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AUTOMATICALLY CONTROLLED GRASS CUTTER BY USING SOLAR ENERGY

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Abstract

This anticipate is basically proposition for decrease the labor and utilization of power. Greatest force point following procedure is utilized to enhance the productivity of the sun based board. The DC to DC buck support converter ventures up the DC voltage from the photovoltaic board and store the DC voltage in a battery. It is a mechanized framework with the end goal of grass cutting. The source is drive from the sunlight based vitality by utilizing photovoltaic boards. The DC-DC converter is utilized to change over the low level DC voltage into the abnormal state DC voltage. Abnormal state DC voltage works the entire framework. The framework control is finished by the microcontroller. Computerization is accomplished by utilizing sensors and microcontrollers. Haggles operations are done utilizing dc engines. DC battery is used for driving and standby mode operation of the framework.

Objective:

1. The main aim of the project is to increase the efficiency of the solar panel output.
2. To design Automatic control for Grass Cutting machine using Microcontroller and sensors.

Introduction:

This anticipate is a proposed model of the programmed grass cutting machine by utilizing the non-renewable vitality (i.e. sun based vitality). The programmed grass cutting machine is a machine which is going to play out the grass cutting operation by its own particular which implies no labor is required. This machine comprises of the photovoltaic, dc to dc converter, engine, controller, sonar sensor and microcontroller. The photovoltaic is utilized to get the sun powered vitality from the daylight and yield of the photovoltaic board is changing. So the dc to dc converter is utilized to change over the low level dc voltage to abnormal state dc voltage. The dc to dc converter is go about as support converter. The

progression up dc voltage is put away in dc battery. The battery is charge by the dc information which is get from the photovoltaic board.

In the event that the battery is completely charged then the controller is separated the contact between dc to dc converter and yield voltage from battery is proselyte the dc voltage as venture up and venture down voltage by the necessity of the dc engine.

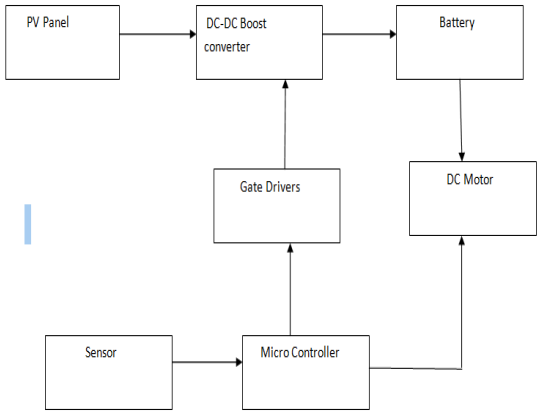


Fig 1: Block Diagram of Automatic Grass Cutter.

Explanation:

Photovoltaic board gets the daylight produce low level dc yield. So we are utilizing MPPT method for getting consistent yield from the photovoltaic board. The DC to DC converter is utilized to help low level voltage to abnormal state voltage supply. The battery charged by the abnormal state voltage getting from the DC to DC converter.

The Dc engine is completely keep running by the battery charge. The supply from battery is not proficient to run the DC engine in consistent pace. So the DC to DC converter is utilized to support the supply which is going to run the DC engine in steady speed in a stacked condition moreover. Abnormal state DC voltage works the entire framework. The framework control is finished by the microcontroller. Robotization is accomplished by utilizing sensors and microcontrollers. Haggles operations are done utilizing dc engines.

Component Details:

1. RPS - Regulator ic 7805(5v), 7812 (+12v), 7912 (-12v)
2. Gate driver – TLP250 (Power range upto 250kw)
3. Output sensing unit – IC LM324 (5V)

4. Microcontroller – pic16f887 (It need 5v)
5. Rectifier Diode – IN4007 (1A)
6. Filter Capacitor – 2200 microfarad.
7. Dc motor – 12v
8. MOSFET – IRF540

Explanation of each component:

1. PV Module: A PV exhibit comprises of a few photovoltaic cells in arrangement and parallel associations. Arrangement associations are in charge of expanding the voltage of the module while the parallel association is in charge of expanding the current in the cluster. Regularly a sun based cell can be displayed by a present source and an upset diode associated in parallel to it. It has its own particular arrangement and parallel resistance. Arrangement resistance is because of obstruction in the way of stream of electrons from n to p intersection and parallel resistance is because of the spillage current.

In this model we consider a present source (I) alongside a diode and arrangement resistance (Rs). The shunt resistance (RSH) in parallel is high, has an insignificant impact and can be dismissed.

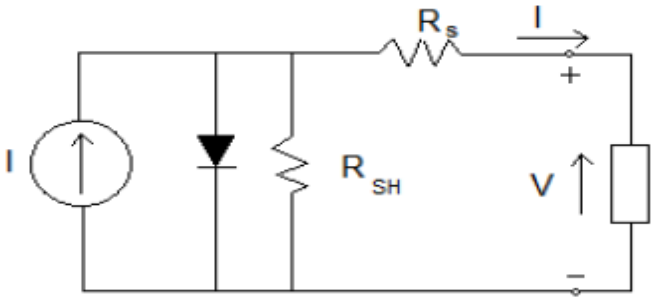


Fig 2.1: Single Diode Model of a PV Cell.

The output current from the photovoltaic array is

$I = Isc - Id$ …… (1)

$Id = Io\ (Vd/kT - 1)$ …… (2)

Where,

Io is the reverse saturation current of the diode,

q is the electron charge,

Vd diode voltage ,

k=Boltzmann constant (1.38 * 10-19 J/K) and

T is the junction temperature in Kelvin (K)

From above eqns.

I = Isc – Io (Vd/kT - 1)……(3)

Using suitable approximations,

Where,

I is the photovoltaic cell current,

I = Isc – Io (((V+IRs)/nkT) - 1).....(4)

V is the PV cell voltage,

T is the temperature (in Kelvin) and

n is the diode ideality factor ,With a specific end goal to display the sun oriented board precisely we can utilize two diode models however in our venture our extent of study is constrained to the single diode model. Likewise, the shunt resistance is high and can be disregarded over the span of our study.

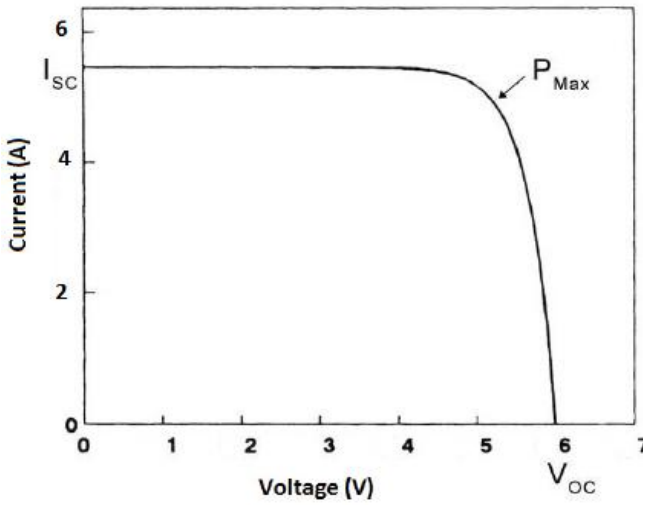


Fig 2.2:I-V characteristics of a solar panel.

The I-V characteristics of a typical solar cell are as shown in the Figure 3.2.

At the point when the voltage and the present attributes are increased we get the P-V qualities as appeared in Figure 2.3. The point showed as MPP is the time when the board power yield is most extreme.

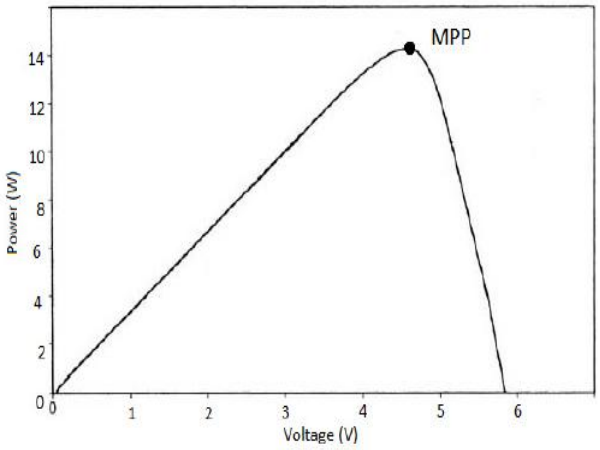


Fig2.3: P-V characteristics curve of Photovoltaic Cell.

2. DC-DC Boost Converter:

The help converter is a stage up DC/DC converter. Itworks in third-quadrant operation. The yield voltage is computed by the equation,

Vo=ton/(T-ton) Vin=k/(k-1) Vin

Where, T is the rehashing time frame T = 1/f, f is the hacking recurrence, ton is the switch-on time, and k is the conduction obligation cycle k = ton/T. By utilizing this converter it is anything but difficult to acquire the irregular yield voltage, which can be higher or lower than the info voltage. It gives incredible accommodation to mechanical applications.

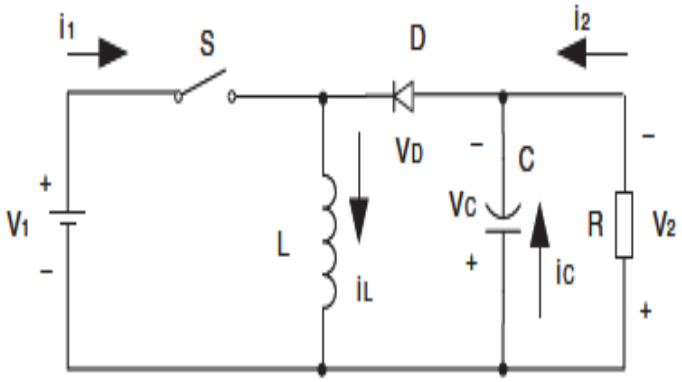


Fig: 2.4 Boost converter circuit diagram.

3. Micro Controller

PIC 16F882

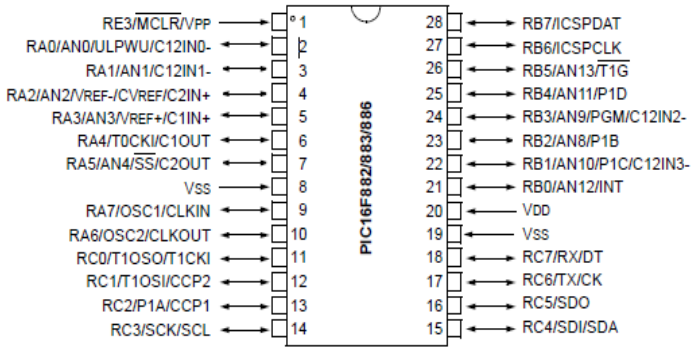
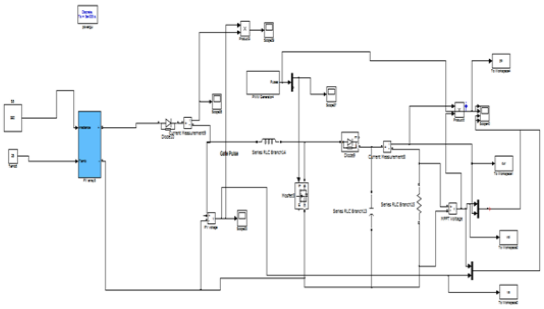


Fig3.1 Pin Configuration of Microcontroller.

- Oscillator Selection
- RESET
- Power-on Reset (POR)
- Power-up Timer (PWRT)
- Oscillator Start-up Timer (OST)
- Brown-out Reset (BOR)
- Interrupts
- Watchdog Timer (WDT)
- SLEEP
- Code Protection
- ID Locations
- In-Circuit Serial Programming

Fixed voltage is given to the microcontroller via of these pins.

Simulation Circuit:

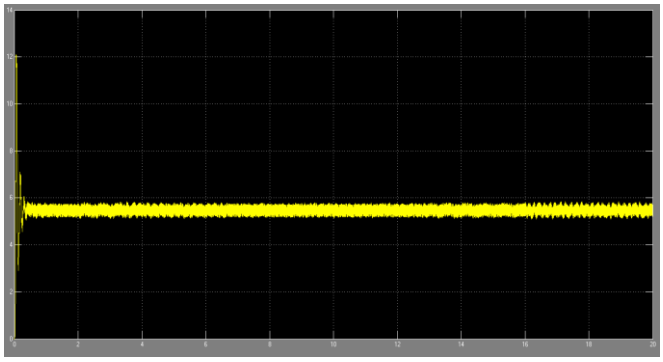


This circuit is designed using mat lab software in the system. By doing these we can get the exact output in the circuit.

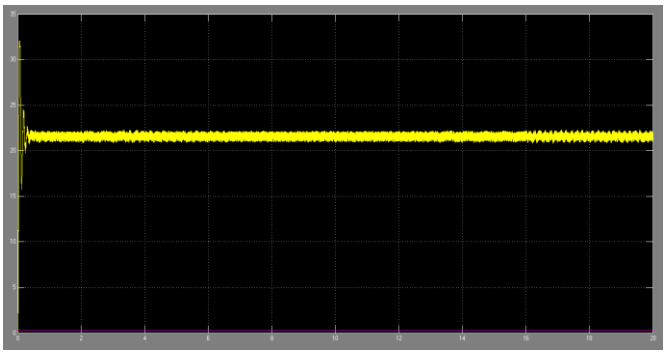
The blocks are taken from the Simulink module in the mat lab software. Here the input is 12v and output is 24v.

Outputs:

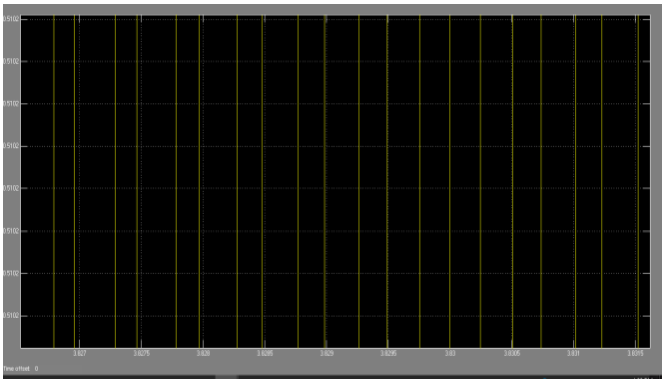
Current Output:



VOLTAGE OUTPUT:



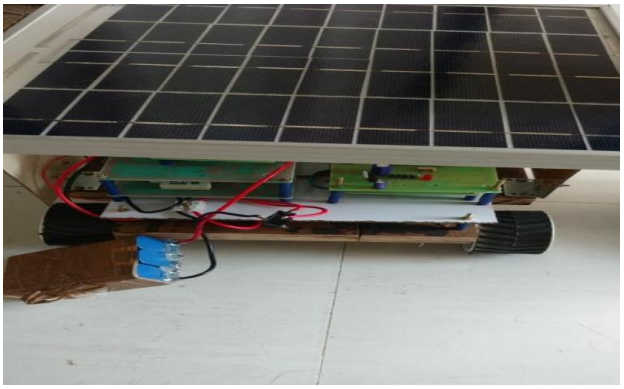
PWM WAVEFORM:

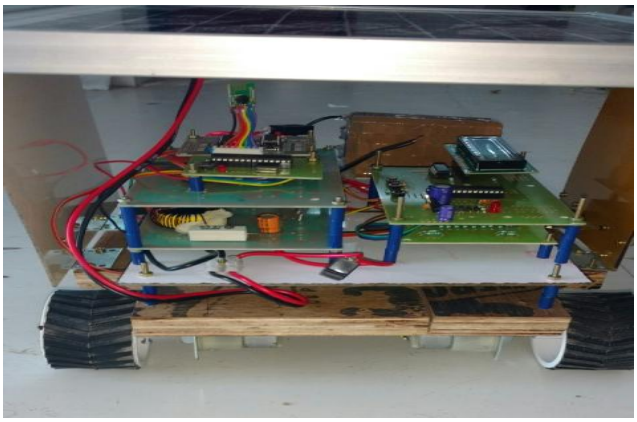


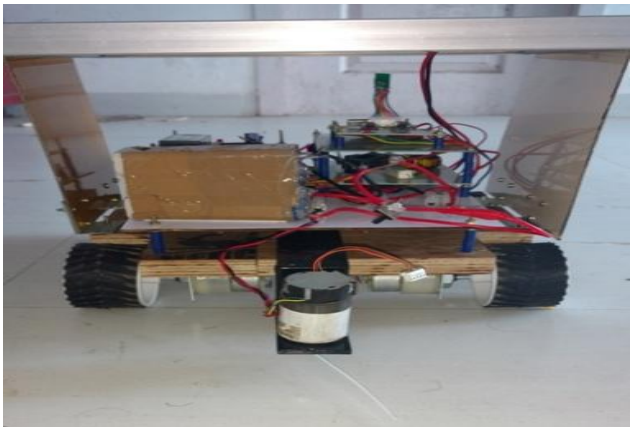
Results:

Input Voltage	12v
Output voltage	24v
Output Current	5.2 A
Switching Frequency	200Kz

Hardware Diagrams:







Conclusion:

Because of the force request we pick the renewable vitality. So there is no running expense. The DC engine is worked in low power with high effectiveness. DC-DC converter is keeping up the yield voltage is consistent and high. The sensors are not influenced the earth and creatures. It will be especially valuable for the client.

This anticipates reasons that the DC engine is control in a consistent pace by control circuit. The DC engine keeps up in a consistent rate in the state of the heap connected. The battery is charged by the photovoltaic board in a steady voltage. The yield of the photovoltaic board is fluctuating yet IC LM317T is go about as a voltage controller and got the shifting

contribution from the photovoltaic and gave the yield in consistent. The battery is detecting by the controller unit consistently it keeps up the steady contribution to DC engine. The DC engine rate can have the capacity to keep up steady and the execution should be possible in appropriate way.

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