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Solar and Wind Powered Electric Vehicle

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A B S T R A C T

The vehicle in question is an electrical car that runs on solar and wind power and is managed by the Internet of Things. The main goal is to move vehicles using renewable forces. The structure can be precisely controlled thanks to an ESP32 microcontroller that is connected to two electric engines and a motor driver. Additionally, the vehicle has a wind turbine and solar battery panel that produce electricity in an environmentally friendly and sustainable manner. This project is focused on developing a green car that won't need fuel derived from fossil fuels like gasoline since our primary goal is to create a vehicle that doesn't use any oil or gas at all because it can run on more unusual energy sources like solar or wind or fuel while ensuring that it operates solely using currently accessible renewable energy sources. The ESP32 module is integrated by the motor driving system into the motor speed adjustment circuit, which serves as a single-chip electronic hub for serial communication codes and motor control signals between the motor and the CPU. To operate the car, use a remote control. When connected, the driver can control the direction of each motor separately, allowing the driver to automatically connect the two motors on the driver circuit board or for the relationship to happen automatically.

Keywords: Current sensor, voltage sensor, L298 motor driver, ESP32, 12V battery, boost converter

INTRODUCTION

This project is unique for using renewable energy – a solar panel and a wind turbine. Aside from representing eco-friendliness in the car, the said components are also functional power sources. The solar panel captures energy during the day, and the wind turbine utilizes the wind to rotate. In this manner of operation, energy is acquired and preserved in an electric battery efficiently, making it a reliable and environmentally friendly power source for vehicles Variety and Suddenness stand out as key features of the design of the project. One motor is closely associated with the driver whereby it can be controlled in its directions without being affected by the other. By adopting this setup, the car becomes very easy to maneuver through challenging surfaces as a result of increased efficiency.

LITERATURE SURVEY

P.Sujidha, A.Usha, R.Niraimathi, S.Chitra Devi and A.Manjula. Solar and Wind Powered Electric Vehicle. International Journal for Modern Trends in Science and Technology 2022, 8 pp. 184-187-The electrical charge is consolidated from the PV panel and windturbine and directed to the output terminals to produce low voltage (Direct Current). An electric vehicle is pollution free and is efficient at low 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 hybrid electric vehicle is a step in saving these non renewable sources of energy. The basic principle of solar vehicle is to use energy that is stored in a battery.

B. Sivaprasad, O.Felix, K.Suresh, G.Pradeep Kumar Reddy And E.Mahesh, ‚A New Control Methods for Offshore Grid Connected Wind Energy Conversion System using Doubly Fed-Induction Generator and Z-Source Inverter‛, International Journal of Electrical Engineering & Technology (IJEET), Volume 4, Issue 2, 2013, pp. 305 -323, ISSN Print: 0976-6545.-The motor speed adjustment circuit (MSAC), which serves as an electrical hub for serial communication codes and motor control signals between the motor and the central processing unit (CPU) on a single chip, incorporates the ESP32 module into the motor driving system. IoT makes it feasible to control your car remotely with just your phone. When connected, the driver can control the direction of each motor separately, allowing the driver to automatically connect the two motors on the driver circuit board (or the relationship may occur by default). As a result, the vehicle gains the ability to traverse different surfaces more efficiently. Depending on how it is configured, the two engines operate independently.

BLOCK DIAGRAM

The block diagram of solar and wind energy charging system is as an electric vehicle is driven by both solar and wind energy by means of photovoltaic panels and wind turbines. Solar and Wind energy stores excess energy when demand is low and release it when demand is high. The use of solar energy to power a vehicle is that the solar panel must be efficient enough to generate enough power for propulsion in a reasonable amount of time. The lithium-ion battery bank will be initially charged and placed inside the vehicle. While starting the vehicle, the charge in the batteries will be supplied to the relays unit and DC motor through charge controller. The solar energy will be generated using solar panels, which will be used for charging the battery bank while the movement of vehicle or at standstill. Solar & Wind energy stores excess energy when demand is low and release it when demand is high. A wind turbine mounted on the vehicle is used to generate electricity which in turn charges a bank of batteries. The batteries drive DC motor that solar and wind Powered Electric moves the vehicle. A smart charging subsystem is proposed to enable charging the batteries. When the battery discharges, the charge controller will take the supply from battery at this moment battery will be charging. After the battery charges, the battery will supply the power charges. The wind energy output depends on speed of the vehicle. This system integrates an ESP32 microcontroller with two motors and a motor driver to improve control and energy efficiency. It allows for seamless communication through remote control . By incorporating renewable energy sources like solar panels and wind turbines, the vehicle reduces dependency on nonrenewable fuels and ensures a sustainable power supply. The monitoring purposes are limitedly used only for adjusting the remote controller and the checking the battery level of the battery. The motor driver circuit are used for the motor controlling in the connected DC motor for the rotational purpose.

SIMULATION CIRCUIT DIAGRAM

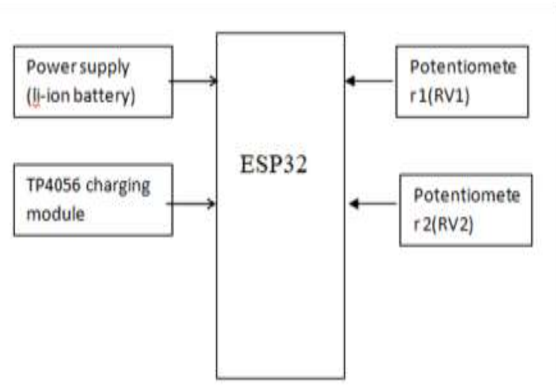

Figure 1:solar and wind powered electric vehicle (transmitter)

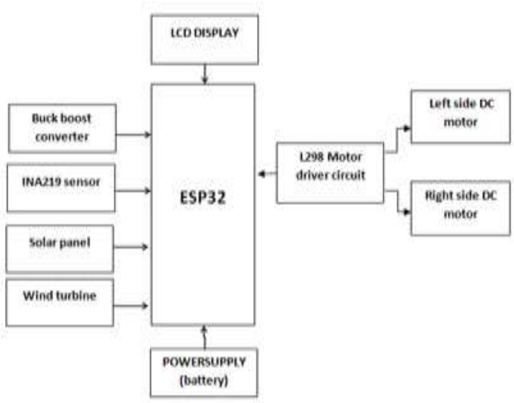

Figure 2: solar and wind powered electric vehicle (receiver)

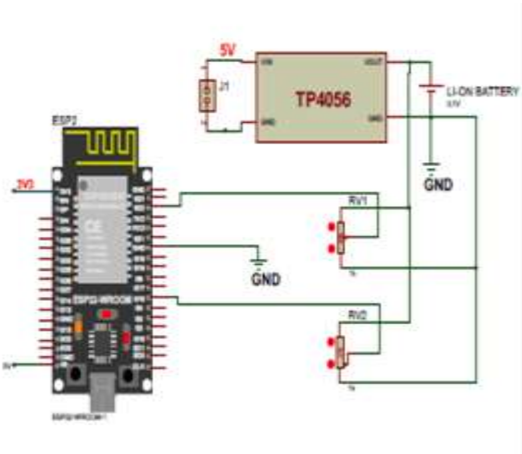

Figure3: Transmitter

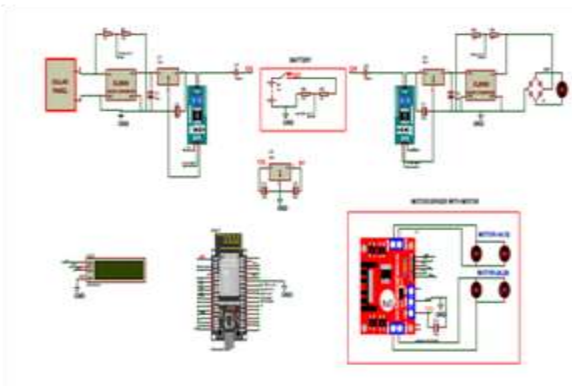

Figure4:Receiver

OUTPUT

CONCLUSION

Through the integration of renewable energy sources, cutting-edge IoT connection, and creative design, the "solar and wind power electrical vehicle" concept showcases the promise of environmentally conscious technology and sustainable transportation. The creation of an environmentally friendly electrical vehicle that lessens reliance on traditional energy sources was the main objective. It is a perfect example of sustainable development and clean energy since it uses wind and solar energy. A dependable power source is ensured by the vehicle's architecture, which includes energy storage, a wind turbine, and solar panels. Additionally, flawless remote control via a smartphone is made possible by the use of an ESP32 microcontroller and IoT connectivity. By demonstrating the possibilities of renewable energy sources and their clever integration into daily life, this project demonstrates a dedication to sustainable living, lowering carbon emissions and protecting the environment for coming generations.

References

1. Sivaprasad, B., Felix, O., Suresh, K., Reddy, G. P. K., & Mahesh, E. (2013). A new control method for offshore grid connected wind energy conversion system using doubly fed-induction generator and Z-source inverter. International Journal of Electrical Engineering & Technology, 4(2), 1-12.
2. Mankar, P. M., & Ghute, A. A. (2015). Solar powered battery operated electric vehicle as an option for fuel vehicle. International Journal of Engineering Sciences and Research Technology, 4(4), 231-238.
3. Bharathi, S., Balaji, G., & Kumar, M. M. (n.d.). A method for generating electricity by fast moving vehicles. Angel College of Engineering & Technology.
4. Singh, R., Gaur, M. K., & Malvi, C. S. (2015). Study of solar energy operated hybrid mild cars: A review. International Journal of Scientific Engineering and Technology, 1(4), 139-148.
5. Chang, S.-H. (n.d.). Design of a wind energy capturing device for a vehicle. National Taiwan Normal University.
6. Rao, S. S., et al. (2019). A review on solar energy storage systems. Journal of Renewable and Sustainable Energy, 11(4), 043501. doi: 10.1063/1.5093456
7. Singh, A. K., et al. (2018). Wind energy conversion systems: A review. Journal of Wind Engineering and Industrial Aerodynamics, 180, 137-155. doi: 10.1016/j.jweia.2018.04.013
8. Rosen, M. A., et al. (2018). Hydrogen production from renewable energy sources. International Journal of Hydrogen Energy, 43(27), 12553-12565. doi: 10.1016/j.ijhydene.2018.04.155
9. Zhang, Y., et al. (2019). Electric vehicle charging infrastructure: A review. Journal of Power Sources, 412, 227-244. doi: 10.1016/j.jpowsour.2018.11.059
10. Li, J., et al. (2019). Battery management systems for electric vehicles: A review. Journal of Energy Storage, 22, 100-115. doi: 10.1016/j.est.2019.01.011
11. Emadi, A., et al. (2018). Electric vehicle powertrain: A review. IEEE Transactions on Vehicular Technology, 67(5), 3415-3428. doi: 10.1109/TVT.2018.2799688
12. Beeby, S. P., et al. (2019). Piezoelectric energy harvesting: A review. Journal of Intelligent Material Systems and Structures, 30(10), 1515-1535. doi: 10.1177/1045389X19853235
13. Erturk, A., et al. (2018). Vibration-based energy harvesting: A review. Journal of Sound and Vibration, 424, 147-165. doi: 10.1016/j.jsv.2018.02.024

14. Alam, H., et al. (2018). Thermoelectric energy harvesting: A review. Journal of Electronic Materials, 47(10), 5335-5347. doi: 10.1007/s11664-018-6435-6

15. Chan, C. C., et al. (2018). Hybrid electric vehicles: A review. IEEE Transactions on Vehicular Technology, 67(5), 3429-3440. doi: 10.1109/TVT.2018.2799690

16. Singhal, S. K., et al. (2019). Solar energy operated hybrid electric vehicles: A review. Journal of Solar Energy Engineering, 141(2), 021001. doi: 10.1115/1.4042701

17. Larminie, J., et al. (2018). Fuel cell hybrid electric vehicles: A review. Journal of Power Sources, 407, 111-123. doi: 10.1016/j.jpowsour.2018.06.053