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AUTOMATED SOLAR GRASSCUTTER USINGESP32 AND GSM

Mrs A.Haritha[1], B.Yashwanth[2] ,A.Navya[3], B.Shashivardhan[4]

Assistant Professor[1], UG Students[2, 3, 4,]

Department of Electronics and Communication

Engineering TKR College of Engineering and Technology, Hyderabad, India.

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.

I. INTRODUCTION

The first lawn mower was invented by Edwin Budding in 1830 in Thrupp, just outside Strode, in Gloucester shire, England. Buddings 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 tothe 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 Mow Bot, 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 witha digital joystick

LITERATURE REVIEW OF EXISTING SYSTEM

1. Husqvarna

Husqvarna, a Swedish manufacturer, this year is also introducing its Automated grass cuter to the U. S. market (it's been sold in Europe for about three years). It works much the same as the Robomow with aboundary 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 $300for installation. It's available in limited quantities this year from select dealers.

The company also plans next year to release a solar-powered model to the U.S. market. Husqvarna Auto Mower and Solar Mower work independently. A boundary loop wire holds the automated grass cutter to the lawn and a search loop ensures that it returns to the docking station for battery recharging.

The solar Powered version does not need a charging station and will be in production next year. Bothmowers share similar features, the only difference is the power source.

Almost silent and environmentally friendly. The boundary loop wire (red) defines the Auto Mower's cutting area whilst the search loop wire (yellow) directs the mower to the charging station. The boundary loop is also laid out around trees and surfaces of the lawn which will not be cut. The lawn mower changes direction if it touches garden furniture, a tree or other solid objects, yet is able to cut under bushes and hedgerows. You can program the cutting height between 30 and 95 mm to achieve a lawn just the way you want it. Dimensions:(L) 71 cm, (W) 60 cm, (H) 26 cm.

I. Technical Solutions:

Another example is called the Lawn Ranger described by Rafael's and developed by Technical Solutions of Frederick, Md. The design uses an onboard computer to control the mower and interact with sensors that guidethe robot. The robot has two modes – operation :remote mode in which an individual guides the mower aroundthe outer perimeter of a person’s yard and around any obstacles in its path. The system is switched to automaticmode in which the robot’s infrared sensors make a comparison between cut and uncut grass. The mower continues this process until it completes the job. The inventor was seeking to manufacture the prototype at a cost of $900 with the intention of creating larger models for the future.

II. OBJECTIVE:

Automated solar grass cutter is a fully automated grass cutting robotic vehicle powered by solar energy that also avoids obstacles and is capable of fully automated grass cutting without the need of any human interaction. The system uses 12V batteries to power the vehicle movement motors as well as the grass cutter motor. We also use a solar panel to charge the battery so that there is no need of charging it externally. The grass cutter and vehicle motors are interfaced to an 8051. family microcontroller that controls the working ofall the motors.

It is also interfaced to an ultrasonic sensor for object detection. The microcontroller moves the vehicle motorsin forward direction in case no obstacle is detected. On obstacle detection,ultrasonic sensor monitors it and the microcontroller thus stops the grass cuter motor so as to avoid any damage to the object/human/animal. Microcontroller then turns the robotic vehicle off until it gets clear of the object and then moves the grass cutter in forward direction again

III. MOTIVATION:

In the conventional grass cutter we add so many things new. Now the grass cutter becomes fully automated. Na there is no any fuel consumption and maintenance part. The grass cutter is totally operated on solar energy,so that the pollution and usage of fuel controlled. The grass cutter becomes automated because of the controllingmechanism i.e. microcontroller. And the obstacles are also detected by the ultrasonic sensor. The speed of vehicle is controlled. The solar grass cutter is used in various applications such as various types of ground.

IV. BRIEF HISTORY:

The first lawn mower was invented by Edwin Budding in 1830 just outside Strode, in Gloucester shire, England. Bedding'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.

Buddings first machine was 19 inches (480 mm) wide with a frame made of wrought iron. The mower was pushed from behind.Cast iron gear wheels transmitted power from the rear roller to the cutting cylinder, allowing the rear roller to drive the knives on the cutting cylinder; the ratio was 16:1.

Another roller placed between the cutting cylinder and the main or land roller could be raised or lowered to alter the height of cut. The grass clippings were hurled forward into a tray-like box. It was soon realized, however, that an extra handle was needed in front to help pull the machine along.

Overall, these machines were remarkably similar to modern mowers An early cylinder reel mower 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 ofenlarging the small blades, obtained letters of patent and acquired rights to manufacture, sell and license othermanufacturers in the production of lawn mowers. Without patent, Budding and Ferrabee were shrewd enoughto allow other companies to build copies of their mower under license, the most successful of these being Ransomes of Ipswich, which began making mowers as early as 1832.

His machine was the catalyst for the preparation of modern-style sporting ovals, playing fields (pitches), grasscourts, etc. This led to the codification of modern rules for many sports, including for football, lawn bowls, lawn tennis and others From the late nineteenth century through the middle of the twentieth century, DC-to- AC power conversion was accomplished using rotary converters or motor-generator sets (M-G sets). In the early twentieth century, vacuum tubes and gas filled tubes began to be used as switches in inverter circuits.

The most widely used type of tube was the thyratron to-DC converters used an induction or synchronous AC motor direct-connected to a generator (dynamo) so that the generator's commentator reversed its connectionsat exactly the right moments to produce DC. A later development is the synchronous converter, in which the motor and generator winding's are combined into one armature, with slip rings at one end and a commentatorat the other and only one field frame.

The result with either is AC-in, DC-out. With an M-G set, the DC can be considered to be separately generatedfrom the AC; with a synchronous converter, in a certain sense it can be considered to be "rectified AC". Given the right auxiliary and control equipment, an M-G set or rotary converter can be "run backwards", convertingDC to AC. Hence an inverter is an inverted converter.

Figure

I. PROPOSED WORK :

BLOCK DIAGRAM:

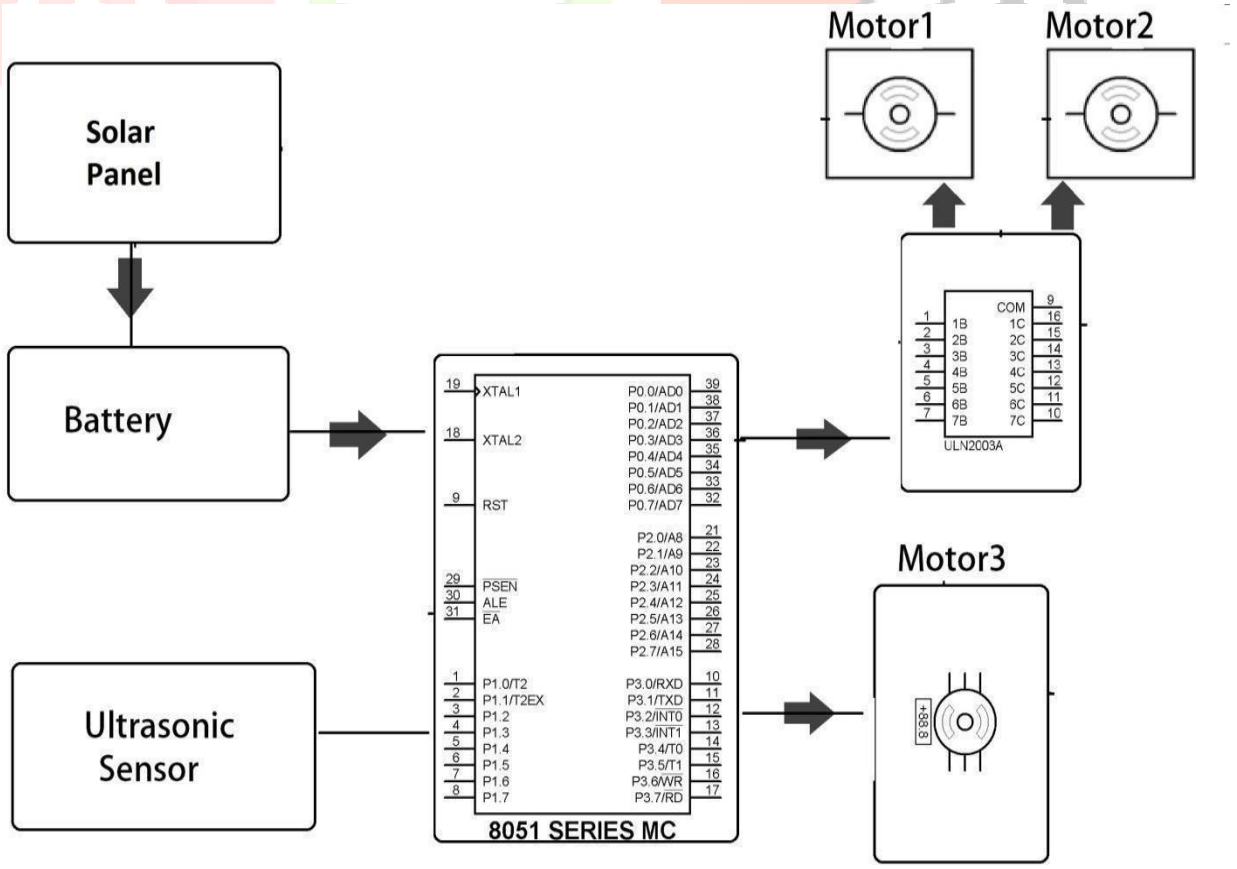

Figure 1

II. METHODOLOGY:

The methodology for this project is similar to the prototype analysis process. In this project we are fabricating a prototype of the solar powered grass cutter. The methodologies of these attachments are explained in few sub- headings. They are a) Components of attachment b)Working of solar grass cutter

A 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

B WORKING OF SOLAR POWERED GRASS CUTTER:

1. Coming to the working of solar powered grass cutter, it has panels mounted in a particular arrangementat an angle of 45 degrees in such a way that it can receive solar radiation with high intensity easily fromthe sun.

2. 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.

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 isprovided. 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 highspeed and this makes to cut the grass

III. Flow chart:

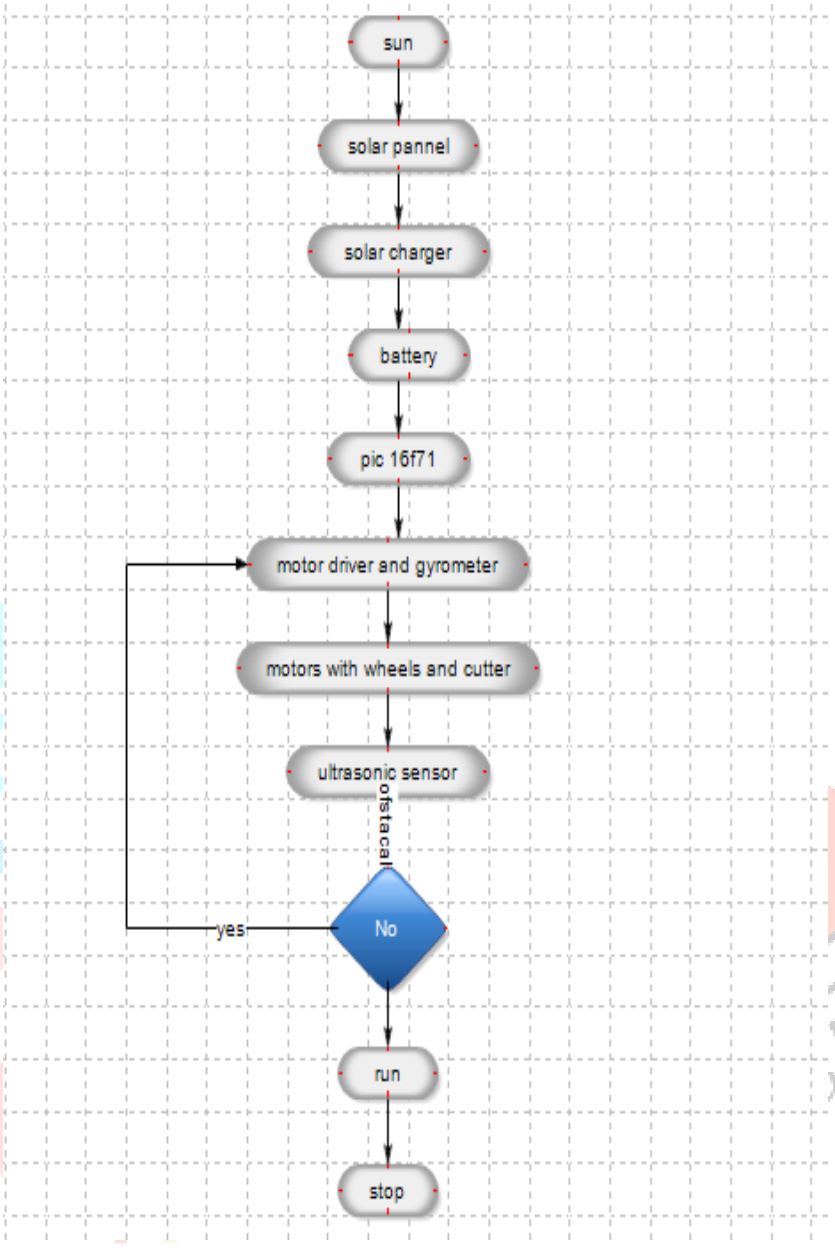

Figure 2

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 further improved by incorporating the following modifications to obtain better results.

The mechanism which we used i.e scotch yoke mechanism does not given excepted efficiency. This efficiency can be increased by using some other mechanism. and speed of motor is reduce because we have used heavy material and this material can be replaced by using light weight material .and design of blades should be done based on types of grass is used to cut.

The project which we have done surly reaches the average families because the grass can be trimmed with minimum cost and with minimum time Finally this project may give an inspiration to the people who can modify and can obtain better results

IV. APPLICATIONS:

1. For cricket ground.
2. The football ground.
3. All garden All Playground

V. ADVANTAGES:

1. Compact size and portable.
2. Easy to move from one place to another place
3. Operating principle is simple.
4. Non-skilled person also operate this machine

CONCLUSION

Our project entitled Manufacturing of solar powered 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. This will give much more physical exercise to the people andcan be easily handled. This system is having facility of charging the batteries while the solar powered 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 i.e scotch yoke mechanism does not given excepted efficiency. This efficiency can be increased by using some other mechanism. and speed of motor is reduce because we have used heavy material and this material can be replaced by using light weight material .and design of blades should be done based on types of grass is used to cut. The project which we have done surely reaches the average families because the grass can be trimmed with minimum cost and with minimum time Finally this project may give an inspiration to the people who can modify and can obtain better results.