IJIREEICE ISSN (O) 2321-2004, ISSN (P) 2321-5526

International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering

ISO 3297:2007 Certified ⁜ Impact Factor 8.021 ⁜ Peer-reviewed / Refereed journal ⁜ Vol. 11, Issue 5, May 2023

DOI: 10.17148/IJIREEICE.2023.11510

SOLAR AND WIND POWERED HYBRID ELECTRIC VEHICLE

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Abstract: Due to scarcity of fossil fuel in future and its detrimental effect on the environment, an alternative energy has to be discovered. Wind power is clean and sustainable natural resources that has yet to be fully utilized in the automotive industry. Also, the sun is probably the most important source of renewable energy available today. The hybrid system has been designed and installed to generate power which combines wind turbine and solar panel. The hybrid model system is renewable energy system, which helps conserve energy by reducing the use of fuel in vehicle. Hence developing a new method for the economical evaluation of Hybrid Systems for electricity production. This project proposes a hybrid electric vehicle (HEV) system which can resolve the major troubles of pollution. Wind and solar are the commonly used renewable energy resources. Nowadays hybrid electric vehicles (HEVS) are energized by an internal combustion engine with the combination of one or more electric motors which use energy stored in batteries. To charge the battery, a HEV cannot plug in to off board sources of electricity. As an alternative, regenerative braking and the internal combustion engine are used by the vehicle to charge. Hence the proposed system can reduce fossil fuel use, decrease pollution, and allow renewable energy sources for transportation.

I. INTRODUCTION

This paper discusses about the usage of solar energy and wind energy to power up the vehicle. In order to achieve the required voltage, the Photo Voltaic (PV) Module may be connected either in parallel or series, butit's costlier.Thus to make it cost effective, power converters and batteries are been used. The electrical charge is consolidated from the PV panel and wind turbine and directed to the output terminals to produce low voltage (Direct Current).An electric vehicle is pollution free and is efficient atlow speed conditions mainly in high traffic areas. But battery charging is time consuming. The charge controllers direct this power acquired from the solar panel and wind turbines to the batteries. According to the state of the battery, the charging is done, so as to avoid overcharging and deep discharge. The voltage is then boosted up using the boost power converter, ultimately running the BLDC motor which is used as the drivemotor for our vehicle application.In the coursework,the characteristic features of the components: solar panel, wind turbine, charge controller, battery, interleaved converter, PIC16F877A and BLDC motor required for the vehicle application were studied in real time and alsowere modeled individually and the complete hardware integration of the system into meet up the application's requirement. Here the hybrid car is specially designed so that the energy limitation can be easily overcome by using the hybrid technology. As the battery running are beneficial for the society and more often this type of technology is fruitful for the environment. So, to overcome the energy limitation we have installed wind with solar energy and that is called the regeneration.

II. LITERATURE SURVEY

A. Adejumobi, S.G.Oyagbinrin, F.G.Akinboro& M.B.Olajide, et al in October 2011 proposed a concept on Hybrid Solar and Wind Power: An Essential for Information Communication Technology Infrastructure and people In rural communities. In today's technology driven world electricity is one of the foremost thing for our day to day life activities. As we all are oblivious of the fact that the renewable sources of energy are depleting at a lightning fast rate. So it's time for us to shift the focus from conventionalto non-conventional sources of energy to produce electricity. The output of the electricity produced by non-conventional sources is less than their counterparts. Renewable sources do not have any detrimental effect on the environment. Solar-wind hybrid system is basically an integration of solar plant and a wind energy plant. It will help in providing the uninterrupted power supply.

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Kavita Sharma, Prateek,Haksar in Jan–Feb, 2012 proposed on "Designing of Hybrid Power Generation System using Wind Energy- Photovoltaic Solar Energy- Solar Energy with Nano antenna" tackling the problem of Fuzzy controller for maximum power point tracking (MPPT) under varying isolation and shading conditions. Under these dynamic changes, most MPPT techniques fail to rapidly locate the global maximum power point and are stuck at global maxima leading therefore to inconsistent power generation and low system efficiency. In order to overcome this problem, we have proposed in this paper to apply the Adaptive Neural Fuzzy Interference System (ANFIS) algorithm in order to achieve global maximum power point tracking in record time. Using this method, the total output power of the solar system and wind system is maximized while minimizing the steady-state oscillations and the tracking time.

Nahidul Hoque Samrat, Norhafizan Ahmad, ImtiazAhmed Choudhury, Zahari Taha in 2015 proposed on "Technical Study of a Standalone Photovoltaic–Wind Energy" Based Hybrid Power Supply Systems for Island Electrification in Malaysia. Energy is one of the most important factors in the socioeconomic development of a country. In a developing country like Malaysia, the development of islands is mostly related to the availability of electric power. Power generated by renewable energy sources has recently become one ofthe most promising solutions for the electrification of islands and remote rural areas. But high dependency on weather conditions and the unpredictable nature ofthese renewable energy sources are the main drawbacks.

Sandeep Kumar, Vijay Kumar Garg, et al in 2013 Inherently variable nature of renewable sources of energy such as solar and wind, are incapable of meeting continuous supply demand. Combining solar photovoltaic (PV) andwind power could offer a feasible solution to the problem of continuous power supply, particularly in those geographical locations where both resources are available in abundance. The present paper investigates the solar and wind energy potential in Indian sub-continent. The feasibility of harnessing renewable energy per sq. meter of land (i.e. energy density) from a combined solar PV-Wind hybrid system in the selected location - Jaisalmer in Rajasthan, is reported. The solar irradiance and wind velocity data for the last three decades for the selected site is collected using PV syst software. A novel design of PV-wind hybrid system is proposed to gauge the better utilization ofthe existing space, productivity enhancement, and energy/m2 harnessed from the utilized land. The proposed system would pave a way forward towards developing a more sustainable, effective and rugged hybrid renewable energy systems that could cater the energy needs of the Indian sub-continent and similar geographical locations.

Samrat NH, Ahmad NB, Choudhury IA, Taha ZB in 2014 Prospect of Wave Energy in Malaysia, in Proceedings of the IEEE 8th International Power Engineering andOptimization Conference. Our earth is a water planet; nearly two thirds of the earth's surface is covered by ocean water. But the shortage of fresh water is a major problem in many areas, especially in rural villages near to the sea or islands. Now, renewable energy-based desalination system is rising around the world due to the adverse environmental effect and high-energy requirements of the conventional fuelbased desalination system. This paper describes the prospect of an off-grid stand-alone wave-powered reverse osmosis desalination system for those areas. A simulation model for the prediction of the wave power delivered for a given value of the wave height and period is adopted. Based on the availability of the wave data, the amount of the water produced at different sites of Malaysia can be calculated in this paper. In addition, this paper deals with an economical analysis of wave energy production for reverse osmosis desalination system.

III. METHODOLOGY

Working:

Here first of all the vehicle that is presently running on battery say for generic electric vehicle can be modified by installing various new circuits. The solar panel will charge the battery on the day time. The circuit attached to the battery will protect the battery from damages the sunlight intensity is more in the summer the solar panel passes more amount of voltage than required by the battery and this leads to the battery damage so for stabilizing the voltage the circuit will be installed between the solar and the battery. As there is no one in the electric car we can install the carburetor fan and the fan will be attached to the generator and the vehicle is in moving position even in the night time when the solar panel will not work the battery will be charged through the wind energy that is from the fan with dynamo attached and the battery will be charged. Clips are attached so that the user can change power source for charging the battery from solar to wind when required. And in another part the sensor based circuit is also installed this circuit will connected to the motors of the vehicle in the night time or at that when the driver forgets to apply brake in the traffic portion or when driver fall asleep while driving in the night time this sensor circuit will continuously bypass the invisible rays and the rays will detect the in front object of the vehicle if suddenly in front objects say for any vehicle has applied brake and the driver forgets to apply brake this sensor will automatically will calculate the distance and the both objects comes closer than the sensor will pass command to the circuit and the brakes will be applied automatically.

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This system can save lot of life even it can avoid accidents. For increasing the loading capacity of the motor the gear section that is the gear box is also installed that will increase the loading capacity of the motor without consuming more voltage and power from the battery.

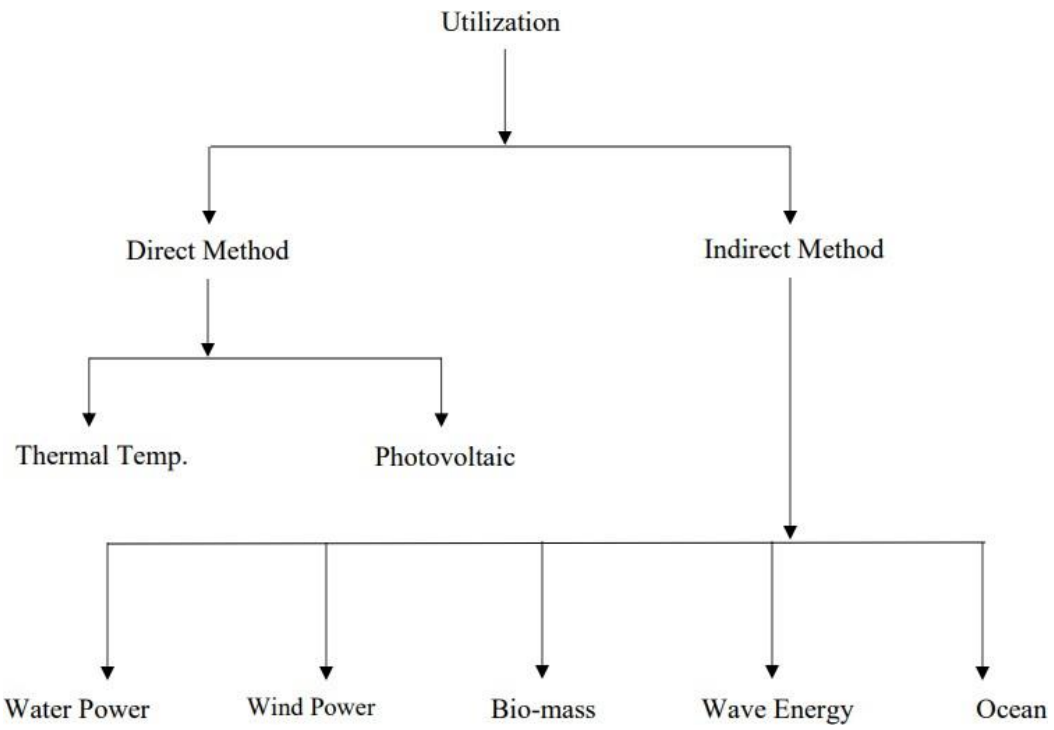
Solar energy utilization:

Solar energy is very large inexhaustible source of energy. The power from the sun intercepted by the earth is approximately 1.8*1011 mw which is many thousands of times larger than the present consumption rate on the earth of all commercial energy sources. Thus, in principle solar energy could supply all the present & future energy needs of the world on a continuing basis. This makes it one of the most promising of the unconventional energy sources. In addition to its size, solar energy has two other factors in its favor. Firstly, unlike fossil fuels & nuclear power, it is an environmentally clean source of energy. Secondly, it is free & available in adequate quantities in almost all parts of the world where people live. The real challenge in utilizing solar energy as an energy alternative is of an economic nature. One has to stride for the development of cheaper methods of collection & storage so that the large initial investments required at present in most applications are reduced.

Wind Energy Utilization:

Wind energy is an important strategic energy over the world. Wind power is a useful form of energy converted from wind energy. The main conversion of wind energy is using wind turbines to make electricity. Generally, studies focus on the specific technology of wind energy. There is, however, little qualitative information on status of wind energy utilization and development. This research tended to focus on systematic analysis of global utilization and development of wind energy, rather than on particular technology. The top eleven wind energy utilization countries account for 87.7% of total. The global utilization of wind energy increased 24.6% in 2010. The highest increasing country is Romania with an increasing rate of 264.3%. The cumulative installed wind turbine capacity has increased by 73.2% in China, which is the largest cumulative installed wind turbine capacity country. US increased by 14.5% in 2010 as the second cumulative installed wind turbine capacity country.

Methods of energy Utilization



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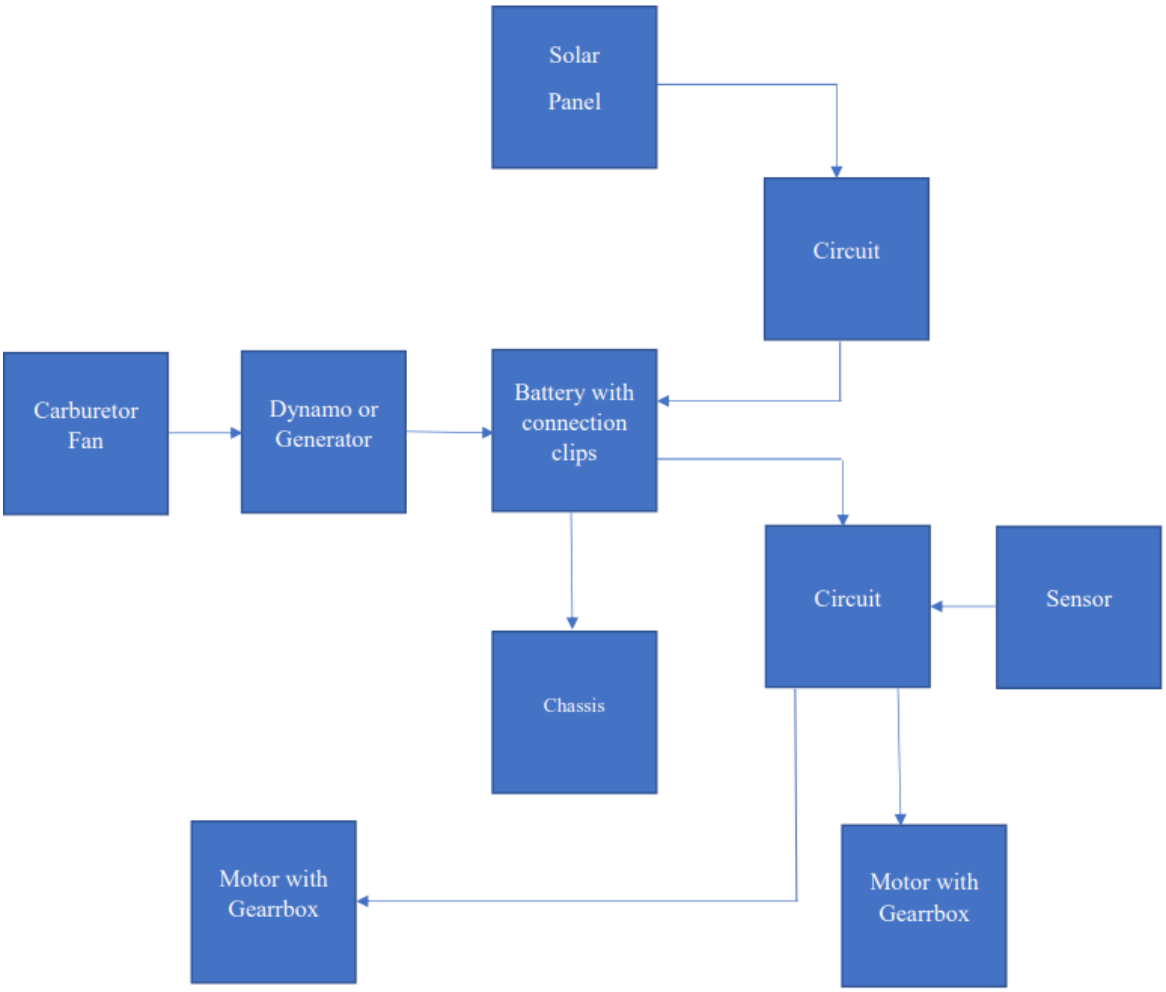
IV. SYSTEM DESIGN

Circuit Diagram:



Conversion Of Wind Energy Into Electric Energy:

In this prototype the wind capturing device is a fan. Fan is mounted on the front side of the chassis with the truncated cone in front of it. Fan will get rotated by the wind blown by the blower which will get directed toward the fan due to cone where in actual it will be the wind around the vehicle when vehicle is in running condition. Rotating fan will convert the captured kinetic energy of wind into mechanical energy. The center shat motor which is connected to battery will convert this mechanical energy into electric energy which is going to store in the battery. Fig shows below the energy stored by prototype from wind energy.

Conversion Of Solar Energy Into Electric Energy:

Solar panel is situated on the top of battery in the prototype. Where in actual vehicle it will be mounted on the upper body of chassis of four-wheeler. While the vehicle in running position or stand still and have a sufficient solar energy the solar panel will trap that energy and due to the photovoltaic effect of solar panel, it will convert this solar energy into electric energy which will get stored into the battery.

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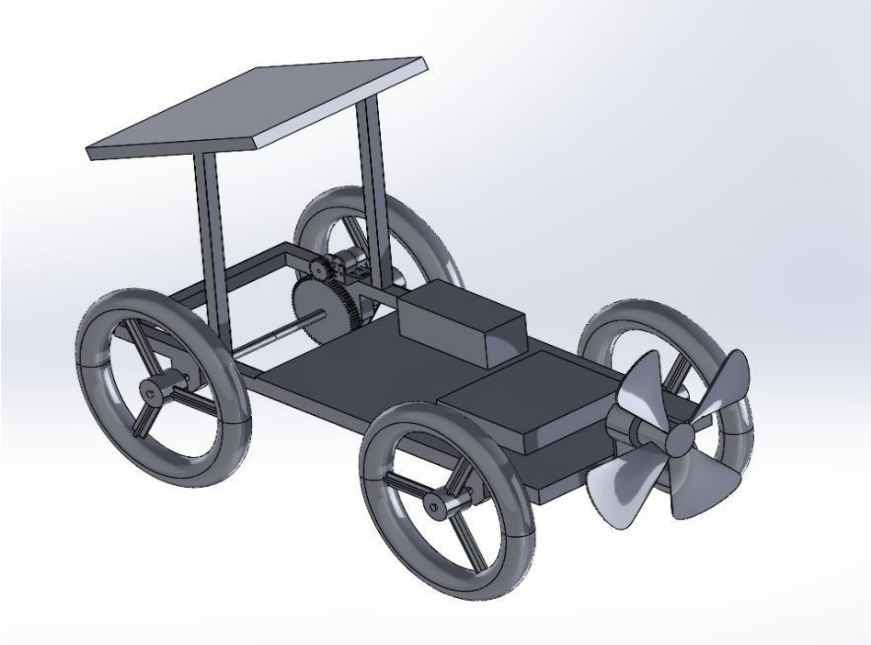
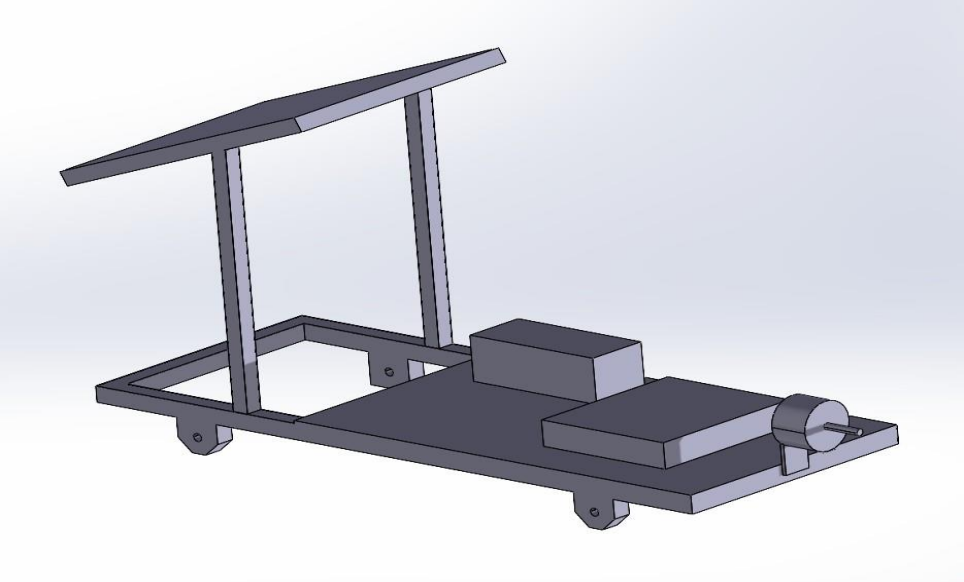
CAD DESIGN OF COMPONENTS:

Model:



Base Frame:



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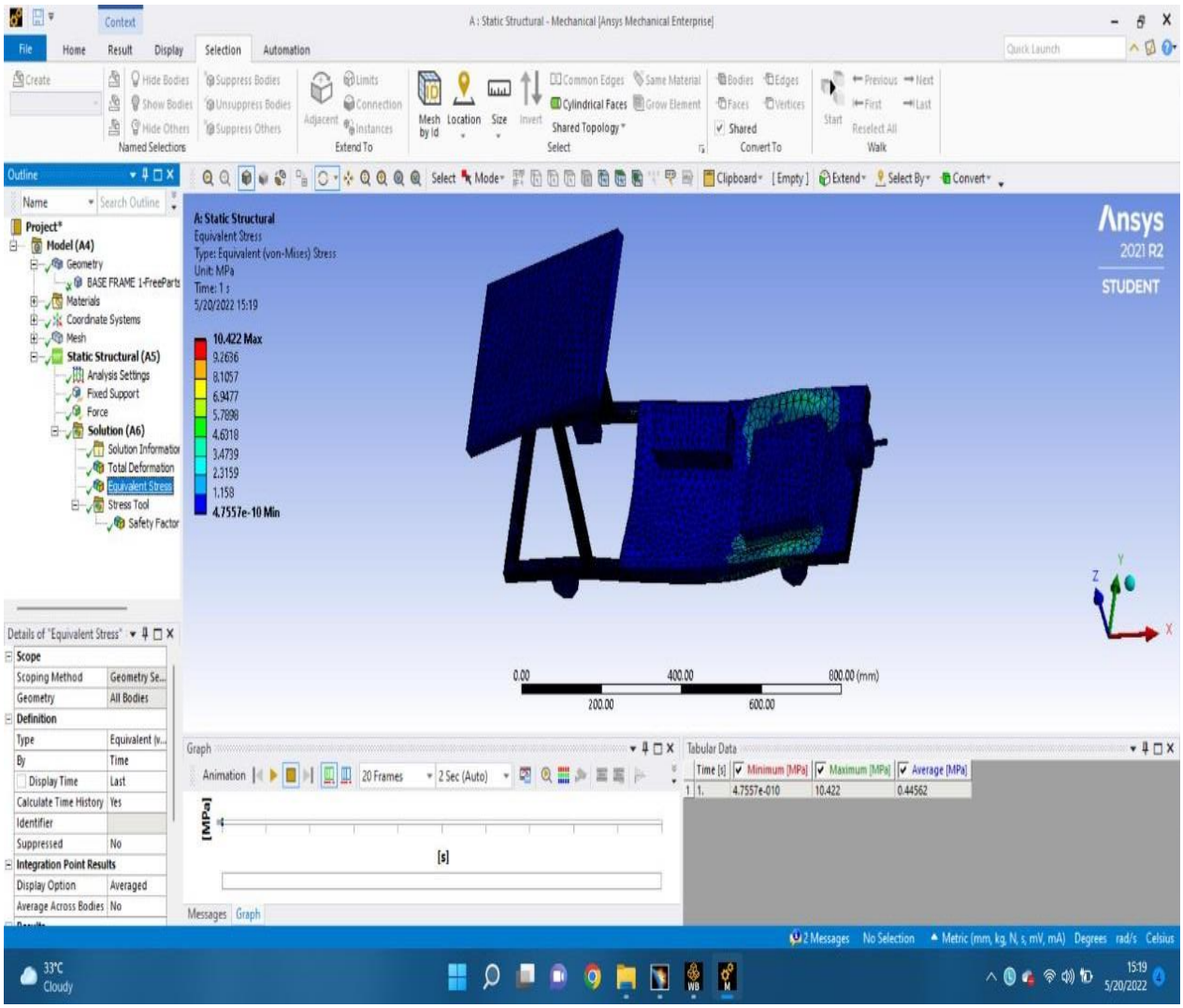
Ansys Simulation:



V. CONCLUSION & FUTURE SCOPE

Conclusion:

Renewable Energy resources such as Solar and Wind are abundantly available and can prove to have significant economic impact. The Position of the Solar Panels is decided on the roof and the position of the Wind Turbine is decided to be behind the vehicles grill. The CAD designs and diagrams give an idea of how the Solar and Wind Energy Apparatus will be fitted to the vehicle. The calculations show an increase in range of the vehicle and positioning of the wind turbine on strategic locations on the vehicle give ways to minimize drag occurring due to the wind turbine. With development in the Renewable Energy technology, this model gives a scope of significant increase in range of the vehicle.

Future Scope:

With the hopes that the renewable energy technology will improve in the upcoming future the charging of the battery will take place at a much more efficient rate. Future developments in the technology may help in eliminating the need to charge the battery at all, as it will be charged by the renewable elements.With the improvement in the technology, Solar and Wind energy powered electric vehicle coupled with Regenerative Braking will lead to a self-sustaining electric mobility.

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