the ultrasonic sensor senses the obstacle and gives feedback to microcontroller then according to the program which was
given to microcontroller its turns left or right .It waits upto some delay and senses again and same procedure works.if no detection occurs to ultra sonic range then it moves forward until it finds some detection. B The movement of bot is done by using the two DC motors of 100 rpm .The motors are driven by using motor driver (L293D) .It is aslo known as H-Bridge .The main purpose of using motor driver is because that DC motors require the minimum voltage as 9v as input.But the microcontroller gives output as only 5v so we require 9v to 12v for driving the motors.So we use motor driver which takes 5v as input and gives the 12v for motors .The L293D motor driver drives only two motors which can move in both directions. And the cutting blade is used to cut the grass.to cut any type grass we need high rpm motor , so we used 1400 rpm motor for cutting blade .The motors runs directly by 12v rechargeable battery .The DPDT switches are used for movement of bot and cutting blade separately.
The methodology for this project is similar to the prototype analysis process. In this project we are fabricating a prototype of the sola powered grass cutter. The methodologies of these attachments are explained in few sub- headings.

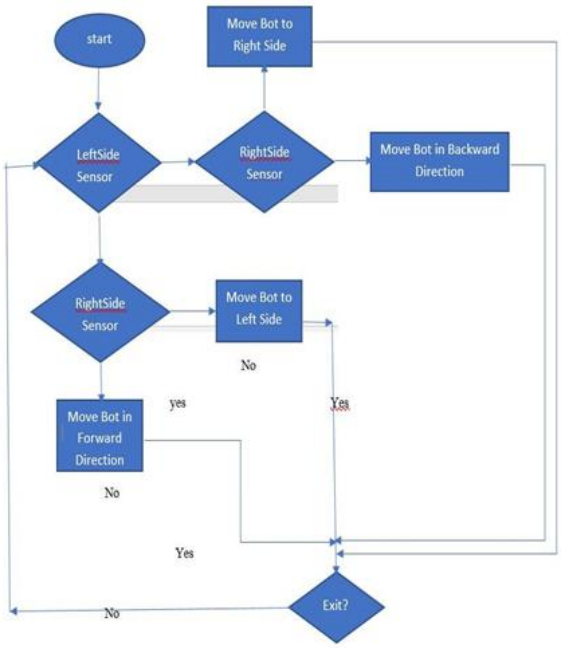

Figure 2: Grass cutter Algorithm

IV.EXPERIMENTAL SETUP.

1. COMPONENTS OF ATTACHMENT 2. WORKING OF SOLAR GRASS CUTTER

Component of attachment: The main components of the solar powered grass cutter are,

1. Solar panels
2. Batteries
3. DC motor
4. Solar charger
5. Mechanism used
6. Circuitry
7. Blades

WORKING OF SOLAR POWERED GRASS CUTTER:

1. 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.
2. These solar panels convert solarenergy into electrical energy as studied earlier. Now this electrical energy is stored in batteries by using a solar charger.
3. 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.
4. 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.
5. 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

V.RESULT:

Our project fully automated solar grass cutter is successfully completed and results are obtained satisfactorily.

Fig3: ChargingThroughSolarPanel.

CALCULATION OF GRASS CUTTER**:**

Volume of the blade (V_b) = Length * Breadth * Thickness

= 0.03 * 0.2 * $1.6*10^{-3}$

= $9.6 * 10^{-6}$ m^3

Weight blade is can be given by

$W_b = \rho gv$

= $7290 * 9.81 * 9.6 * 10^{-6}$

= 0.686 N

W_b = 0.686 N

Torque of blade:

T_b= Weight of blade * Radius of blade

T_b = 0.686 * 0.01

= $6.86 * 10^{-3}$ N-m

Power,

$P = 2\pi NT_b / 60$

= $2*\pi* 300 * 6.8 * 10^{-3} / 60$

= 2.77 W

P = 2.77 / 748

= 0.003 hp

CONCLUSION:

Our project entitled Manufacturing of solar powered grass cutter is successfully completed and the results obtained aresatisfactory. It will be easier for the people who are going to take the project for the further modifications. This project is moresuitable for a common man as it is having much more advantages i.e, no fuel cost, no pollution and no fuel residue, less wear andtear because of less number of moving components and this can be operated by using solar energy. This will give much more physical exercise to the people and can be easily handled. This system is having facility of charging the batteries while the solarpowered grass cutter is in motion. So it is much more suitable for grass cutting also. The same thing can be operated in night time also ,as there is a facility to charge these batteries in day light.

The mechanism which we used is scotch yoke mechanism does not given excepted efficiency. This efficiency can beincreased by using some other mechanism. and speed of motor is reduce because we have used heavy material and this materialcan be replaced by using light weight material .and design of blades should be done based on types of grass is used to cut. Theproject which we have done surly reaches the average families because the grass can be trimmed with minimum cost and

withminimumtime Finallythis projectmaygive an inspirationtothe peoplewhocan modifyand canobtainbetterresults.

FUTURE SCOPE:

We completed our project successfully with the available sources. But the results and modifications are not up to the expectations.This can be furtherimprovedbyincorporating thefollowingmodificationstoobtain betterresults.

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