

FABRICATION AND PERFORMANCE EVALUATION OF AUTOMATIC HYBRID GRASS CUTTING MACHINE

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Abstract—As a result of the increasing prevalence of grass cutter machines in contemporary society. Contamination is human - made, which we should be visible in our regular routine. The environmental impact of the IC engine on earlier lawn mower models led to an increase in pollutant levels. A shaper fueled by an IC motor is more costly. The expense of keeping a conventional machine is higher. We want to create a new kind of grass cutter that uses solar energy and is cheaper than the previous model to fix these problems. Our's undertaking will likely make a sun based controlled grass shaper, which will save power and diminish the work labor force.

Keywords—Solar, micro controller, Arduino nano, solar panels, sensors.

I. INTRODUCTION

Pollution is currently the most pressing issue worldwide. Humans are to blame for pollution, which can be seen in our own homes. Because they produce gases, gas-powered lawnmowers were capable of causing pollution. Also, it's without a doubt wasteful because of the rising fuel costs. The utilization of daylight to drive an electric engine, which thusly moves an edge, is alluded to as a sunlight based controlled grass trimmer. Nevertheless, those grass cutters are pricey. In any case, the power in our programmed grass shaper is battery-powered. This plan fills in as an option in contrast to an unsafe internal combustion lawnmower.

Additionally, it will be the alternative to the automatic solar lawn mower because of its higher price. As a result, an automatic lawn mower with a rechargeable battery can help users save money. Using their Android phone, the user of this automatic grass cutter can cut the grass in the specified area by entering information. Additionally, this grass cutter's eyes are sensors that detect the height of the grass.

In order to determine whether the grass cutter was cutting into something, we required an ultrasonic sensor. When designing the grass cutter, safety is the primary concern. We wanted our grass cutter not to be in operating mode if the user was holding it in the air because it has blades. Realizing that the client would be haphazardly holding the grass shaper we really wanted a sensor to identify direction.

II. LITERATURE REVIEW

The current arrangement was supplanting the fuel-controlled engines to engine controlled which diminished contamination. As ordinary energy sources are running out and power is expensive, energy specialists have been contemplating the

option accessible sources. The use of solar panels to generate electrical energy from the sun's rays has gained popularity.

Photovoltaic solar cells produce DC power, which can be used to power any DC load within its capabilities, such as wireless battery chargers and automatic lawn mowers. Indeed, even with an electric engine trimmer there actually was a disadvantage, an individual should be there to control the machine, this was tackled by presenting remote controlling of the machine utilizing far off gadget.

Researchers introduced an ultrasonic sensor that is used for obstacle detection. The robot will move forward until an obstacle is detected, so remote controlled machines are not completely devoid of human presence. This system had a problem in that there were no boundary conditions set, so even if the robot was on for a long time, the work might not be done.

Since grass and concrete have different water content, a humidity sensor was used as an improvement to differentiate between the two. However, this was not 100% accurate and may vary depending on the atmosphere's moisture content and the location. In this instance, boundary wires are used to establish boundaries so that the robot cannot cross them.

III. PROPOSED METHODOLOGY

- Collecting the raw materials needed for fabrication of the hybrid grass cutting machine from various source.
- By using Soldering gun to Solder the electrical components to make strong and compact.
- Assemble the all components by various process.
- Test the hybrid powered grass cutter by considering various parameter like length and thickness of grass.
- Obtaining results can be tested materials and compare those.

IV. SCHEMATIC DIAGRAM

- An Arduino nano microcontroller, a 4DC motor, and a drive circuit are used in this proposed system.
- The system in this project is entirely powered by solar and battery power.
- The primary objective of this project is to cut costs and save time and effort.

- One ultrasonic sensor is shown in this block diagram, which we used to detect obstacles. When an obstacle is detected, the cutting action stops, and vice versa.

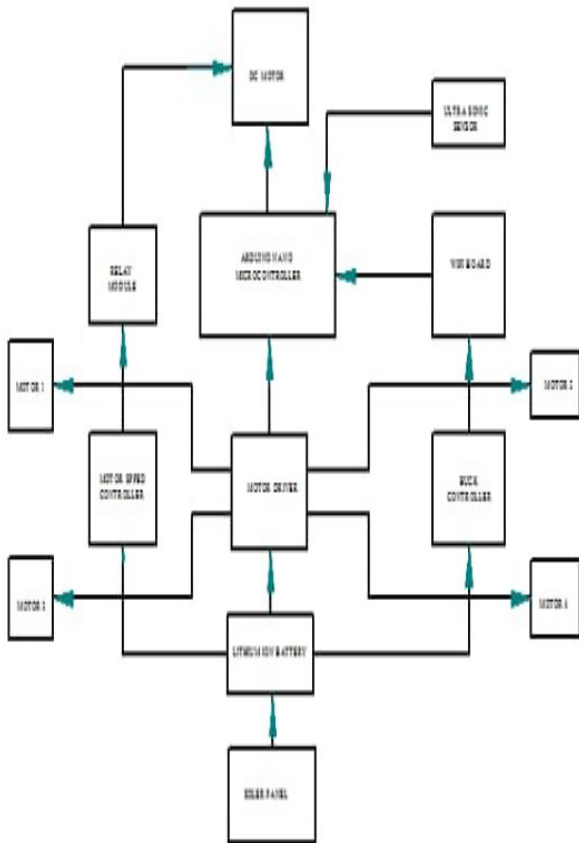


Fig 4.1 Schematic Diagram of Grass Cutting Machine

V. OBJECTIVES

1. to create a solar-powered hybrid grass cutter that overcomes the shortcomings of the previous model and uses solar energy to power it.
2. The intention is to stay away from fuel utilization and diminish the human exertion, working expense and support cost.
3. to make it better for the environment.
4. Determine a correlation between the various parameter-based results.

VI. REQUIREMENT OF COMPONENTS

a. Battery: -

An electrical battery is made up of one or more electrochemical cells that are used to turn chemical

energy that has been stored into electricity. Numerous household and industrial applications now rely on the battery for power. Limit of the battery 4.2 v and 4000 mah



Fig 6.1 Lithium-ion battery

b. Solar Panel: -

Solar (or photovoltaic) cells can be used to generate power through the photovoltaic effect in a solar panel. These cells are arranged in a grid-like manner on the surface of solar panels. As a result, another way to describe it is as a collection of photovoltaic modules mounted on a supporting structure. A photovoltaic (PV) module is a connected assembly of 36 solar cells. When it comes to wear and tear, these panels last a very long time. Solar panels degrade extremely slowly. Their effectiveness only decreases by one to two percent annually (sometimes even less). The majority of solar panels use crystallized silicon solar cells..

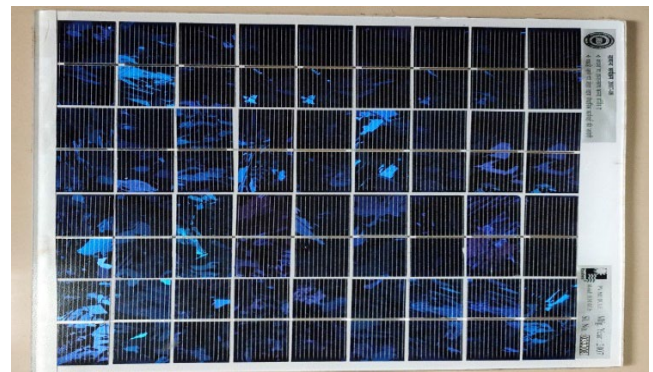


Fig 6.2 solar panel

c. Ultrasonic Sensor: -

An ultrasonic sensor is a device that measures distance from an object by using ultrasonic sound waves. A transducer in an ultrasonic sensor sends and receives ultrasonic pulses that convey environmental data. the closeness of an object. High-recurrence sound waves resound off of surfaces, making different reverberation designs. In order to function, ultrasonic sensors produce a sound wave that is beyond the range of human hearing. The transducer of the sensor acts as a microphone and transmits and receives ultrasonic sound.

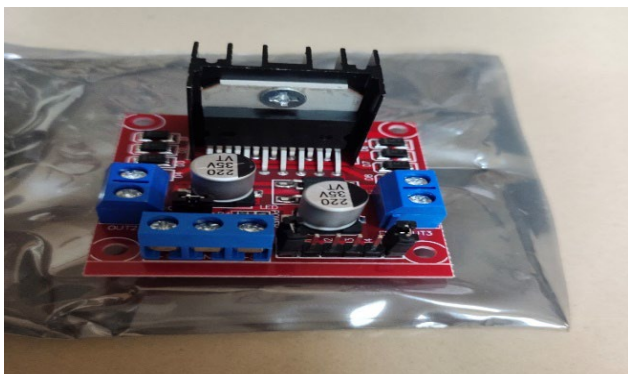


Our ultrasonic sensors, like many others, use a single transducer to send a pulse and get an echo. To estimate the distance to a target, the sensor measures the time between sending and receiving an ultrasonic pulse.

Fig 6.3 ultrasonic sensor

d. Microcontroller Arduino nano: -

The Atmel ATmega328P microcontroller serves as the foundation for the compact and reasonably priced Arduino Nano. Although it has a smaller form factor and a few differences in the layout of its pins, its functionality is comparable to that of the Arduino Uno. Due to its small size and low price, the Arduino Nano is a popular choice for hobbyists and electronics enthusiasts. It very well may be utilized to fabricate a great many undertakings, from straightforward Drove shows and engine regulators to



additional mind-boggling robots and computerization frameworks. The board has 14 computerized input/output pins, 8 simple sources of info, and a 16 MHz quartz precious stone. It also has a voltage regulator that ensures a steady 5V supply and a USB connector for power and programming.

Fig 6.4 Microcontroller Arduino nano

e. DCMotor

An electric motor that runs on direct current (DC) electricity is known as an ownA DC motor. The operation of any electric motor is based on straightforward electromagnetism.



Fig 6.5 DC Motor

VII. Result: -

construct the hybrid powered grass cutter. The test consisted of several trials, which are summarized in the table.

No of Trails	Height of the grass before cutting	Height of the grass after cutting
Trail 1	20	30
Trail 2	23	35
Trail 3	25	41
Trail 4	28	44

1. The conditions of the lawn, the length of the grass, and the cut height all influence the cut area.
2. To work on the effectiveness of sliced it is prescribed to cut all the more every now and again and stroll at ordinary speed.
3. The base cutting measurement of the grass is 0.5 to 0.8 mm.
4. For a fully charged battery, the runtime is about one hour, depending on the conditions and grass density to be cut.

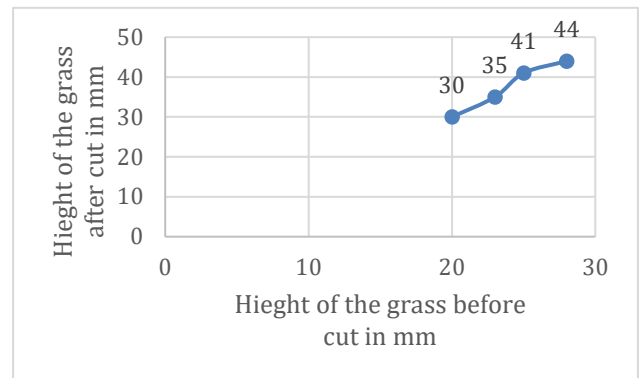


Fig 7.1 Graph

- X- axis indicate the height of the grass before cut
- Y- axis indicate the height of the grass after cut

VIII. CONCLUSION: -

As a result of this robotic vehicle, labor costs and manpower will be significantly reduced with assistance. There are two methods of activity, each intended for an alternate situation. Although monitoring services can use manual mode, automatic mode is extremely useful for operation when the owner is not present in the grass field.

No extra help is required. By pre-planning its route, both time and power consumption are decreased. The grass cutter's power source can be improved, resulting in a successful operation. In addition, any constraints encountered may serve as references in the future and open the door to further improvement.

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