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AUTOMATED GRASS CUTTER USING SOLAR ENERGY

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Abstract: *Nowadays, the gasoline prices are increased day by day, and demand for gasoline also increased. Due to burning the fuel in the atmosphere high pollution occurs. When high pollution occurs, human health conditions will be damaged. Solar energy is a renewable source of energy; by using solar energy, pollution will not occur. In earlier days, people used grass cutters, which are run by fuel, so pollution occurred. On the advancement of technology, day by day, new technologies are introduced. This design uses solar panel, microcontroller and ultrasonic sensor are used for the process. By using this technology, human effort will be reduced, time will be reduced, and cost will also be reduced.*

Keywords: Microcontroller, solar energy, ultrasonic sensor, motor.

1. INTRODUCTION:

Pollution is the major issue in this world. Mainly pollution occurs due to vehicles and surroundings. Fuel usage increases the energy pollution day by day. In order to prevent pollution, usage of fuel consumption will be reduced, and usage of fuel-energy-based vehicles and components will be reduced. Solar energy is the renewable energy it is drawn by the sun. By using solar cells, which absorbs the photo energy from sun and coverts it into proper electrical signal. The solar energy can be stored in batteries whenever we need to use the energy we can use by batteries, and that depends upon the work. The grass cutter plays an important role in cutting grass at school, college, industries, gardens, grounds, pitches, etc. In earlier days, people were using scissors and manual grass-cutting machines for cutting the grass. In recent days the technology has been developed, so due to using manual grass cutters, human effort is needed, more time, fuel needed, so a solar-based grass cutter is introduced. In this technology, solar panels are used to convert the photon energy into electrical energy, which is stored by batteries, ultrasonic Sensors are used to detect the obstacles. Advanced microcontroller is used for processing. By using this technology, we can be able to reduce human effort and time taken for process.

2. LITERATURE REVIEW:

+ From journal :**IJCRT- International Journal of Creative Research Thoughts | Volume 11, Issue 5 |** May 2023 ISSN : 23202882

+ In the above journal they done their project by manual, it is a manual solar grass cutter and does not contain solar panel.

3. PROBLEM SOLVEMENT:

In the above journal they done manual grass cutter, by using that human effort needed and time taken to complete the process is more, to avoid that microcontroller is used. Due to using this Human effort will be reduced

4. METHODOLOGY:

In this paper, we developed a solar grass cutter using advanced microcontroller. In this solar grass cutter, it is completely automated; it does not need any mortal trouble. It operates with a battery energy, the energy of battery is drawn from a solar panel. Battery is used to store electrical energy temporarily. Then substantially an ultrasonic detector is used; by using this detector obstacles will be avoided; it is substantially used to descry the obstacles, and when it found any obstacles, it stops the work, then two motors are used to move from one place to another place, and it's also known as bus. Another motor is used for trimming the grass with respect to the comment. Motors are used to drive the current from the microcontroller, The current from the microcontroller is not enough, so a motor driver circuit is used to increase the current position depends upon motor specification. Rechargeable battery is used because we need to store the energy again and again, then the battery may be a lithium-ion battery or Lead- acid batteries are used for processing because they're most effective.

5. BLOCK DIAGRAM:

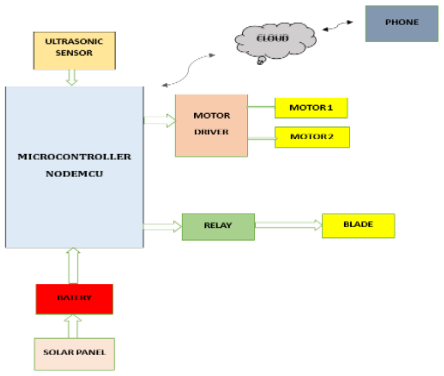

Figure-1: Block diagram

The block diagram consists of

- NODEMCU Microcontroller
- Solar panel
- Motor driver
- Motors
- Relay
- Ultrasonic sensor
- Blynk app
- Battery

5.1. Node MCU Microcontroller:

Figure-2: Node MCU microcontroller

Node MCU is the one type of microcontroller. It is used in many interfacing techniques. It consists of built in Wi-Fi SoC. Its memory space is 128k Bytes. It can store the byte of data up to 4M bytes. It consists of a USB port used for communication. It can support UART, SPI, and 12C protocols. Its cost is very low compared to other microcontrollers.

5.2. Solar panel:

Solar panel is also known as photovoltaic panels. It is used to convert photon energy into electrical energy. Solar cells or photovoltaic arrays are used for converting process. It used in Industries, home, etc.

Figure-3: Solar panel

5.3. Motor driver:

Figure-4: Motor driver

Motor drivers are used to drive the motor. It is used to increase the current level and it is given to the motor, the current from the microcontroller is not sufficient because it is low, the low current does not drive the motor properly, so in between them, the motor driver is used, it is used to raise the current level and given to motor. Here L293D motor driver is used for process.

5.4. DC Motor:

Figure-5: DC motor

Dc motor is used to convert the electrical energy into mechanical energy, Its works in the principle of Fleming's left-hand rule. When a conductor is placed in proper magnetic field, the conductor experiences a force, such force called Lorentz force. Here 12 v DC motor is used for cutting the grass and also it is used to drive the wheels.

5.5. Relay:

Figure-6: Relay

Relay is an electrically controlled switch. It is used for isolation purposes. It is used to isolate low voltage and high voltage. When supply flows through the coil, the coil gets energized, then the normally opened contact gets closed or normally closed contact gets opened. It is mainly used in industrial purposes.

5.6. Ultrasonic sensor:

Figure-7: Ultrasonic sensor

It is a one type of sensor. Ultrasonic sensors are used to detect obstacles, when it found any obstacles, its process gets stopped, when the obstacles are avoided. Its process again started. It is also known as transducer, which absorbs the physical medium and converts it to proper electrical signal.

5.7. Battery:

Figure-8: Battery

Battery is used to convert the chemical energy into electrical energy. Inside the battery it consists of Electrode, Electrolyte, and separator. Electrodes may be Anode and cathode, which are dipped in electrolyte. Electrolyte may be any chemical [example (H_2SO_4)]. Separator is used to separate anode and the cathode. During chemical responses, Electrical energy is generated. There are 2 types of batteries. rechargeable and non - rechargeable batteries. In This solar lawn knife uses rechargeable batteries.

5.8. Blynk app:

Figure-9: Blynk app

Blynk app which is used to control the projects via Wi-Fi or Bluetooth module by mobile phone itself. It was mainly designed for IOT. It can handle any type of projects, when Bluetooth or Wi-Fi module connected in the project.

6. RESULTS AND DISCUSSIONS:

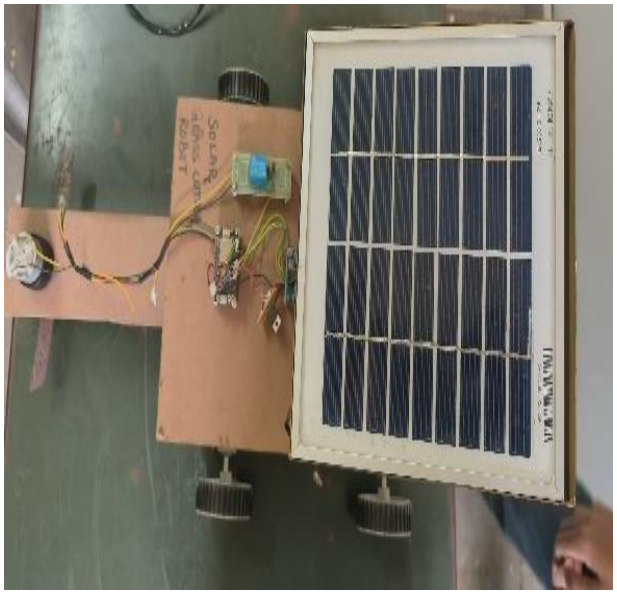

Figure-10: Hardware diagram

By switching on the power supply the grass cutter ready to trim the grass. For trimming the grass the command is given by blynk app, now the grass cutter starts trimming or cutting, when it found any obstacles it stops cutting the grass and when the obstacles are avoided then its starts again cutting process. Depends up on the comments the grass cutter process is determined.

6.1. Advantages of the system:

- While cutting, noise effect is very low
- Pollution free
- Low cost
- High safety, due to using of ultrasonic sensor.
- Eco friendly

7. CONCLUSION:

In conclusion, IoT plays an important role in this design. IoT is the advanced technology which is used to control the design via mobile phone, when Bluetooth or Wi-Fi device is enabled. By using there is no carbon emission. The main aim to introducing this technology is to reducing the pollution. To keep the pollution free India all must take a part to reduce the pollution by using advanced technologies like solar grass cutter. In the innovative world all must do advanced projects to make the world pollution free. Due to reducing the pollution no more problems will arise. The tremendous advantages using solar grass cutter are high efficiency.

8. REFERENCE:

[1] Non-Conventional Energy sources by GDRAI, Khana publishers

[2] Design and implementation of autonomous Lawn Mower Robot controller

[3] Andre Colens, U.S. Patent 5,444,965, Continuous and autonomous mowing system August 29, 1995.

[4] Vicky Jain, "Solar Based Wireless Grass Cutter" , International Journal of science Technology and Engineering ,Vol2,2016,576580.

[5] Guo-Shing Huang," "Intelligent auto saving energy robotic lawn mower", IEEE transaction on robotics. Pg. 4130 to 4136 In 2010.

[6] Baluprithvira, K.N., R. Harini , M.M. Janarthanan, C. Jasodhasree (2021). Design and development of lawn mower. In 2nd International Conference on smart electronics and communication, Pages 12151219.

[7] Robert Zondlo, U.S. Patent 5,461,292, Remote controlled guidance system for working vehicle, October24,1995.

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