RESEARCH PAPER ON SOLAR AUTOMATED GRASS CUTTER

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ABSTRACT

These days the computerization assumes vital part in the field of creations and furthermore mechanization is becoming quickly. Along these lines, it assumes vital part in the existence of people. Previously, the grass cutter was dealt with physically that is by human contact and furthermore, they require fuel or energy for working, Due to this there is parcel of loss of fuel and energy and it causes contamination as fuel is utilized for running the gadget The necessity of electrical energy is developing at exceptionally quicker rate as the utilization of electrical gadgets is expanding and the huge measure of ventures and the apparatuses. Solar energy is a best free wellspring of the energy, we are likewise running out of energizes. the traditional grass cutter is expensive and its support cost is extremely high. In this way, we need to supplant the ordinary grass cutter to the new computerized solar force based grass cutter to stay away from the above downsides. This model is prudent as contrast with the traditional one. The fundamental witticism of this gadget is to make a grass cutter that sudden spikes in demand for solar force energy, hence to save the electrical energy and to decrease the human interface. In this undertaking we use Arduino UNO microcontroller for controlling the activities of a grass cutter, the grass cutter has given Ultrasonic sensor for hindrance location, an edge for cutting the grass, and DC motors for the wheels of the Robot. It is completely computerized and sustainable power based venture. Grass cutter works consequently in this manner it doesn't need any talented individual to work the gadget.

Keywords: *Lawn, Automation, Solar Grass Cutter, Microcontroller, Motor, Solar Panel, Battery.*

1. INTRODUCTION

Solar energy is an inexhaustible wellspring of energy. Its sources are partitioned into two kinds they are inactive solar source and dynamic solar source. These sources are totally relying on how the solar energy is caught and it is disseminated and furthermore on how it is changed over to the solar force. As we probably are aware the solar energy is free energy and it very well may be used without any problem. By utilizing this solar energy, we work solar grass cutter. In the market there are a wide range of grass cutters are accessible, for example, gas based grass cutter, electrical energy-based grass cutter. The electrical grass cutter relies on power and the gas based grass cutter expects fuel to work. The consuming of fuel in gas grass cutter reason air contamination just as commotion contamination. For the cutter machine huge link wire is needed for cutting the grass of enormous region and the heaviness of motor is additionally hefty [3]. Along these lines, as the innovation is improving, we additionally need to supplant the customary traditional grass cutter to the new computerized solar based grass cutter.

In this way, from the above challenges, attempted to make a computerized solar based grass cutter which having battery of 12V and a solar board which used to store the solar energy in the battery [4]. There are complete 5 DC motors are utilized in the gadget from which 4 are utilized for moving gadget starting with one spot then onto the next and one major motor is utilized for cutting of the grass. These motors are associated with the motor driver and took care of by Arduino UNO. For the hindrance discovery reason ultrasonic sensor is utilized. There is on need of wire and fuel to work gadget. Thus, the gadget is contamination less and eco-accommodating. The gadget has given with two modes to work inside they are programmed and furthermore one can work the gadget with telephone by interfacing the gadget with Bluetooth as Bluetooth module is given in the gadget.

This venture gives the planning steps to mechanized solar grass cutter, whose point is to cut the grass of the predetermined region which is indicated to the gadget with no human collaboration. The yield is accomplished by utilizing the sensors and different parts. A definitive objective of this gadget is to make a comparative gadget as conventional grass cutter with better proficiency and of minimal expense.

2. METHODALOGY

The gadget comprises of Arduino UNO microcontroller, Ultrasonic sensor, Bluetooth Module and a Solar fueled framework. Associating these components in required organization we get our ideal framework structure [7]. The Ultrasonic sensors functions as the eyes of the gadget, To give the necessary capacity to the gadget we utilize the battery and to charge the battery we mount solar board at the highest point of the gadget, The battery supplies the energy to the segments and as indicated by the orders the motor moves. Furthermore, this machine will likewise eliminate the obstacles coming. The framework doesn't need any human association for the activity of the framework. When the information is given it will all work without anyone else and as the space is covered it will stop by its own.
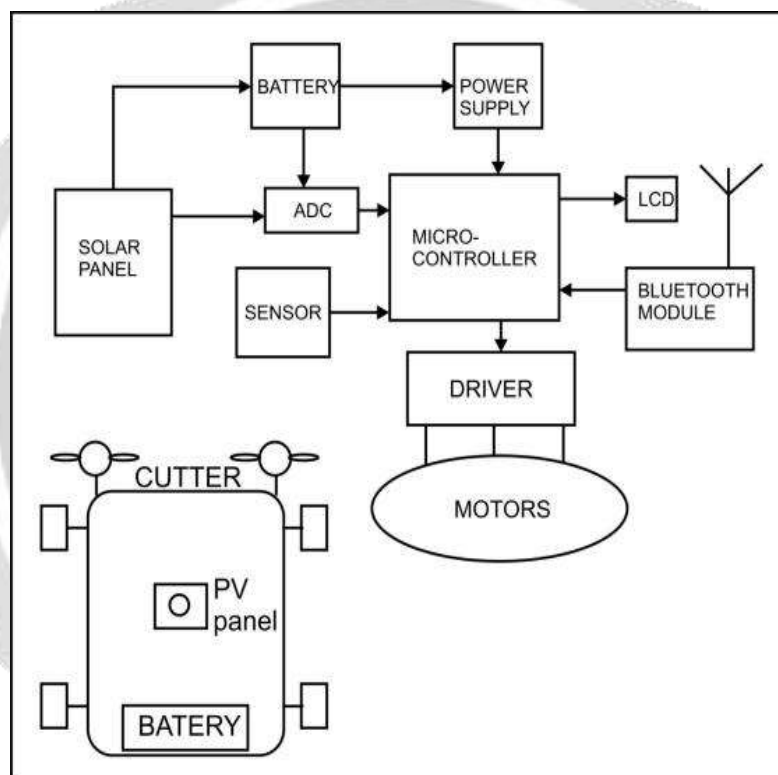
3. BLOCK DIAGRAM

Fig. 3.1 Block Diagram

4. COMPONENTS

COMPONENT	SPECIFICATIONS
Arduino UNO	28 pins; Operating voltage: 7–12V
Bluetooth Module HC-05	6 pins; Operating voltage: 3.3–5V; Transmission range: 100 m
L298N Motor Module	Operating voltage: 5V; Max power: 25W
IR Obstacle Detection Sensor	Voltage: DC 3–5V; Range 2–30 cm; Angle: 35°
Geared DC Motor with ENCODER	Geared Motor (6 Wires; Operating voltage: 12V;16 Speed
Simple DC Motor	e Motor (2 pins, Operating voltage: 12V; Speed: 60RPM)
DC Battery	Input Voltage: 12V; Capacity: 7A; Battery type:
Solar Panel	Operating Voltage: 12V; Max. Power:5W
Relay Module	Pins: 6; Operating Voltage: 5V DC
Android Mobile Application	Android compatible

5. FLOW CHART

Fig. 5 Flow Chart
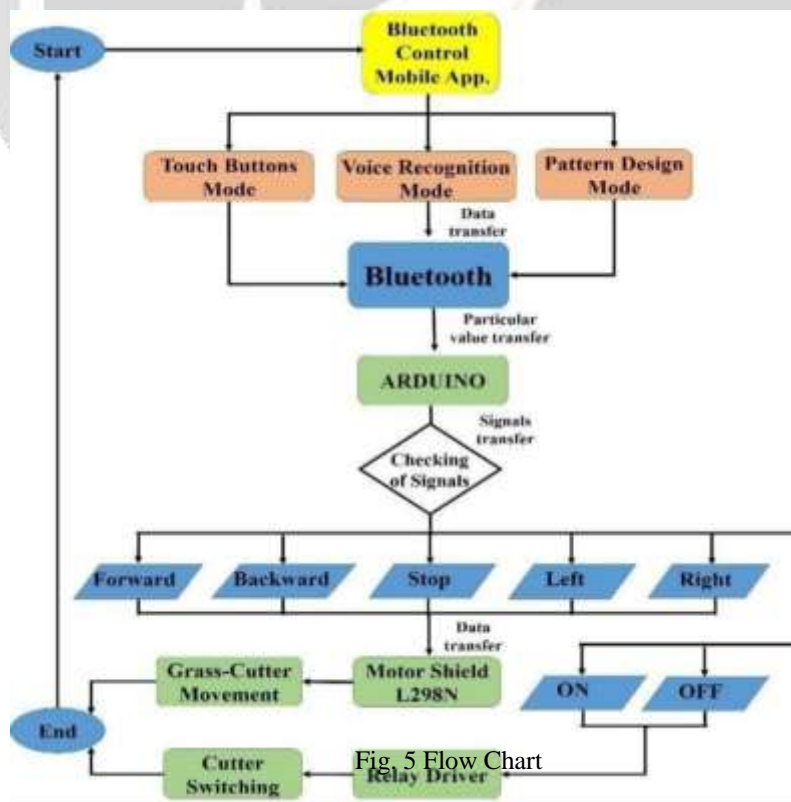
Before all else, the Android portable application gives three modes (contact button, voice acknowledgment, and example plan) of controlling grass cutter, as delineated in Figure 5. Initially, interface the Android versatile application with Arduino by the Bluetooth module, when the client

presses any contacted button or talks some keyword in voice acknowledgment in the application, it will subsequently move the information to Arduino that is put on grass cutter by means of Bluetooth module. In the wake of getting the information. Arduino will quantify these with predefined Keywords.

Arduino Uno will check if the client talks or press "Forward" contact button, it's anything but a forward sign to the motor safeguard. On the off chance that Arduino establishes that client press the regressive or talks a retrogressive keyword, it's anything but a back message to the motor safeguard. Essentially, if the client squeezed the right bolt or speak Right, Arduino will convey a Right message to the motor safeguard. Moreover, if keywords are perceived as left move if client press left bolt or talks left, Arduino will convey a Left message to motor safeguard, and if client press stop button or talks stop, Arduino will convey a stop message to the motor safeguard. Hence, subsequent to acquiring the sign, the motor module will check and control the grass cutter's development [6]. Likewise, If Arduino found that client talks or press the ON/OFF touch button, it's anything but a sign to the hand-off module to turn ON or OFF cutter.

Moreover, It Arduino establishes that the client squeezed any examples button; it's anything but a sign to the motor module to move in relating examples and hand-off module to turn on the cutter.

At first, the grass cutter robot won't move and remained still when it doesn't get any sign from an android application. At whatever point the client squeezed or talks the keyword, the sign will be estimated of that bearing by an Arduino and order will ship off the motor safeguard to turn on comparing motors and the grass cutter robot will begin moving in the like the keyword.
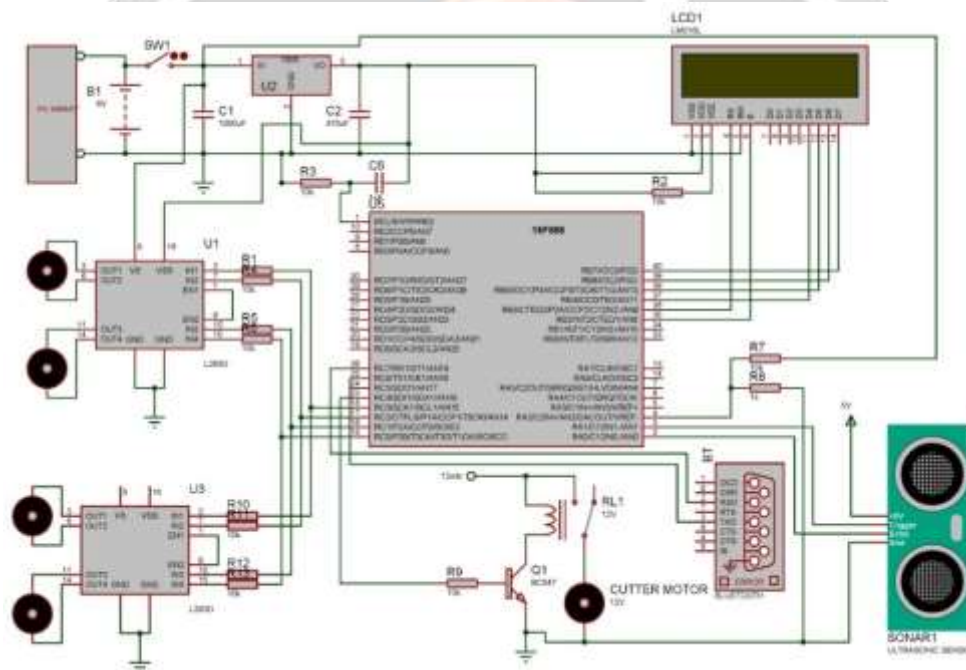
6. CIRCUIT DIAGRAM

Fig. 6 Circuit Diagram

7. DESIGN PARAMATERS

1. SELECTION OF ELECTRIC MOTOR:
       A) 30 RPM DC motor SPEED =30
       B) RPM VOLTAGE = 12VOLT
       C) WATTS = 18WATT

2. TORQUE OF THE MOTOR:
       A) Torque = (P X 60) / (2 X 3.14 XN)
       B) Torque = (18X 60) / (2 X 3.14 X 30)
       C) Torque = 5.72 Nm Torque = 5.72 x 10^3 N-m

3. BATTERY CALCULATION

A) The shaft is made of MS and its allowable shear stress= 42MPa

B) Torque = 3.14 x fs x d ³ / 16 5.72 x 10³ = 3.14 x 42 x d ³ / 16D = 8.85 mm

C) The nearest standard size is d =9 mm.

4. ELECTRICAL (ELECTRIC) POWER EQUATION:

A) Power P = I × V Where V = 12 W = 18I=18/12=1.5

B) A H.P = .02414

5. SOLAR PANELCALCULATION:

A) VOLT = 12V

B) WATT = 5W

C) W = V X I 5 = 12 X I I = 5/12 I = 420ma

     i) BAH /CI = 8 ah/420ma = 19hrs

     ii) To find the Current Watt = 18w

     iii) Volt = 12v Current=?

       P= V x I 18 =12 x I I = 18/12 = 1.5

     iv) AMPS battery usage with 1.5 AMPSBAH /I 8/1.5 = 5.3hrs

8. WORKING

The solar yard trimmer is a completely computerized grass cutting automated vehicle. Controlled by solar energy that additionally dodges snags and is able to do completely computerized grass cutting without the requirement for human intercession. The cerebrum of the bot is the Arduino which chooses the different activities. The L293D9 motor driver executes these orders by changing the force and extremity of the motors.

The ultrasonic sensors distinguish the obstructions, for example, stones creatures and so on The LDRs are the crown gem in distinguishing the wall or limits of the yard set apart by the lasers. The laser radiates A.

when distinguished, causes the beginning occasion and the bot pushes ahead until it identifies laser bar B.

At the point when laser shaft B is recognized the bot stops for the time-frame of two seconds and afterward takes a right point turn and pushes ahead by 8 inches and takes another right point turn and starts pushing ahead. This progression is rehashed until the laser bar recognized alongside laser pillar A. At the point when laser Beam An and C are identified triggers the stop occasion.

The development motors run at 60-80 rpm and the sharp edge motor runs at 1000 rpm. The two cutting edges are organized in an enemy of equal of the bot is 2.5 inches. The solar board is 8x4 creeps in measurement. The ultrasonic sensor is put at a point of 15 degrees and set to least discovery of two feet to the normal hub. The LDRs are set at opposite to one another distracting way. The ground clear in this task, solar controlled programmed yard trimmer will alleviate the customer from cutting their own yards and will lessen both natural and commotion contamination.

9. ADVANTAGES

- No long wires required.
- Compact Design and easily Moveable
- No Fuel required
- Less maintenance
- Very economical
- Anyone can operate
- Eco-friendly
- Pollution free

10. RESULT

The design of arduino base solar powered agricultural grass cutter will include direct current (D.C) motor, a rechargeable battery, solar panel, a stainless steel blade and control switch. The automatic grass cutting machine is going to perform the grass cutting operation by its own which means no manpower is mandatory:

1. We used the Arduino-based control systems with wireless connectivity, in which the

pattern design grass cutting robot system could be automatically controlled based on
Android application (touch buttons and voice recognition), to avoid any limitations of the specifications, wireless range, etc.
2. Android mobile application provides three modes (touch button, voice recognition, and pattern design) of controlling grasscutter
3. Connect the Android mobile application with Arduino by the Bluetooth module, when the user presses any touched button or speaks some keyword in voice recognition in the app, it will consequently transfer the data to Arduino that is placed on grass cutter via Bluetooth module Outer sheath applying.
4. The effectiveness of the proposed mobile application technique has much effective for different purposes such as, in the grass cutting field it can be used by disabled patients to cut simple grass or in different complex patterns easily just pressing a single button on the mobile application.

Fig. 10 - Solar grass cutter robot

11. CONCLUSION

In this article, a design scheme for android mobile application system for controlling a pattern design grass cutting robot having solar energy capability based on Arduino has been explained, which is programmed to respond to events (based on the touch arrow buttons, voice recogniton and pattern designing with Android mobile application as described above) and to make corresponding actions. The proposed project presented with mainly three operational modes in which the system is using a mechanism of controlling the grass cutting robot based on touch arrow buttons (grass cutter moves similarly to the direction of the button presses) and a voice recognition system (grass cutter moves accordingly to the keyword spoken by the use.

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