International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 06 | June - 2023 SJIF Rating: 8.176 ISSN: 2582-3930

FABRICATION OF MANUAL SOLAR GRASS

Dr . V. Sai Srikanth
Professor, Department of Mechanical Engineering,
Raghu Engineering College, Visakhapatnam, Andhra Pradesh, India – 531162.

R.V.S.S.GOUTHAM
Student, Department of Mechanical Engineering,
Raghu Engineering College, Visakhapatnam, Andhra Pradesh, India – 531162.

S.Bhanu Swaroop Reddy
Student, Department of Mechanical Engineering,
Raghu Engineering College, Visakhapatnam, Andhra Pradesh, India – 531162.

S.Harish
Student, Department of Mechanical Engineering,
Raghu Engineering College, Visakhapatnam, Andhra Pradesh, India – 531162.

T.Govindarao
Student, Department of Mechanical Engineering,
Raghu Engineering College, Visakhapatnam, Andhra Pradesh, India – 531162.

U.Balakrishna
Student, Department of Mechanical Engineering,
Raghu Engineering College, Visakhapatnam, Andhra Pradesh, India – 531162.

ABSTRACT: The goal of the project is to create a lawn-cutting machine system that uses solar energy to power the grass cutter. Based on the main principle of mowing, a solar-powered lawn cutter was created and built. This lecture will cover the design of a solar-powered grass cutter, which includes a direct current (DC) motor, a rechargeable battery, a solar panel, a stainless-steel blade, and a control switch. The solar grass cutter is controlled by a switch on the board that closes the circuit and allows current to flow to the motor, which drives the mowing blade. The solar charging controller recharges the battery. Different varieties of grasses were used to test the performance of the produced machine.

Which transmit solar energy & then solar energy is converted into electrical energy & electrical energy is converted in to mechanical energy. This electrical energy is transmitted to electric motor. On the shaft of the electric motor a blade is connected having cutting edge which cut's the grass.

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KEY WORDS: mechanical Grass Cutter, Manual Solar Grass Cutter, Smart Solar System.

1.INTRODUCTION TO SOLAR ENERGY

Solar energy is created by nuclear fusion that takes place in the sun. It is necessary for life on Earth, and can be harvested for human uses such as electricity. Solar energy is a renewable resource, and many technologies can harvest it directly for use in homes, businesses, schools, and hospitals. Some solar energy technologies include photovoltaic cells and panels, concentrated solar energy, and solar architecture. There are different ways of capturing solar radiation and converting it into usable energy. The methods use either active solar energy or passive solar energy. Active solar technologies use electrical or mechanical devices to actively convert solar energy into another form of energy, most often heat or electricity. Passive solar technologies do not use any external devices. Instead, they take advantage of the local climate to heat structures during the winter, and reflect heat during the summer. There are many solar energy technologies that harness the sun's energy. The two main ways to use energy from the sun are photovoltaics and solar thermal capture. Photovoltaics are much more common for smaller-scale electricity projects, while solar thermal capture is typically only used for electricity production on massive scales in utility solar installations. In addition to producing electricity, lower temperature variations of solar thermal projects can be used for heating and cooling. Solar is one of the fastest-growing and cheapest sources of power in the world and will continue to spread rapidly in the coming years. With solar technology improving each year, the economic benefits of solar improve, adding to the environmental perks of choosing a clean, renewable energy source. In the coming years, we can expect more and more solar and wind power to enter the mix of large-scale power stations, helping to reduce our country's greenhouse gas emissions and combat climate change

1.1APPLICATION 1 - SOLAR ROOFTOP

With a myriad of state-of-the-art electronic devices and gadgets today, it's not hard to see why the most common solar power examples is rooftop solar. Generating electric power via rooftop solar panels is kind of application that has gained tons of momentum in the last few decades. As more and more people realize the environmental, social, and financial benefits of solar energy, rooftop solar has increasingly gained traction especially with homeowners in countries and states that receive year-round sunshine, such as Australia, California, Nevada, Florida, and Texas. The rising adoption of rooftop solar is also speedy thanks to the plummeting costs of solar panels, making solar electricity more pervasive, more affordable, and readily available than ever in most countries. The percentage of national electric power generated through rooftop solar has more than tripled in the last four years, accounting for more than 40%, according to the US Solar Energy Technologies Office Rooftop solar can save homeowners thousands of dollars in electric bills each year, not to mention it can help them cut their carbon footprint, and avoid the rising costs of electricity. As you think about going solar with rooftop photovoltaic panels, it is important to consider your home's sun exposure, roof type, roof condition, aesthetics of your home, roof orientation, as well as your home energy requirements

1.2 APPLICATION 2 - SOLAR HEATING

Another core application of solar energy is generating concentrated thermal power. Given the abundance of the sun's free energy, many businesses like hotels and homeowners are embracing solar space heaters and solar water heaters as alternative ways to heat their properties. How do they work? Solar water heaters, as the name suggest, make use of water as a medium for transferring thermal energy, while solar space heaters are designed to use air or liquid as a method of harnessing sunlight and converting it into thermal enegy

1.3 APPLICATION 3 - SOLAR LIGHTING

One of the most direct and effective ways to enhance sunlight is to use it for outdoor solar lightning, which is a great way to spruce up the curb appeal, security, and resale value of your property. Unlike standard outdoor lights, solar lighting is easy to install, mostly wireless, and collects sunlight to reduce reliance on the utility-supplied electric power at night. While solar lights are not yet as popular as solar panels, they're increasingly being used alongside products like smart home thermostats and LED bulbs to improve energy efficiency and reduce energy costs. They are not expensive, too, with most models coming at around $20 a piece. The prevalence, affordability, and accessibility are some of the top reasons why more and more street lights are powered through solar energy

1.4 APPLICATION 4 - POWERING AUTOMOTIVE (SOLAR-POWERED TRANSIT)

An innovative examples of solar energy is PV Powered transportations and automotive. Cars, planes, buses, subways, street trolleys, railroads, and even roads can all be run with solar 5 energy, and solar-powered transportation is increasingly becoming a popular alternative to traditional means. A few years ago, we saw the first solar-powered plane make a trip around the world, marking a major milestone for the application of solar energy in the transportation industry. Even more exciting, China is using solar-powered businesses to facilitate mass transit in megacities like Beijing while reducing its dire carbon footprint. Meanwhile, solar-powered cars have recently shown up in motor competitions across the globe. A typical example is the Solar Spirit debut model that participated in racing tournaments in Australia. And we've just scraped the surface as far as solar-powered automotive and transit goes

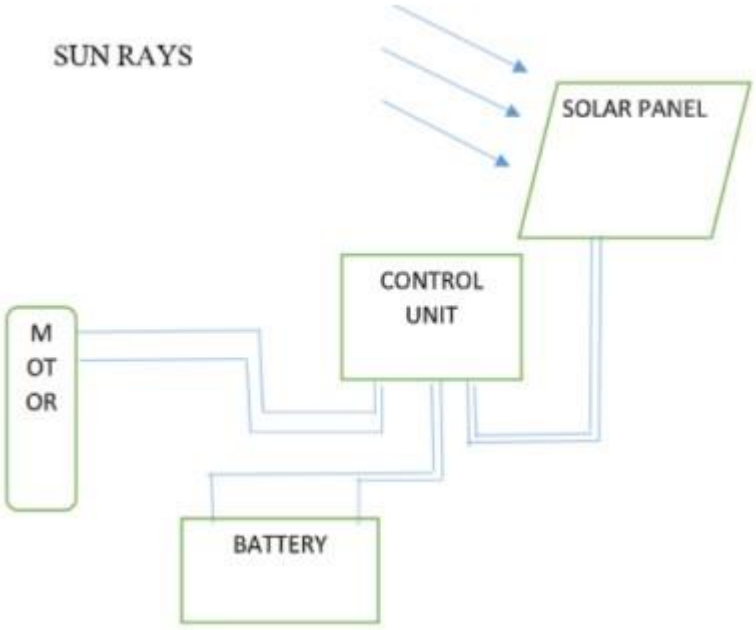
1.5 APPLICATION 5 - POWERING WEARABLE TECH

If there's one personal application of solar energy, it's a wearable solar tech. It's not something new for consumer electronics to be powered with solar. Portable solar chargers can power or charge a wide array of electronics, from cameras and smartphones to e-readers and tablets. As the tech world embraces solar, we are going to see a bevy of self-charging and eco-friendly solar wearables, including smartwatches, smartphones, step counters, fitness trackers, portable solar chargers, portable power stations, and much more

1.6 APPLICATION 6 - SOLAR VENTILATION Solar Ventilation systems have come a very long way. Today, advanced solar ventilation systems like solar attic fans increasingly play an important role in reducing the burden of gaspowered air conditioning as they help in cooling buildings and homes during the hot summer weather. That makes solar ventilation a smart way to use solar energy, particularly for homeowners who haven't installed rooftop solar panels to offset their central cooling & heating costs in their homes. Industrial and commercial applications of solar energy include thermal heating technologies that help heat air before being circulated in buildings and industrial sett

2.MATERIAL AND METHODS

A solar panel, charge controller, battery, DC motor, and grass cutter blade make up the solar lawn cutter. Four wheels and a plywood board support the entire apparatus. So that the cutter can move in the desired direction, the front two wheels revolve.In designing the cutting blade, the force required to cut the lawn as well as the force acting on the blade was considered. The force required by any sharp object to have impact on the grass is less than 10 Newton. It is also dependent on the height, density and the area covered by the object . Therefore, in designing the blade of the solar powered lawn mower, the force required for effective mowing should be greater than 10 Newton. A stainless steel was used in the construction of the cutting blade because of its strength and weight which can transmit same speed as that of the DC motor or a little less cause of friction.



SOLAR PANEL:

Solar panel is used to save the electric energy.it is also used to store the energy with the help of the battery. In this grass cutter we use 10w/12v solar panel which provides enough power to charge the battery. A solar panel, or solar module, is an interconnected system of small individual solar cells. They generate electricity from sunlight through the photovoltaic effect. A solar panel, or solar module, is an interconnected system of small individual solar cells. They generate electricity from sunlight through the photovoltaic effect

10W/12V Solar Panel

LEAD-ACID BATTERIES

These batteries contain lead-acid that is cheaper and used mostly in vehicles. They generally come with a voltage range of 2V to 24V and have a power density of 7 Wh/Kg

DC MOTOR:

In this model a 775dc motor is used which are connected to the blades. The 775 motor is a highperformance DC electric motor that is commonly used in a wide range of applications, including robotics, remote control vehicles, and power tools. The 775 model of DC motor represents a certain size of the motor body outer frame. This size is standard for all 775 motors. The motor is able to deliver a high amount of power while still being relatively lightweight, which makes it well-suited for use in applications that required both higher power and portability. Additionally, it is also known for its high efficiency, which means that it is able to convert a electrical energy into mechanical energy with lesser losses thus doing more work with less energy.

CUTTING BLADE:

The cutting components of grass cutters are mower blades. They're frequently built of tough metals because they have to resist high-speed contact with a number of substances besides grass. The materials utilized (as well as the blades' size, thickness, and design) differ per manufacturer. The cylinder cutting gear on the first known lawn mower was composed of iron. It was used to mow athletic fields and large gardens. Cutting mechanisms developed and evolved as manufacturers changed the form and structure of mowers, including cylinder/reel 24 blades, deck blades, mulching blades, and lifting blades. They have sharp, spinning blades that cut through the grass and its roots, lifting up large strips so you can roll them up and remove them. Sod cutters work for removing grass for new garden spaces or preparing for a new lawn.

NYLON WHEEL :

Nylon Wheels are incredibly strong and provide high load capacities, excellent wear and tear resistance and can cope with occasional impact without fracture, and in addition are relatively inexpensive compared to other materials with comparable properties. Nylon is resistant to a wide range of aggressive substances, has good rolling properties on smooth floors and is available in a variety of versions and dimensions. The white version is very popular as it makes dirt and dust easy to see. The material is not particularly suitable for applications involving high temperatures or uneven surfaces. When used in these circumstances, the material requires a significant amount of force to push and pull loads and can produce a considerable amount of noise. Nylon wheels and castors are frequently used for packaging machines or in the automotive industry. They are also commonly used for stainless steel containers or machinery which is normally left in a stationary position, such as laboratory equipment. In addition to standard nylon versions, Blickle also provides heavy duty series made of compressed cast nylon or nylon with a rubber damping ring for lower noise emissions.

WORKING AND OPERATION

The working principle of solar grass cutter is it has panels mounted in a particular arrangement at frame that it can receive solar radiation with high intensity easily from the sun. The solar panels convert solar energy into electrical energy, using photovoltaic effect and stored in battery. The number of times a battery can be discharge is known as its life cycle. 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, whilst the solar panel power to continuously recharge the battery while in operation. The cutting blades tap power from the D.C. motor. The motor is connected to the batteries through connecting wires between these two switch is provided On/off switch it starts and stop the working of the motor and Toggle Switch is used for direction of blade (clockwise & anti clockwise). The rotating blades continuously cut the grass as the mower is propelled forward

and the cut grass. The designed solar-powered grass cutter comprises of direct current (D.C.) motor, a rechargeable battery, a solar panel, stainless steel blade which is directly coupled to the shaft of the D.C. motor

OPERATION PRINCIPLE :

The photo- voltaic effect can be observed in nature in a variety of materials but the semiconductors performed best in sunlight. The solar powered lawn mower involves the application of solar power to charge batteries for the purpose of using it to power an electric motor which in turn actuates the blade as the mower is being propelled. When the mower moves, the lawn mower blades which are attached to the revolving electric motor cuts the grass. The electric circuit ensures solar energy from the sun is transferred through a charge controller to charge the battery which in turn supplies power to run the electric motor, while the solar panel power, will continuously recharge the battery while in operation. When the power switch is on, the electrical energy from the battery powers the motor which in turn actuates the blades. The solar panel generates current to recharge the battery, thereby compensating for the battery discharge. The solar lawn mower is made up of a lawn mower deck with handle, a 12volts electric motor; a 12 volts battery and blade. A charge controller is mounted separately used for charging the 12 battery. The solar panel is a photovoltaic cell that generates current when light falls units surface. 100 Watts solar panel is used to charge the battery. The electric motor forms 29 the heart of the machine and provides the driving force for the blade. The maximum output voltage produced by a silicon cell is approximately 0.5Volts when there is bright sunlight. Solar panels need direct sunlight to produce greater solar output. Although in situations whereby the weather is cloudy, the solar panel can absorb solar energy but the rate will be significantly reduced to about 25 to 40% when compared to sunny days. The panels will only produce maximum output to charge the battery during the peak sun hours per day. Peak sun hours per day is approximately 4.86hours. Considering the power and voltage of the solar panel, the following calculations were made.

RESULT

In order to overcome the increasing demands for fuel and the environment grass cutter due to using carbon-based grass cutter, it is quite necessary to switch to a new source of energy, i.e., the solar power which would be a efficient, limitless and of course an ecofriendly. Since these types of grass cutter are the future technol

CONCLUSIONS AND RECOMMENDATIONS

In the world today, all machines are designed with the aim of reducing or eliminating greenhouse gas emissions which is the major causes of climate change. This solar powered grass cutter will meet the challenge of environmental production and low cost of operation since there is no cost for fuelling. A solar powered lawn mower has been developed for the use of residences machine's capacity is adequate for its purpose. The machine has proved to be a possible replacement for the gasoline powered grass cutter. In the presented paper provides the fabricated information about the "Fabrication of Solar grass Cutting Machine" which was

designed such that the solar plate generates solar energy and utilizing this energy for running the grass cutter motor. Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced ICs with the help of growing technology, the project has been successfully implemented. Thus, the project has been successfully designed and tested.A Smart waste management system is a step forward to make the manual collection and detection of wastes automated in nature. The developed system integrated by using the smart Vehicle System and the Smart Monitoring and controlling, in which it would pioneer work for solid waste collection, monitoring and management processes. The currently employing method in which concerned municipal employee has to look for the filled waste bins manually across different spots in an area/street for checking regularly whether the waste bin is filled or not, which is complex and timeconsuming process. This automation of waste also reduces the human effort and consequently 40 the cost of the whole process. model is used for carrying and unloading the solid wastes in dustbin by using DC motor. This Method is most effective in large corporation areas. This method can be implemented practically. In future, some additional features will add to this project to crush and recycling plastics and other materials automatically. Due to power demand, choose solar energy which is a renewable source of energy and hence there is no running cost. Our project entitled Android app operated solar powered grass cutter is successfully completed and results obtained are satisfactory. This project is more suitable as it is having much more advantages i.e., no fuel cost, no pollution and no fuel residue.

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