Solar Grass Cutter with Floor Cleaning

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Abstract - **Due to the continuous increase in the cost of fuel and the effect of emission of gases from the burnt fuel in to the atmosphere so that we use solar panel for this system. Because of the sun is the major source of energy for life on earth used for heat and lightning now a days solar energy has been known as a renewable resources such as sun, wind, and hydro.**

This paper introduce a new development of hybrid cleaner named as smart solar hybrid cleaner. The main aim of this project is to design a a system which helps in continuous monitoring of industrial parameters. The proposed system is capable of monitoring four important parameters of an industry like voltage, current, temperature and light intensity. The abnormality in the four parameters is announced through voice circuit.

The controlling device of the whole system is a Microcontroller. Temperature sensor, Voltage sensor, Current sensor, LDR (Light Dependent Resistor) is interfaced to the Microcontroller. The Microcontroller reads the analog values from four sensors, digitizes them and starts analyzing of data. The data is continuously displayed through a LCD display. If any parameter is abnormal, the system gives a voice announcement. To perform the intelligent task, Microcontroller is loaded with intelligent program written using embedded 'C' language.

This hybrid cleaner is developed to reduce air pollutant and it also save our time. This grass cutter and including room cleaner is designed as remotely controlled and automatically controlled both by using arduino UNO. Smart phone is used as the remote controller. The smart solar hybrid Cleaner is reliable with high efficiency of the system compared that the system is reliable and environment friendly

Keywords- Smart Solar Hybrid cleaner, grass cutter, Room cleaner, Robot, Solar cutter, Automatic Cleaner

I. INTRODUCTION

The conventional grass cutter and room cleaner the both are used separately the grass cutter is used by worker in the gardening and agricultural industries however, the manual handled grass cutter are consuming a lot of energy and producing air pollution the conventional grass cutter are also creating a high level of noise and vibration which can cause serious health issues, such as grip strength, decreased hand sensation. etc In early time we use the grass cutter and room cleaner separately then it's too costly to buy one by one but by this mechanism we save our money and also environment This is a smart solar hybrid cleaner based on automatic and phone controlling This cleaner is clean room and also it cut grass powered by solar energy that also avoids obstacles and is capable of fully automated grass cutting and room cleaning without any human interaction And it also controlled by mobile phone by using software the software of this system interact with mobile phone its start working

In the past and even until now, cutting of grasses in the schools, sports tracks, fields, industries, hotels, public center, etc. was done with a cutlass. This method of manual cutting is time consuming because human effort is needed for the cutting. Also inaccuracy in cutting level was observed using the manual cutting method. This work deals with the cutting of verdant (shrubs, stubborn, grass, flowers, leaves of trees) and also with the design of the machine, its efficiency, rigidity, mode of operation and the selection of materials. The design gives a greater degree of flexible mobility and interchangeability.

Grass cutter machines have become very popular today. Most common machines are used for soft grass furnishing. In our project Grass cutter machine we are aimed to develop for operation and construction. The main parts of the Grass cutting cum floor cleaner are DC motor of .75HP capacity, relay switch for controlling motor, Battery for charging it through solar panel.

So introduce solar energy for the machine process to work. A solar panel is a large flat rectangle, typically somewhere between the size of a radiator and the size of a door, made up of many individual solar energy collectors called solar cells covered with a protective sheet of glass. The cells, each of which is about the size of an adult's palm, are usually octagonal and coloured bluish black. Just like the cells in a battery, the cells in a solar panel are designed to generate electricity; but where a battery's cells make electricity from chemicals, a solar panel's cells generate power by capturing sunlight instead.

II. LITERATURE REVIEW

Prof. C. J. Shende: In this paper they have prepared manually handle device which is capable to cut the grass. This device consists of linear blades and it does not affected by climatic conditions. The main objective of this paper is to move the grass cutter is different directions to prepare various designs as per requirements. By using link mechanism the height of the cut can be adjusted. The unskilled labour can easily operate this device.[1]

C. B. Mills: Today, new technology is bringing us improved mower versions. Low emission gasoline engines with catalytic converters are being manufactured to help reduce air pollution. Improved muffling devices are also being installed to reduce the noise pollution. Battery powered mowers are also becoming practical. Although slightly smaller with an average cutting swath of only 17-19", these new mowers will quietly cutting lawns without the common cloud of blue smoke hanging in the air, for about an hour per charge. Prices are comparable to a high-end gasoline powered mower.[2]

Davidge E D: "I'm planning on moving my entire fleet to propane. Not only is it better for the environment, it also increases my productivity. I'm saving money on fuel, and labor costs as well, since my crew isn't spending time filling up at the pump. Propane has no additives and is a clean burning system. I save on maintenance since there is no carburetor or fuel filter to maintain.[3]

Edwin Beard Budding: Budding obtained the idea of the lawn mower after seeing a machine in a local cloth mill which used a cutting cylinder mounted on a bench to trim cloth to make a smooth finish after weaving. Budding realized that a similar concept would enable the cutting of grass if the mechanism could be mounted in a wheeled frame to make the blades rotate close to the lawn's surface.[4]

Ms. Lanka Priyanka: In this paper they have fabricated grass cutting machine with tempered blades are attached to this grass cutter. This grass cutter is manually operated as well as automatic operated. The materials commonly used GI sheet, motor, wheel, Al sheet, switch, wire, square pipe and insulating material.[6]

P.Bulski: Bulski identify the sound created by the machine is making noice pollution. He research on sound created by the machine and giving the result how to remove the sound while cutting the grass of lawn or ground. As looking to the petrol engine it make air pollution to environment so from my recommendation it should be implement on electric operated lawn mower.[9]

Praful P. Ulhe: In this paper they have prepared manually operated grass cutter with spiral roller blades due to spiral blades increases the efficiency of cutting. For adjusting the height reel cutter is component placed on grass cutter. This grass cutter used to cut the grass uniformly and also it can cut the different types grasses.[10]

Randsome: The first was produced by Ransomes in 1902. JP Engineering of Leicester, founded after World War I, produced a range of very popular chain-driven mowers. About this time, an operator could ride behind animals that pulled the large machines. These were the first riding mowers. In the United States, gasoline-powered lawn mowers were first manufactured in 1914 by Ideal Power mower.[11]

Thomas Green & Son: He introduced a mower called the Silens Messor (meaning silent cutter), which used a chain drive to transmit power from the rear roller to the cutting cylinder. These machines were lighter and quieter than the gear-driven machines that preceded them, although they were slightly more expensive. The rise in popularity of lawn sports helped prompt the spread of the invention. Lawn mowers became a more efficient alternative to the scythe and domesticated grazing animals.[12]

III. OBJECTIVES

The objective of the project is to design the smart solar hybrid cleaner which operates upon solar energy and it also avoid obstacles. The purpose is to avoid fuel

consumption and reduce the human effort, operating cost, maintenance cost. Also solar based hybrid cleaner are environmental friendly it is used for various application. The whole machine operates on the solar energy which is stored in battery Our project is a battery powered automatic and phone controlled grass cutter and room cleaner include in one machine. It will have a solar powered charging station that is use to give charging power to battery and battery gives power to motor and motor helps to process grass cutting and room cleaning In this project have a vacuum cleaner which helps to clean dust In this hybrid cleaner have a lifting technology which helps to body puss on the upward direction when water droplet dropped on machine to protect the blade from junk Room cleaner is use four shook observer arm which is connected with cleaning disc Automatically it will shut off when finish it work

To reduce the cost of early grass cutter and room cleaner which is work on separately. It can be operated by unskilled person also.

1)The main project objective is to minimize overall weight so we can move this easily.

2) Ac motor create more vibrations and have more noisy therefore to remove vibrations and noise we use DC motor which have a less weight and create a less noise.

3) Ac motor need more power and long wire to provide power for working of machine, we remove this disadvantage by using battery and solar panel. Solar panel is secondary source to charge battery.

4) Machines available in market have less space for storing of trimmed grass; we eliminate this disadvantage by providing big tray on the top of chassis.

IV. METHODOLOGY

- Select the material for structure of machine
- Fabricate the structure of machine
- Calculate the required power of motor for desired operation
- Select the required solar panel with suitable power output

Determine the capacity of battery For the fabrication of a solar powered grass cutter cum floor cleaner we referred to various literature and papers. Different ideas were gathered and evaluated before designing and fabricating the grass cutter.

Several rural areas were visited to find out the challenges in terms of access to electricity and gasoline. Based on these challenges, the idea of designing solar powered grass cutter cum floor cleaner came about to address this problem. The electricity is produced when sun light falls on the solar cells causing the electrons move around them. The action of electrons starts an electric current.

The convection of sun light into electricity takes place instantly. There are no mechanical parts to wear out. The rays coming from sun are made to fall on the solar panel. The solar panel is kept at an angle perpendicular to sun rays such that maximum rays are falls on the panel, energy receiving from sun used to produce electricity and stored in a battery. Electrical energy of the battery is converted to mechanical energy through a set of blades designed to achieve cutting operation.

The electric circuit ensures power transfer from the battery to run the D.C. motor, while the solar panel power to continuously recharge the battery while in operation. The cutting blades or polishing pad gets power from the D.C motor. When the power switch is on, the electrical energy from the battery powers the motor which in turn actuates the blades or polishing pad.

The solar panel generates current to recharge the battery, thereby compensating for the battery discharge. The rotating blades continuously cut the grass as the mower is propelled forward and the cut grass or the polishing pads continuously cleans the floor as the mower is propelled forward.

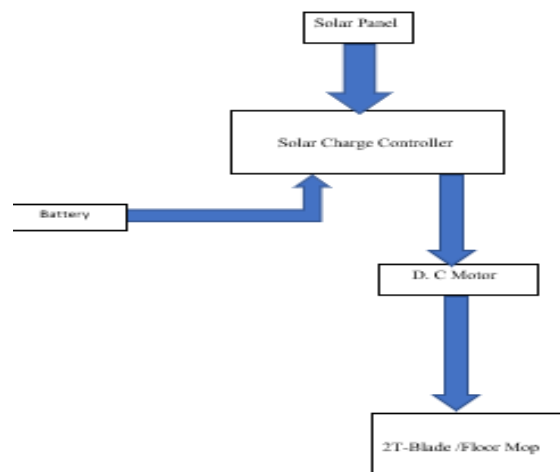### V. BLOCK DIAGRAM AND WORKING

Fig. 1 Block Diagram of the Proposed system

Components used
- ARDUINO UNO
- ULTRASONIC SENSOR
- BLUETOOTH MODULE
- MOTOR DRIVER
- DC MOTOR
- 12V BATTERY SUPPLY
- SOLAR PANEL

1) Arduino Uno

The Arduino Uno is a microcontroller board based totally on the ATmega328. It has 14 digital input/output pins (of which 6 pin can be used as PWM outputs), 6 analog inputs, 16 MHz crystal oscillator, a USB connection, a energy jack, an ICSP header, and a reset button. It contains the whole lot needed to aid the microcontroller; simply connect it to a computer with a USB cable or electricity it with an AC-toDC adapter or battery to get started.

The Uno differs from all preceding forums in that it does now not use the FTDI USB-to-serial driver chip. Instead, it capabilities the Atmega8U2 programmed as a USB-to-serial converter. The Arduino Uno can be powered through the USB connection or with an external electricity deliver.

The power supply is chosen automatically. External (non-USB) electricity can come either from an AC-to-DC adapter (wallwart) or battery. The adapter can be connected by plugging a 2.1mm centre-positive plug into the board's strength jack. Leads from a battery may be inserted in the Gnd and Vin pin headers of the POWER connector. The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

2) Ultrasonic sensor

The Ultra sonic distance sensor provides precise, noncontact distance measurements from about 2cm to 3meters. It is very easy to connect to Micro Controllers, propeller chip, or arduino, requiring only one I/O pin. The sensor has a male 3-pin to supply ground, power and signal. The header may be plugged into a directly into Solder Less Bread board, or in to a Standard 3- Wire Extension Cable.

The sensor detects objects bye matting a short ultra-sonic burst and then" listening" for the echo. Under control of a host micro controller, the sensor emits a short 40 KHz burst. This burst travels through the air, hits an object and then bounces back to the sensor. The sensor provides an output pulse to the host that will terminate when the echo is detected hence the width of this pulse corresponds to the distance to the target.

3) Bluetooth Module

HC-05 module is a Bluetooth module, designed for transparent wireless serial (SPP-Serial Port Protocol) connection setup.

HC-05 is a Bluetooth device used for wireless conversation with Bluetooth enabled gadgets like Smartphone. It communicates with microcontrollers using serial communication (USART).
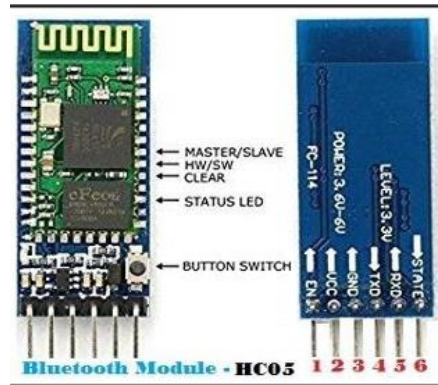

Fig. 2 Bluetooth Module

The HC-05 Bluetooth module has 3.3 V level for RX/TX and microcontroller can detect 3.3 V level, so, there may be no want to shift TX voltage stage of HC-05 module. But we want to shift the transmit voltage level from microcontroller to RX of HC-05 module.

4) Motor Driver

L298N Dual H Bridge Motor Driver is a motor controller breakout board which is commonly used for controlling velocity and route of motors. It also can be used to control the brightness of positive lighting initiatives such as excessive powered LED arrays. An H-bridge is a circuit which can force a current in both polarity and be controlled with the aid of pulse width modulation. This twin bidirectional motor motive force is based totally on the very popular L298 Dual H-Bridge Motor Driver Integrated Circuit. The circuit will let you effortlessly and independently control two motors of as much as 2A every in both directions. It is ideal for robotic packages and well applicable for

connection to a microcontroller requiring just more than one control lines in keeping with motor. It also can be interfaced with simple manual switches, TTL common sense gates, relays, etc. This board prepared with electricity LED indicators, on-board +5V regulator and safety diodes.

5) DC Motor The main characteristic of this motor is to convert electrical electricity to mechanical electricity. The working principle of this motor especially depends on electromagnetic law, which states that every time a magnetic subject is formed inside the vicinity of modern wearing conductor & cooperates with an outdoor field, then the rotating motion may be generated. Once the series motor is started, then it'll supply utmost pace as well as torque slowly with excessive speed.

6) 12V Battery Suppl

Lithium Ion Battery is used to deliver the electricity for the rotation of the Motors, the specs of the Battery is 12V voltage and 3A ampere hours. Batteries are a collection of 1 or greater cells whose chemical reactions create a waft of electrons in a circuit.

All batteries are made up of 3 simple components: an anode (the '-' side), a cathode (the '+' side), and some type of electrolyte (a substance that chemically reacts with the anode and cathode).

7) Solar Panel

Solar panel refers to a panel designed to absorb the sun's rays as a supply of energy for generating electricity or heating, single solar module can produce only a limited amount of power, most installations contain more than one module. A photovoltaic system normally includes an array of photovoltaic modules, an inverter, and a battery percent

VI. WORKING

For controlling Fully Automated Grass Cutter we have an android application here we use RC-CAR Control application. Here for controlling we give two different Modes namely, i. Manual Mode ii. Automatic Mode i. Manual Mode: - In this mode we control fully automated solar grass cutter by manual controls given in RC CAR Control application. We can handle it like mobile car game. In this mode we can give command forward move, reverse move, left move, right move

and stop. ii. Automatic Mode: - As per name it is fully automated mode. Whenever we choose this mode it works automatically by default it go forward movement and cut grass till whenever any obstacle is not detected. If any obstacle is detected by Ultrasonic Sensor Grass Cutter is stop at that moment and rotates by 90° at right side and then it goes forward and cut grass. After that this cycle become repeats and it work continually.

Operating Steps:

Step1: - Install RC CAR Control application in mobile handset.

Step2: - Tern ON switches which give supply to Arduino UNO and Motor Driver.

Step3: - Connect Bluetooth module connection through mobile Bluetooth.

Step4: - For manual mode use given arrows for movement of grass cutter.

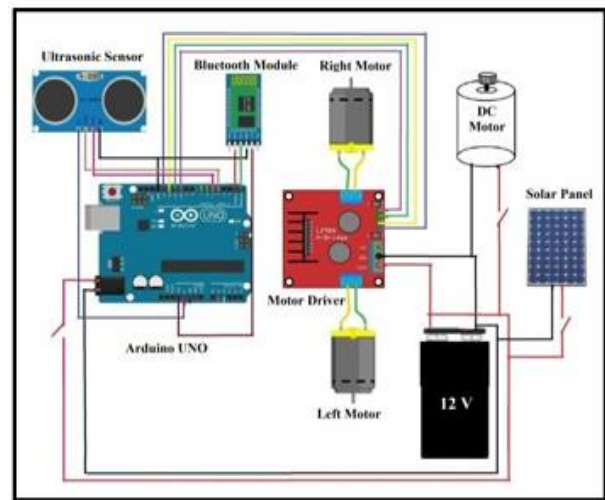Step5: - For automated mode tap on Ultrasonic sensor option.

Fig. 3 Circuit Diagram

VII. FUTURE WORK

- Design of blades should be done based on types of grass is used to cut.
- Add camera for give a simple way to see the location of the lawn mower.
- Attach wi-fi and Xbee module for longer distance of wireless control for the Lawn Mower.
- Size can be reduced to make it compact.
- We can use this product as floor cleaner simply changing blades by floor cleaner mop.

VIII. CONCLUSION

30x15 Not Function al The design of Fully Automated Solar Grass Cutter was tested successfully under manual and automatic operational modes. Compared to manual mode, the autonomous operation of the lawn mower resulted in a more efficient way of cutting the lawn, greatly reducing the cutting time by about 57%. By our design determinately we conclude that the Fully Automated Solar Grass Cutter Robot with Impediment Avoidance plays very key role in these days because to reduce pollution due to gas and petrol engines, it reduces the jeopardy for the users.

REFERENCE

[1] Technical Solutions, J. Hammond and R. Rafaels, "Build the Lawn Ranger," Radio Electronics, June 1990, pp. 3149. [2]. K. D. Sowjanya, R. Sindhu, M. Parijatham, K. Srikanth and P. Bhargav, "Multipurpose autonomous agricultural robot," 2017 International conference of Electronics, Communication and Aerospace Technology (ICECA), Coimbatore, 2017, pp. 696-699.

[2] D. W. Matolak, "Unmanned aerial vehicles: Communications challenges and future aerial networking," 2015 International Conference on Computing, Networking and Communications (ICNC), Garden Grove, CA, 2015, pp. 567-572.

[3] R. Welch, D. Limonadi and R. Manning, "Systems engineering the Curiosity Rover: A retrospective," 2013 8th International Conference on System of Systems Engineering, Maui, HI, 2013, pp. 70-75.

[4] H. Hisahara, Y. Ishii, M. Ota, T. Ogitsu, H. Takemura and H. Mizoguchi, "Human Avoidance Function for Robotic Vacuum Cleaner through Use of Environmental Sensors: Roomba® Making Way for Humans," 2014 5th International Conference on Intelligent Systems, Modelling and Simulation, Langkawi, 2014, pp. 64-67.

[5] E. Ackerman. "iRobot Definitely Developing Robot Lawn Mower, Astronomers Very Upset." IEEE Spectrum (April 9, 2015).

[6] Atif Khan, Febin Moideen, Juan Lopez, Wai L Khoo, and Zhigang Zhu, "Kindectect: kinect detecting objects," in International Conference on Computers for Handicapped Persons. Springer, 2012, pp. 588–595.

[7] Sharon Nissimov, Jacob Goldberger, and Victor Alchanatis, Obstacle detection in a greenhouse environment using the kinect sensor," Computers and Electronics in Agriculture, vol. 113, pp. 104–115, 2015.