MULTI INPUT CONVERTER FOR HYBRID VEHICLE

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Abstract

Conventional energy resources are depleting very fast and to meet the global energy demand, the scarcity of these resources is the most crucial factor in the present era. One of the major contributors to carbon emissions is transportation sector which survives mostly on conventional energy resources. In the Indian context, the transportation sector contributes about 18% of CO_2 emissions of total emissions. To decarbonize this sector, the vehicles utilizing renewable resources such as solar PV technology would be a sustainable step. Solar energy which is abundant in nature and present everywhere can prove to be a great alternative to conventional resources. In the present study, solar PV technology is integrated with electric and hybrid vehicles. Additional literature review of solar electric vehicles including three-wheeled as well as four-wheeled is carried out. Autonomous vehicles and robots utilizing PV technology are also studied and presented. Finally, the foremost barriers and challenges to adopting PV technology in electric and autonomous vehicles are identified and presented.

Keywords: Photovoltaic (PV), Hybrid vehicle, MPPT, boost converter,

1.   INTRODUCTION

Transportation has been instrumental in the global economic growth since the earliest civilizations known to man and efficient traffic management has a major impact on the country's economy. In today's world where science has made amazing advances so have the recent vehicles[1]. These vehicles are more advanced than ever. They have more speed, state of the art engines and are very closely to these reasons there is a need to adapt a device which can continuously monitor all the various parameters of car[4].Gasoline has two problems when burned in car engines. The first problem has to do with smog and ozone in big cities. The second problem has to do with carbon and greenhouse gases. Catalytic converters eliminate much of this pollution, but they aren't perfect either. A gasoline car typically uses a spark-ignited internal combustion engine, rather than the

compression-ignited systems used in diesel vehicles. In a spark-ignited system, the fuel is injected into the combustion chamber and combined with air. To eliminate these problems we proposed a hybrid vehicle which runs on Solar and battery[2]. In this thriving society, more and more vehicles are produced to meet the increasing demands of people from all corners of the world. Here comes the necessity to provide more and more efficient and reliability to them. Hence this project aims to design a converter for hybrid vehicle[3].

Solar and battery are the two sources for hybrid vehicle. Solar being a renewable energy it is a primary source and battery is a secondary source. Two relays are used as a converter circuit one for the switching of the sources and other for the shutdown mechanism. Whenever the voltage from the solar is greater than threshold value i.e. 9V, the relay selects the solar as a supply to run the vehicle. If it is less than 9V then the vehicle will run on battery i.e. secondary source. For displaying the voltages we use ADC MCP3208 that convert analog signal into digital signal. As ADC works on 5V a potential divider circuit is placed. The voltages are compared to a program that is run in a microcontroller 8051 and microcontroller gives the signal to relays. The output from the converter circuit is given to the Boost converter that will boost the voltage to the required amount and this output is given as input to the motor driver circuit L293D. Based on the input speed, PWM pulses are generated and are given to motor driver circuit and finally this output is given as input to BLDC motor. The voltage values and speed variations can be observed in the LCD.
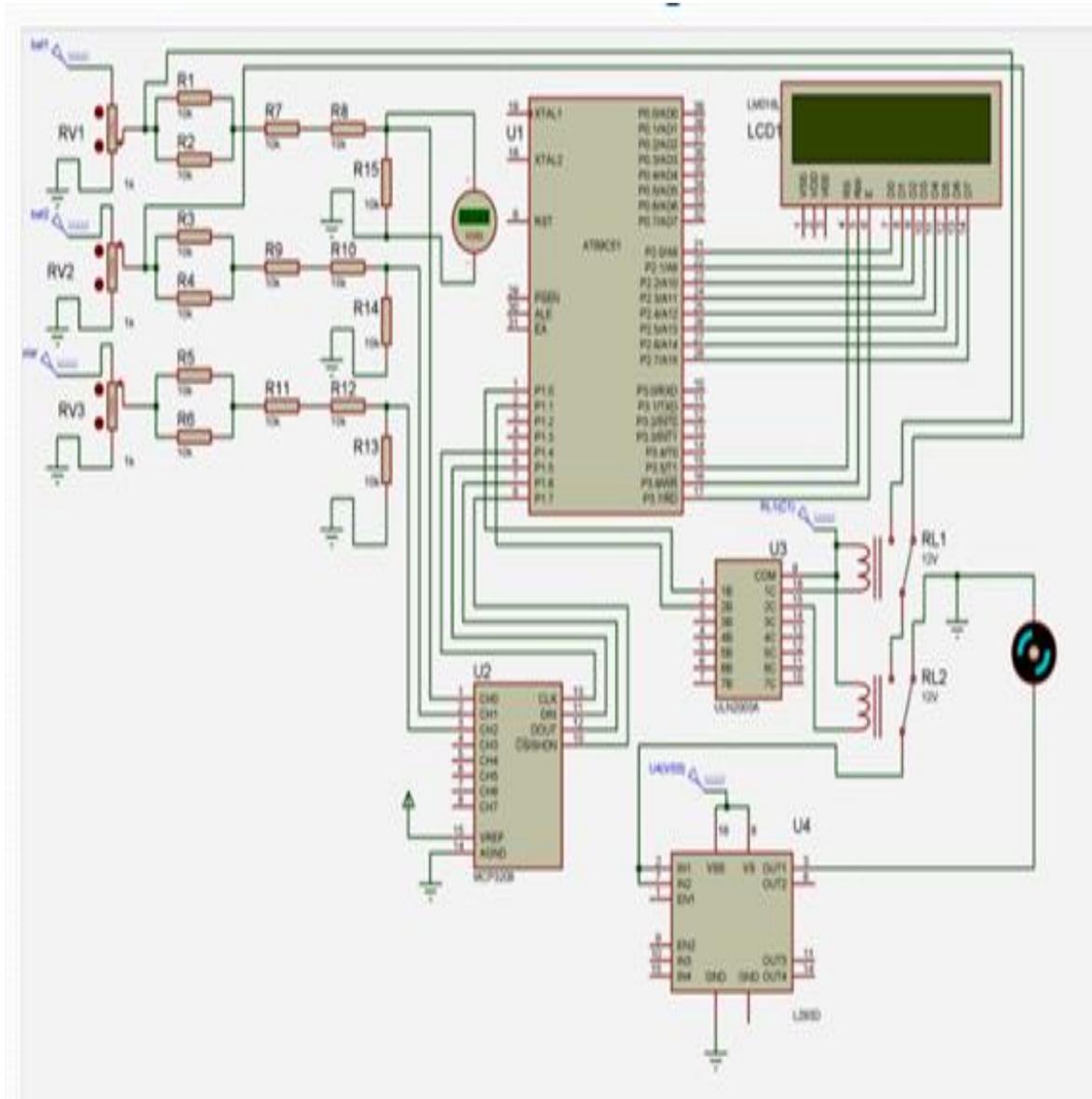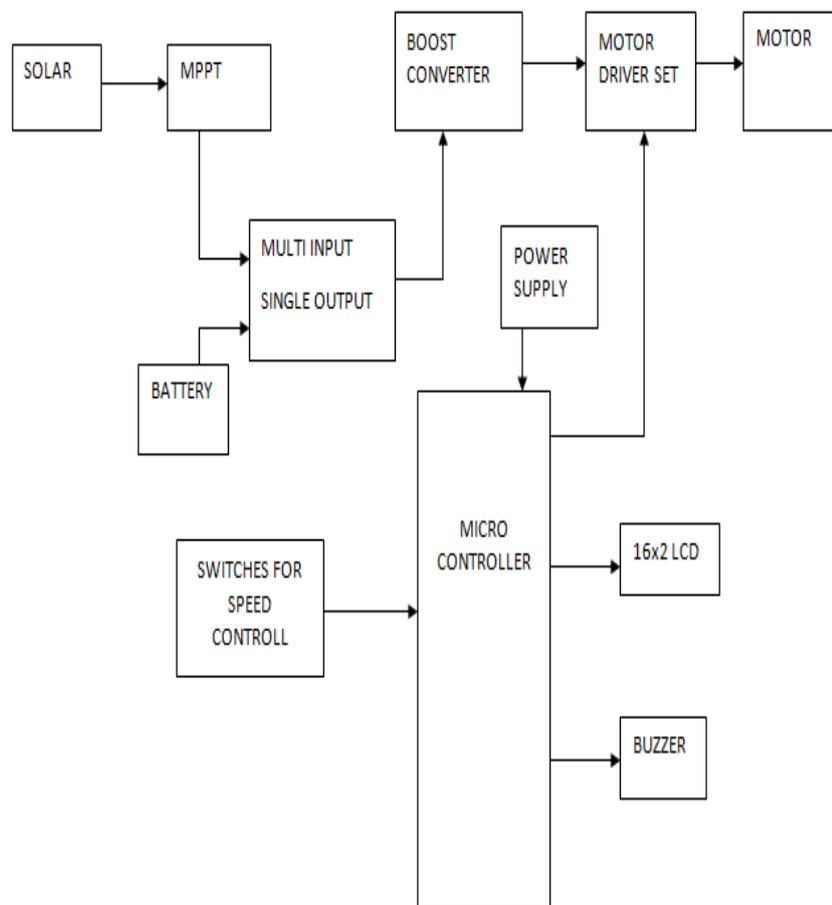
2. CIRCUIT DIAGRAM

Fig (1): Schematic Diagram

3. WORKING

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Fig (2): Block Diagram

4. PROJECT FEATURES

Source shifting:
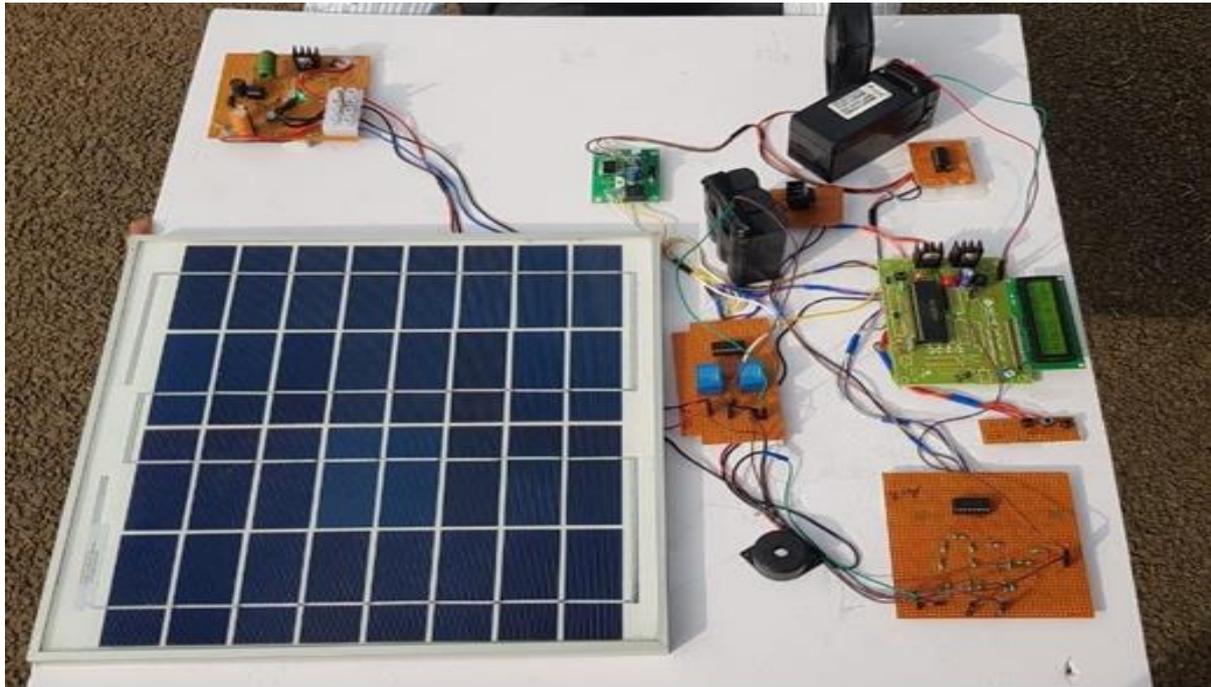Source shifting enables to maximize the usage of renewable energy i.e. solar.
Speed control:

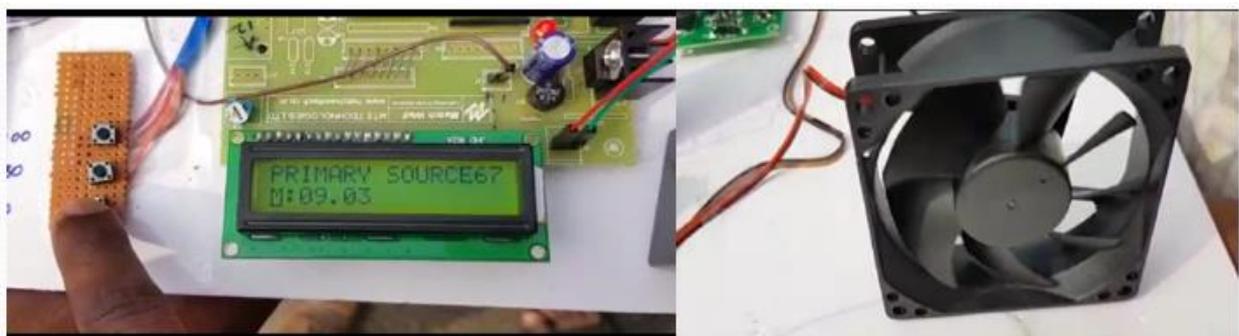We can get wide ranges of speed with PWM technique.

5. RESULTS

The result of the project is to make best of solar energy when available to drive a vehicle and reduce the air, noise pollution.

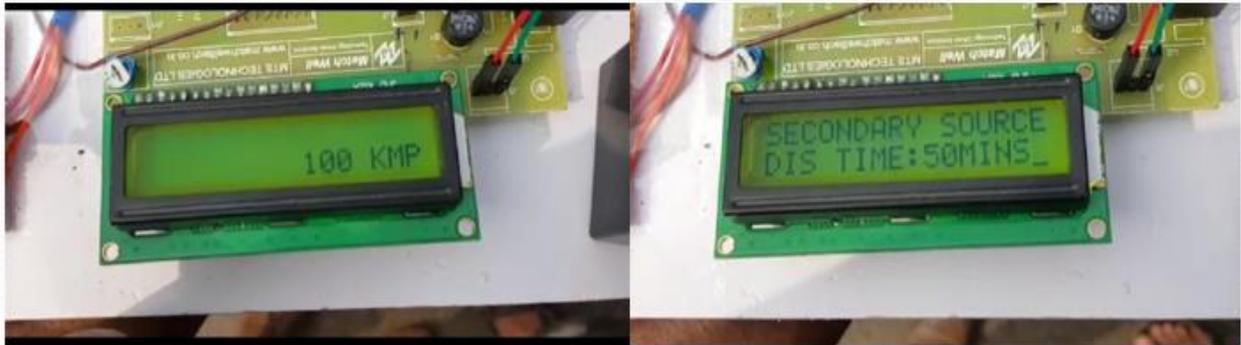**Circuit of proposed project:**

Fig(5.1):circuit connections

Case1: The car is running on solar i.e. primary source because the voltage is above the threshold voltage i.e. 9V.

Fig(5.2): Vehicle running on solar

Case2: The car is running ob battery i.e. secondary source because the voltage from solar is below the threshold voltage i.e.9V

Fig(5.3): Vehicle running on battery

Observation Time Slot	Switch Number	Motor Rotating Speed	Source type for delivering power to load
9AM-10AM	1	Low Speed	Primary Source
	2	Medium Speed	Primary Source
	3	High Speed	Secondary Source
1PM-2PM	1	Low Speed	Primary Source
	2	Medium Speed	Primary Source
	3	High Speed	Primary Source
4PM-5PM	1	Low Speed	Primary Source
	2	Medium Speed	Secondary Source
	3	High Speed	Secondary Source

✓ Primary Source   - PV array
✓ Secondary Source - Battery

6. CONCLUSION

This project is suitably fulfilled the basic things such as avoidance of usage of fossil fuel and increase the efficiency of vehicle to meet the global changes in climate. A simple circuit is built for the automatic source conversion and a DC-DC converter is also placed in order to achieve the power balance. It is possible to transform the overall transportation sector and it is only way to decrease the global usage of fossil fuels. Because two sources are being used it is more reliable. It is more efficient and reliable than the existing electric vehicles.

7. Future Scope

With the increase in global pollution and depletion in natural resources renewable sources are being utilized and examined at a rapid rate. With the advances in fuel cell technology batteries can be replaced with fuel cells which are having more than 80% efficiency. Also solar cells efficiency is being improved at rapid rate they can be extensively used. With the recent advances in power electronics converters can really help in improving the conversion efficiency and also they can do great power management between the source. With increasing efficiency in the renewable energy sector more sources can be kept in place to improve the efficiency. Due to commutation less motors and their greater flexibilities and their ability to operate at high speeds they can be employed to increase the efficiency.

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