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SOLAR GRASS CUTTER WITH Wi-Fi CAMERA

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ABSTRACT: Automation now plays a significant part in the field of inventions, and it is also incr easing at a quick rate. As a result, it plays a critical function in human life. Grass cutters were pre viously handled manually, requiring human touch and also requiring fuel or energy to operate.

As a result, there is a significant loss of fuel and energy, as well as pollution, as fuel is consumed to operate the device. As the use of electrical devices grows, as does the number of industries an machineries.

The need for electrical energy is expanding at a rapid rate. We are also running out of fue ls, thus solar energy is the best free source of energy. it is quite expensive, and the expense of ma intenance is also high. To prevent the aforementioned drawbacks, we must replace the traditional grass cutter with a new automated solar-powered lawn cutter.In comparison to the traditional model, this one is more cost-effective. The major goal of this technology is to produce a lawn cutter that runs on solar power, saving electricity and reducing the amount of human interaction. The ARDUINO UNO microcontroller is used in this project to operate the activities of a grass cutter, which is equipped with an Ultrasonic sensor for obstacle detection, a blade for cutting the grass, and DC motors for the Robot's wheels. It's a fully automated project that runs on renewable energy. The grass cutter is self-contained and does not require any special skills to operate.

The implementation details of an intelligent autonomous grass cutter are presented in this study, which will allow the user to cut the grass with only two inputs: length and width. After turning o n the system, the user must enter the plot's length and width, and the grass cutter will cut the gras s in the calculated area automatically. We created an ARDIUNO
controlled lawn cutter for this project, which eliminated the need for human intervention. All im portant design aspects are included in the project documents.

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Keywords: Automated, Intelligent, Solar, Grass-cutter, Machine, ARDUINO ,Ultrasonic Sensor, Wi-Fi Camera

I. INTRODUCTION

Solar energy is used to power this system, which is powered by a solar panel and a battey The engine speed control on this lawn cutting equipment is programmable. We've created a grass cutter that runs on solar power. As a result, it saves electricity and personnel. We presented a sm art solar grass cutter device that uses sliding blades to cut a lawn to a consistent length. Solar po wer is a renewable energy source. Passive solar sources and active solar sources are the two cate gories of solar sources. These sources are entirely reliant on how solar energy is captured and del ivered, as well as how it is transformed to solar electricity.

As we know the solar energy is free energy and it can be utilized easily. By using this solar, we operate solar grass cutter. In the market there are many different grass cutters are available such as gasoline-based grass cutter, electrical energy-based grass cutter. The electrical grass cutter depends upon electricity and the gasoline-based grass cutter requires fuel to work. The burning of fuel in gasoline grass cutter cause air pollution as well as noise pollution. For the cutter machine large cable wire is required for cutting the grass of large area and the weight of motor is also heavy. So, as the technology is improving, we also need to replace the traditional conventional grass cutter to the new automated solar based grass cutter.

In the time where technology is driven by environmental awareness, consumers are looking for ways to contribute to the relief of their own carbon footprints. Most of the pollution is man-Made and arise because of emission of gases from the burnt fuel into the atmosphere. So to get rid of such pollution, the abundant solar energy is available in India which can be used to drive various types of agricultural equipment. This project is driven by objectives to find alternate option for lawn mower, which is eco-friendly and doesn't require man-power. The design of Solar powered grass cutter will comprise DC motor, a rechargeable battery, keypad, LCD display, solar panel, a stainless steel blade and a controller. The purpose of this project is to design and build a grass cutter which can perform the grass cutting operation on its own without any need of operator, which means no manpower is required. The movement of the grass cutter is controlled by microcontroller on the basis of input received from the users.

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II. LITERATURE SURVEY

This system is driven by the solar energy by using solar panel and battery. This grass cutting machine was programmable for engine speed control. We have designed a grass cutter which operates on solar energy. Hence it saves the electricity and reduces manpower. We have proposed smart solar grass cutter system which uses of sliding blades to cut a lawn at an even length. The comparative study of pros and cons of solar powered automatic grass cutter and conventional grass cutter is presented in Table 1.

Table 1. Comparison between Conventional and Solar based Grass Cutter

Sr.No.	Parameters	Solar Powered Grass Cutter	Conventional Grass Cutter
1	Pollution factor	Doesn't Cause pollution	Causes pollution
2	Fuel	Not required	Required
3	Operating cost	Low	High
4	Load carrying Capacity	Low	High
5	Man power	Not required	Required

III. METHODOLOGY

The block diagram of the project represented in Fig.1 consist of components like ARDUINO Uno, 16X2 LCD display, DC Gear Motor X2, DC Motor for cutting, L293D Motor driver, Rechargeable Battery, Solar panel 24W, and 4X4 Keypad. All these components are described in this section.

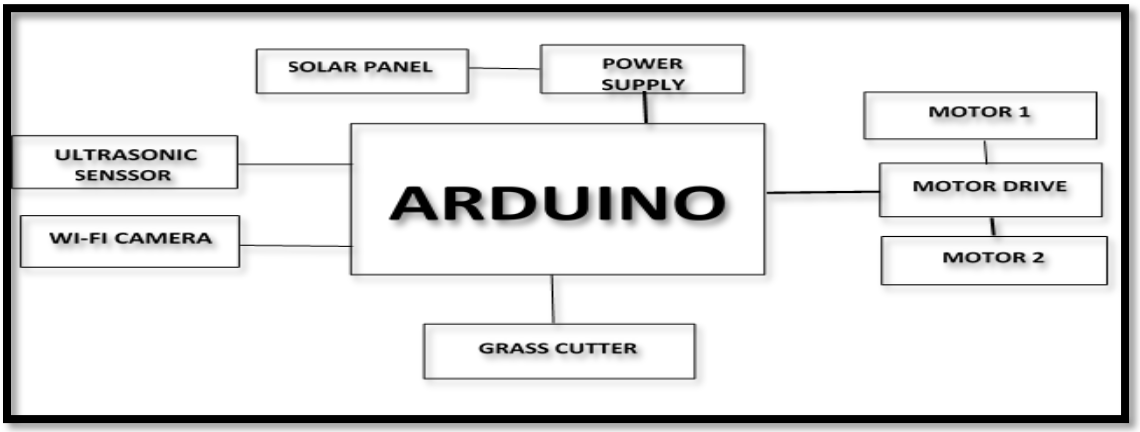

Fig.1 block diagram.

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Components

3.1 ARDUINO UNO : The main controlling device used in our project is ARDUINOUno microcontroller board as shown in Fig.2. ARDUINO device used in our project is ARDUINO Uno board has ATMEGA 328p as an inbuilt microcontroller. It requires +5V power supply and it can source 20mA current at its I/O pins. The ARDUINO is chosenin our project because of ready availability of board and on-line support.

Fig. 2 ARDUINO

3.2 16X2 LCD display

16X2 LCD display module as shown in Fig.3 works on input voltage range of 4.5 to 5.5V. Display consists of 16 columns and 2 rows. It consists of total 16 pins. We are using LCD display to take inputs from the user. It consists of two registers- command register and data register. It requires 1 mA current for its operation

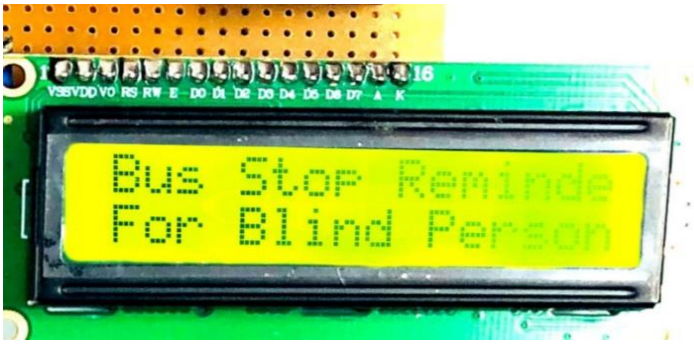

Fig.3. LCD Display

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3.3. DC Gear Motors : The project requires two geared 12 volt dc motors of 100 rpm for movement of the wheel. These motors are driven by the motor driver L293D module. Motors require more current to work properly so this IC is used. Similarly another 12V dc motor of 1000 rpm is used to rotate the cutter blade fitted onto the machine. The motor used in the project is shown in Fig.4.

Fig.4 DC Motor

3.4. Rechargeable Battery

Only when the sun shines does a solar panel generate electricity. As a result, it is necessar y to store the electricity generated by solar panels, particularly when the equipment must be used at night or in low light conditions. To store the electrical energy generated by the solar panel, we must utilise a battery made up of a bank of cells with the required voltage rating. The controller i s also powered by a battery.As shown in Fig.6, we have used 12V battery with the capacity of 1 Ampere hour (AH). If we use 6 volt batteries, then such two batteries need to be connected in series for getting 12 volt DC supply. The battery is charged by connecting it to solar panel and charging controller. The charge controllers are used to protect the battery from over charging and under charging since in both of these conditions, the battery life is reduced.

Fig.5 DC Battery

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3.5. L293D Motor Driver: Usually the current required by dc motor is more than what is available at the ASRDUINO pins. Therefore when we need to control dc motor through ARDUINO, motor driver ICs are required to boost the current level. Fig.5 shows L293D motor driver which allows driving of DC motor in desired direction. This IC consists of 16pins which can be used to control two DC motors simultaneously. The current capacity of this driver is 600 mA, thus using this we can drive small and medium sized motors.

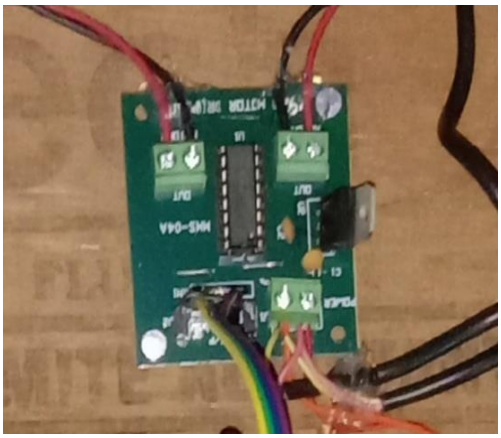

Fig.6 Motor Driver

3.6. Solar Panel A solar panel: is nothing but solar photovoltaic cells used to convert solar energy into electricity. The solar panel shown in Fig.7 can generate 5W and it has no load voltage of 18 Volts and full load voltage of 17 Volts. The solar panel is connected to the battery through charge controller which controls the charging voltage and current for the battery.

Fig.7 solar panel

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3.7. Keypad :cis used to take the input from the user. The keypad shown in Fig.8 has maximum voltage across each segment or button of 24V, maximum current through each segment or button of 30mA and maximum operating temperature of 0°C to 50°C. It comes with ultra-thin design and adhesive backing.

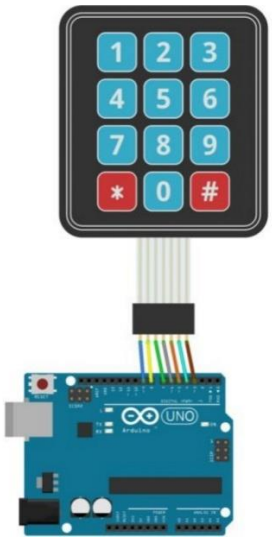

Fig.8 Keypad

3.8 camera : White Positioning:wall mount or ceiling mount 360Degree movement memory card supported up to 64 GB can be connected to any mobile power bank so that use it without electricity.5V 2A USB power camera comes with USB cable and Adaptor.with inbuilt mice and speaker for communicate with mobile app use it as Wi-Fi door bell. And talk to visitor using your mobile app

Compatible Device: Up to Android 2.3 And IOS 6.0 device package include :1XV380 smart camera 1xUSB cable 1xuser manual 1x 5V 2A power adaptor

Feature:

- Positioning : wall mount or ceiling mount 360 Degree movement
- Memory card supported up to 64 GB
- Can be connected to any mobile power bank so that use it without electricity

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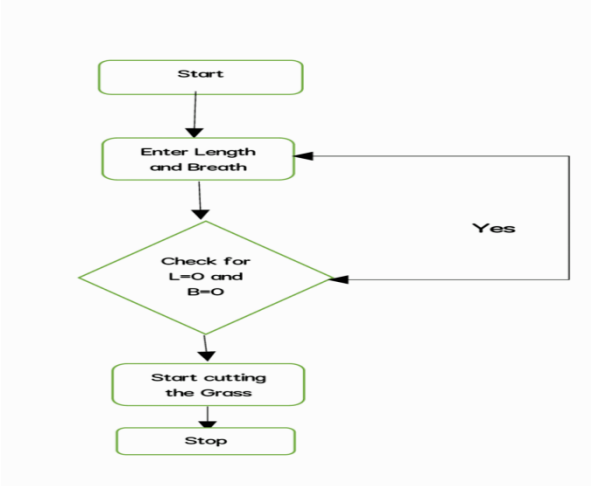
Fig.9 Camera

IV. RESULTS AND IMPLEMENTATION

The Flow Chart, Interfacing Diagram And Calculations Are Presented In This Section.

a. **Flow Chart**



b. **CIRCUIT DIAGRAM**

The interfacing and connection diagram of different components like motor, motor driver, microcontroller, LCD and keypad is shown in Fig.10. Fig.11 shows the designed system.

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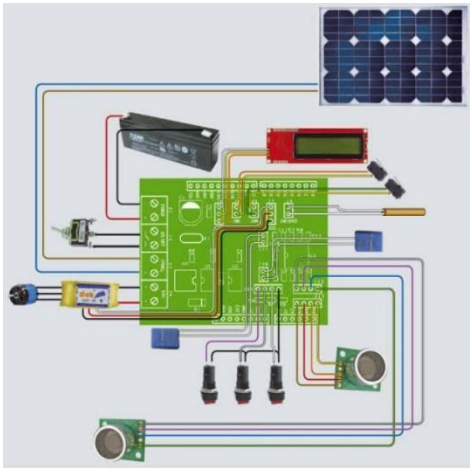
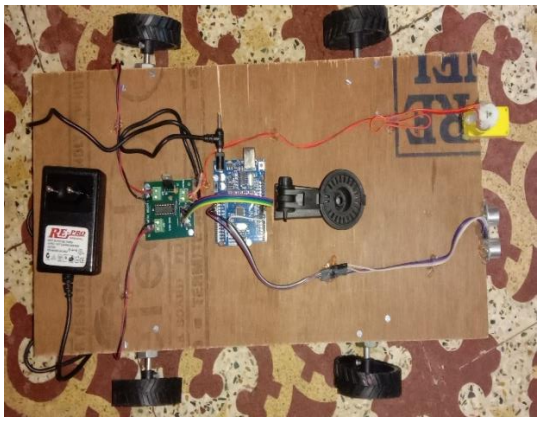


Fig.10.Circuit Dia.



4.2 CALCULATIONS

The calculations of required torque of motor are based on the following dimensions of the machine.

a) Length of machine = 33cm
b) Breadth of machine = 9cm
c) Circumference = 2πr = 58 cm
d) Speed of Motor = 100 rpm

Accordingly delays are calculated for left and right turn for the machine.

Force required by cutting blade to shear the grass is given by eq

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(1) where, T = Shaft torque, R = radius of cutting blade. F =T/R (1) Shaft torque is given by eq.

(2) where P is motor power and N is motor speed in revolution per second. T = P/2πN

(2) But the motor speed is usually expressed in rpm, therefore eq. (2) is modified to form (3) where the motor speed is N is in rpm. T = (P*60) / (2ΠN)

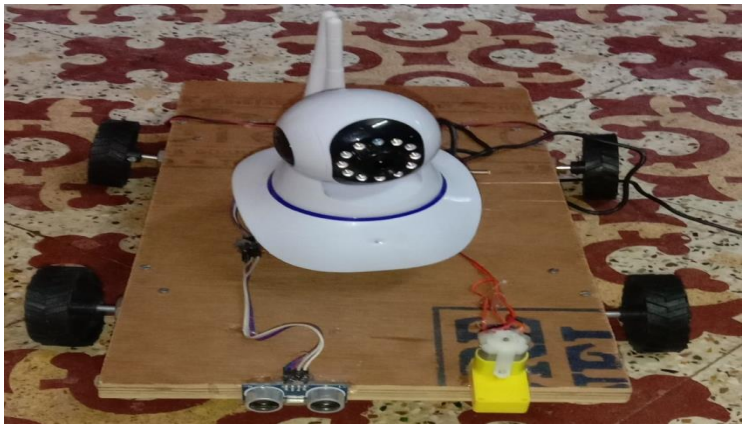

Fig.12 solar grass cutting with Wi-Fi camera

V. CONCLUSION

Our robot is selfcontained and runs on solar power. If solar energy is unavailable due to weat her conditions, we can charge the battery with a 12V/1A adaptor from the mains. The battey take roughly 5 to 6 hours to charge in daytime. When the battery is fully charged, the robot may run for up to 2 hours. It is a futuristic robot that operates without the use of traditional have energy sources or human effort.

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