International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 03 | Mar 2020 www.irjet.net p-ISSN: 2395-0072

RENEWABLE ENERGY BASED ROBOTIC GRASS CUTTER USING IOT

S.Sathya[1], P.Arunmozhi[2], E.Pavithra[3], N.Anusuya[4], Asst.Prof.K.S.Gowthaman[5]

[1][2][3][4]BE Students, Dept. of Electrical and Electronics Engineering, GCE, Thanjavur, Tamilnadu, India
[5]Asst. Professor [Internal guide], Dept. of Electrical and Electronics Engineering, GCE, Thanjavur, Tamilnadu, India

---

Abstract: The lawn mower is fully automated robotic vehicle powered by solar energy and obstacles are avoided. It is also capable of fully automated grass cutting without the need of any human intervention. To boost the bot movement motors using 12V batteries in this system. Solar panels are used to rise the battery level. The cutter and its motors are interfaced to the PIC Microcontroller that controls the working of all the motors. In this paper the focus is on the design of a charging system for batteries with the help of solar panels. This methodology apply it to a robotic vehicle.

Key words: Solar panel, PIC microcontroller, Geared dc motor.

1. INTRODUCTION

The motor engines which required regular maintenance such as engine oil and greasing. They created a lot of noise and air pollution. In the cold and harsh environment, the fuel powered motors tend to freeze and do not start. These problems are solved by using electric motors. The mover uses battery chorded system causes a range as a limitation and damage to the chords.

2. LITERATURE REVIEW

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 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. 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. Both mowers 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.

3. EXISTING SYSTEM

The switching system consist of two selectors which is selector 1 and selector 2. Selectors are electrically connected to the battery system and function is charge and discharge the battery level. And it is connected between the two 6V batteries the charger module and the load system. Between charger and two 6V battery pack selector 1 is inserted. Selector 1 function is current routing from PV panels to the charger input. It consists of DC to DC converter which is controlled by the micro-controller using a PWM signal applied to its terminals and supplies each battery according to a programmed algorithm. The capacitor is used for voltage conditioning between PV system and charger system.

4. BLOCK DIAGRAM

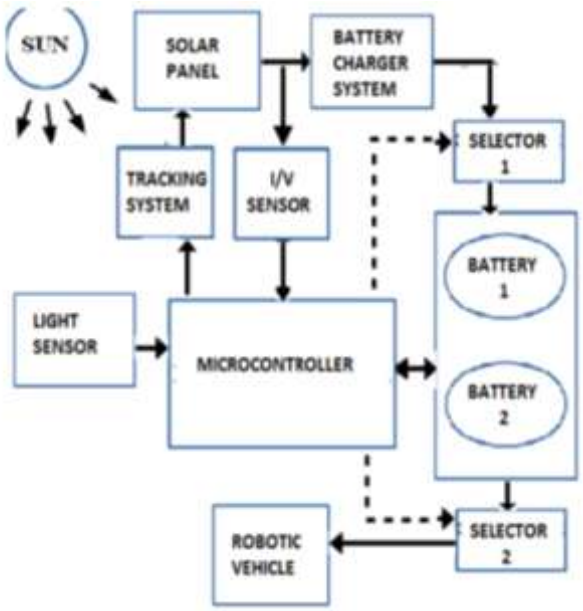

Fig-1: Block diagram of Solar Grasscutter

5. PROPOSED SYSTEM

The solar grass cutter is fully automated robotic vehicle powered by solar panel and obstacles are avoided and it is capable of fully automated grass cutting without the need of any human interaction and it is controlled by using IoT. The system using 6V dual-battery pack to power the vehicle movement motors. The solar panels are used to charge the battery so that there is no need of charging it externally. The grass cutting blades, battery level and vehicle motors are interfaced to a PIC controller. family microcontroller that controls the working of all the motors The Solar controller is taking charge from solar panel and giving it to the battery.

PIC microcontroller runs the program to calculate solar voltage and battery voltage and display's it on LCD Display. Node MCU is used to connect the Rover with the internet so that we can be able to see the battery power left in rover from anywhere around using cayenne app. Because of this we can also control the robot using the cayenne app controls and also can set the rover into auto mode, where the rover itself will choose a path to move according to the boundaries of the filed.

5.1 PROPOSED SYSTEM-BLOCK DIAGRAM

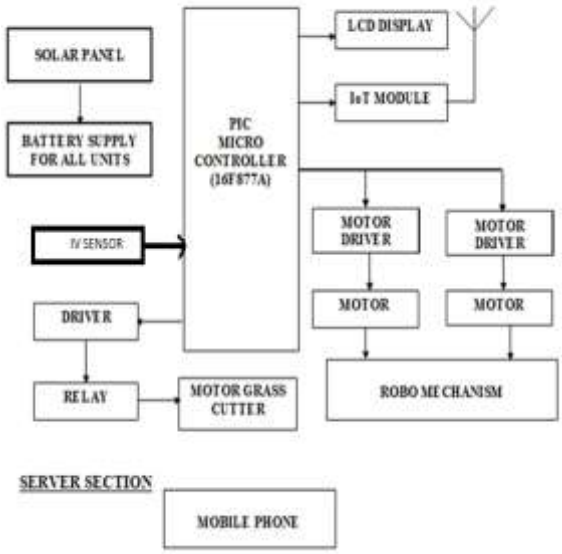

Fig-2: Solar Glasscutter using IOT

Power is being drawn from the panel through the diode (D1). A Zenor diode (D2) is placed at the input terminal to suppress the excess voltage. Capacitor C1 is used to eradicate any unwanted noise/spikes. The voltage divider circuit comprising of (R1 and R2) is used to sense the solar panel voltage. The output from the voltage divider will be delivered to PIC microcontroller analog pin RA0.

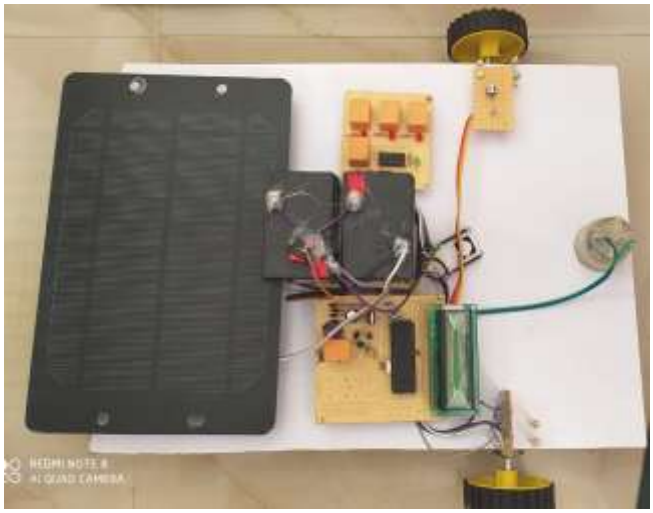

Fig-3: Solar Glasscutter using IOT- kit view

The working of fully automated solar grass cutter has panels (poly crystalline) placed at an angle of 45 degrees in such a way that it can receive high intensity solar radiation easily from the sun.

These solar panels results electrical energy. Now solar charger is used to electrical energy is stored in batteries and increase the current from the panels while

batteries are charging, it also disconnects the solar panels from the batteries when batteries are fully charged and ales charger connects to the panels when batteries down.

The connecting wires used to motor is connected to the batteries. Between these a two motor driver is provided for converting purpose. It starts and stops the working of the motor.

From this motor, the power transmits to the DC motor mechanism and this makes the blade to rotate with high speed and this makes to cut the grass.

5.2 .COMPONENT OF PROPOSED SYSTEM

The main components of the solar powered grass cutter are,

1. DC series motor

2. Node MCU

3. Battery cells

4. Lead acid battery

5. PIC microcontroller

5.2.1 DC SERIES MOTOR

The speed controller works on the fundamental by varying the average voltage sent to the motor. An inefficient method is simply adjusting the voltage sent to the motor. To switch the motor supply on and off instantly. This is a better way to switch the motor. If the switching is fast enough, the motor functioning does not get affected, it only notices the average effect.

5.2.2 NODE MCU

Node MCU is a low cost software and it is open source Iota platform. The firmware is initially included in this software which runs on the software ESP8266 Wi-Fi SoC from Expressive systems and Non-OS SDK used to built this firmware and hardware based on the ESP12 module. The Luascripting language used in the firmware. Node MCU is based on the Lua-cjson project. Various open source projects are used it, which is Lua-cjson and SPIFFS

5.2.3 BATTERY CELLS

Battery Cells are the most important basic component of a battery. The electrolyte and the lead plates are main component of a container. And it can interact in this container. Each battery cell fluctuates in average voltage from about 2.12 Volts when full to about 1.75 volts when empty. Note the main advantage of battery cells a very small voltage difference between a full and an empty cell (another advantage of lead-acid batteries over rival chemistries).

5.2.4 LEAD ACID BATTERY

A lead-acid battery is an electrical storage device. The reversible chemical reactions used to store energy in lead acid batteries. Lead plates or grids combinations are lead-acid batteries and electric energy converted by a diluted sulphuric acid into potential chemical energy and back again. The lead acid batteries consist of electrolyte hazardous to your health and may produce burns. If you direct contact with the lead-acid batteries, it produce other permanent damages in human body

5.2.5 PIC MICROCONTROLLER

We used PIC (16F877A) in this vehicle in order to increase the efficiency of the bot and also account for future modification. The major advantage of PIC microcontroller is its capability to perform in such a small form factor. Also the programming language used for PIC is Embedded C, which is a very popular high level language

6. RESULTS AND DISCUSSION

This paper proposes a fully automated solar grass cutter by using IoT and analyses its performance experimentally. It will be easier for the people who are going to take the project for the further modifications. The solar panel is used for charging the battery, which is environment friendly. It is having some important advantages i.e. pollution free, no fuel cost and no fuel residue and moving components are less and it can be operated by using solar energy. It can be handled easily and it can be operated in day and night time also.

REFERENCES

[1].Vicky Jain, Sagar Patil, Prashant Bagane, Prof.Mrs.S.S. Patil, Solar Based Wireless Grass Cutter, International Journal of Science Technology and Engineering, Vol.2, 2017, 576-580.

[2].Ashish Kumar Chaudhary, Yuvraj Sahu, Prabhat Kumar Dwivedi, Harsh Jain, Experimental Study of Solar Power Grass Cutter Robot, International Journal of Advance Research and Innovative Ideas in Education, Vol.2,2016,68-73.

[3].Pankaj Malviva, Nukul Patil, Raja Praapat, Vaibhav Mandloli, Dr.Pradeep Kumar Patil, Prof Prabodh Bhise, Fabrocation of Solar Grass Cutter, International Journal of Scientific Research in Science , Engineering and Technology, Vol.2,2016,892-898.

[4].Praful P. Ulhe, Manish D. Inwate, Fried D. Wankhede, Krushna Kumar S. Dhakte, Modification of Solar Grass Cutter Machine, International Journal for Innovative Research in Science and Technology, Vol. 2,2015, 711711-714.

[5].T. Karthick, S. Lingadurai, K. Muthuselvan, M. Muthuvanesh, C. Pravin Tamilselvan, Grass Cutting Machine

using Solar Energy, Internation Journal of Research in Mechanical

[6] Divya C. H., Ramakrishna, H. and Praveena Gowda (2013), "Seeding and fertilization using an automated robot", International journal of current research vol.5.