DEVELOPMENT OF HYBRID ELECTRIC VEHICLE

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ABSTRACT

The Paper we starts with the brief history about Hybrid Technology and also some detailed introduction on it. Paper will also discuss about the technologies used in the making of electric Cars such as "Hybrid Solar power Vehicle". "Hybrid Electric Vehicle" and "Plug In battery charging hybrid electric vehicle". Our Paper is based on the explanation of such technologies, their function, drawback of this technology, efficiency of Hybrid. In present scenario, the world is facing shortage of fossil fuels and hike in their prices due to ever increasing demand. Hence it has become important to revolutionize our way of living by initiating green revolution in automobile industry. In our project we focuses on hardware development of Hybrid Electric vehicle to address this severe situation and has been coupled with green technologies: solar and kinetic energy, which not only offer an alternative to Internal Combustion driven Vehicles but can also help us take a leap forward in achieving sustainable global development by reducing air pollution and ever increasing temperature of the earth.

Keywords: Electric Vehicles, Battery, Solar Panel, Solar Energy, Generation, Series Parallel.

I.   INTRODUCTION

In today's scenario the transportation sector is almost entirely dependent on single fuel petroleum. The continued role of petroleum as the primary transportation fuel should be questioned. The domestic production of petroleum is steadily declining while our consumption continuously is increasing. Meanwhile, petroleum consumption rate in the emerging economics are rapidly expanding. Petroleum sources are limited. Today's nearly 60% of petroleum consumption is dedicated to transportation by means of IC engine vehicles which emits CO & CO_2 gas & pollute the environment.

At the same time the electric car was developed, work was done on the first hybrid electric vehicle (HEV). One early version developed in1912 can be seen in the Ford Museum in Dearborn Michigan. Hybrid power systems were the battery technologies play an important role in fulfilling this hybrid technology. Because batteries could supply only enough energy for short trips, an onboard generator, powered by an internal combustion engine, could be installed and used for longer trips. This technology has three essential components: power supply units, energy storage systems and power generation units. Power units could include fuel cells, dc generators and turbine engines. Energy storage devices could be batteries or flywheel systems, and gear units can come in the form of electric motors.

Modern Hybrid Electric vehicles make use of efficiency-improving technologies such as conversion of the vehicle's kinetic energy to electric energy, which is stored in a battery banks or combination supercapacitor banks. Some varieties of HEV use an internal combustion engine to turn an electrical generator, which either recharges the vehicle's batteries or directly powers its electric drive motors this combination is known as a motor–generator. A hybrid-electric produces lower emissions than a comparatively same sized gasoline vehicle

By considering above circumstances we are introducing the idea of hybrid vehicle technology is an excellent way to reduce the consumption of fuel and saving running cost .It is economical as compare to IC engine vehicles and this hybrid vehicle save the environment from pollution. In our project we are using hybrid technology as electrical energy. The electrical power will be generated by using a generator and solar plate. This generated energy stored in a battery and then fed to the dc motor.

II.   METHODOLOGY
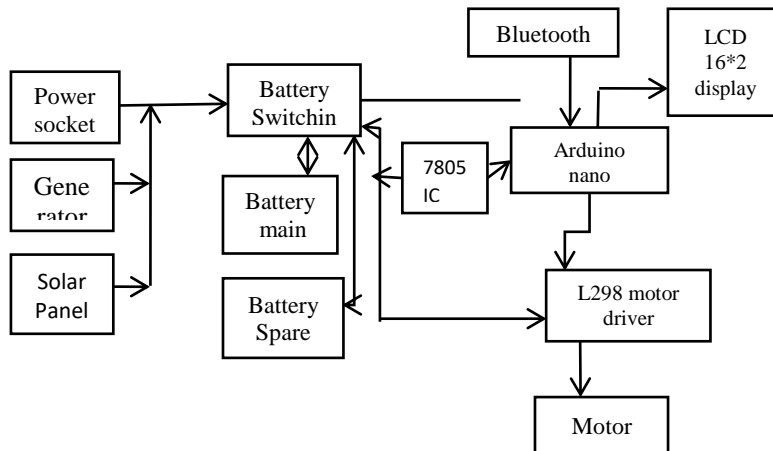
In this project our main focus is conservation of energy, in this we are using three energy sources that is power shocked , generator, and solar panel. The energy which is generated by solar panel and generator is going to stored in battery when the source of light is not available for example in monsoon and at the night time power socket will provide energy input to the machine it will be used in emergency when battery is not charge to continuity of the machine. energy generated in solar cell power socket and power generator will be stored in battery pack in which we have two batterys, battery 1 and battery 2. When 1st will get discharge it automatically switch to the battery 2 for further consumption of energy. After this all the controlling of vehicle is done by Arduino nano for which we are using 7085 IC, The power produced by the battery is 12 volt but for the working of the microcontroller 5 v of power is required for this 7085 IC is used to step down the voltage from the battery and convert 12 volt into plus 5 volt . Arduino nano controls everything battery switching, motor driving ,LED display.
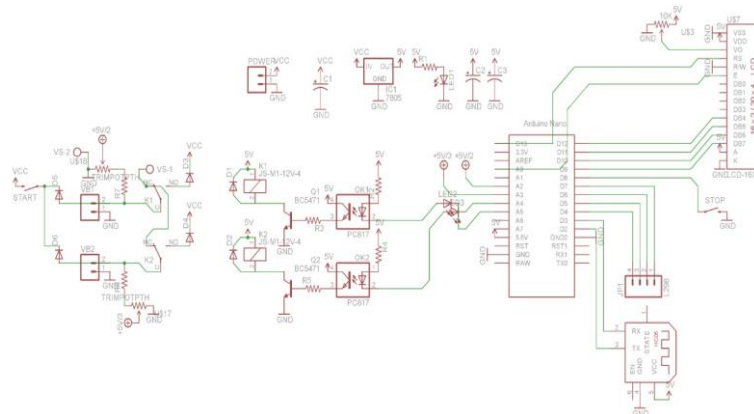

Fig: schematic diagram

Designing of PCB: for controlling part we design PCB with the help of auto disk eagle and print PCB layout on photo paper by laser printer and after that tracing is done on copper clad plate by iron pressing on hottest temperature and should be done properly and remove extra photo paper from copper clad PCB layout after dipping it in water for cleaning.
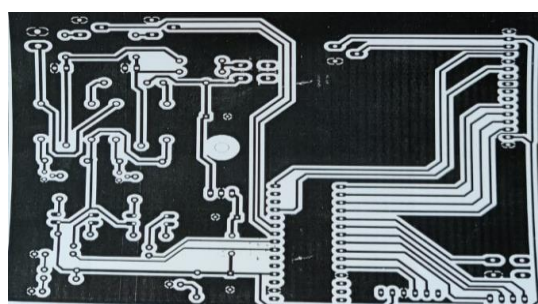
In etching process we have to remove expose copper from are PCB copper clad layout only to keep black track part or it will get short circuited, for this process we dip are layout in etching solution which is fecl3-Cu-CuCl3+fe put this solution in box with PCB layout copper clad layout shake the box for 15-20 min and it should be submerged properly. After that we have to wash it with water and clean it with Iso-propyl Alcohol (CH3)2CHOH and remove the ink with scrubbing. After that drilling is done to add components on PCB after which components are join on PCB with the soldering.

III.   WORKING OF HYBRID EV SYSTEM

This system is designed around arduino nano board. This board is equipped with ATMEL ATmega328p microcontroller. The controller has 13 digital input and output pin and 6 analog input pins. Microcontroller is operating on 5v dc supply.

The system consist of following components

1. MCU (micro controller unit)
2. Display module based on LCD 16x2
3. 2 channel relay
4. Battery 8volts/ 1 A
5. Solar panel 12V/2A

Initially, system waits for start switch to be pressed. After pressing start switch, the system boots up. At time booting the system calculate voltage of main battery and spare battery. Then system will activate the battery whichever is greater and another battery goes to charging mode. For battery charging we are getting energy from solar panel, generator, and power shocked. Solar panel is mounted on the roof of the vehicle energy generation takes place when Photovoltaic energy is the conversion of sunlight into electricity. A photovoltaic cell, commonly called a solar cell or PV, is the technology used to convert solar energy directly into electrical power. A photovoltaic cell is a non-mechanical device usually made from silicon alloys. Sunlight is composed of photons, or particles of solar energy. These photons contain various amounts of energy corresponding to the different wavelengths of the solar spectrum. When photons strike a photovoltaic cell, they may be reflected, pass right through, or be absorbed.

Only the absorbed photons provide energy to generate electricity which will further get stored in battery

Generator is connected on front shaft of vehicle Electric generators work on the principle of electromagnetic induction.

when are vehicle moves the wheel rotates and with that the coil rotates, it cuts the magnetic field which lies between the two poles of the magnet. The magnetic field will interfere with the electrons in the conductor to induce a flow of electric current inside it which will be used for charging purpose

when the source of light is not available for example in monsoon and at the night time power socket will provide energy input to the machine it will be used in emergency when battery is not charge to continuity of the machine.

Now, as the system successfully boots up, it will wait for motion command to be recommend by Bluetooth module (HC05). The commands will sent from bluestick control application. As the controller receives commands form Bluetooth it will direct motor to act likewise.

During execution of each command the HC will keep an monitoring battery voltage of both batteries and if main battery gets under 6v then the system immediately switch to spare battery using solar panel and dc generator.

If both batteries gets under 6v, the HC will not allow the vehicle to drive until either one of the battery bring charging up.

IV.   RESULTS AND CALCULATIONS

Calculating Solar Panel, battery and Battery Charger Specifications:

In order to exactly determine the dimensions of the solar panel, batteries, charge controller and inverter the following mentioned parameters will need to be strictly calculated and configured.

Estimating Load Wattage:

(a)First you will need to estimate how much watts of electricity you may require for the specified load.

Let's say you have a 25 watt load that needs to be operated for approximately 10 hours, in that case the total power required could be estimated simply by multiplying the load with hours, as given under

Load x hours = total watts

25 Watts x 10 hours = 250 Watt hours.

This becomes the absolute power necessary from the panel.

Determining Approximate Solar Panel Dimension:

(b)Next, we need to determine the approximate dimensions of the solar panel for satisfying the above estimated load requirement. If we assume a roughly ten hour daily optimal sunshine, the specifications for the solar panel could be simply and quickly calculated as explained in the following expression

Total watts x hours = watts.

250 Watt hours / 10 hours sunlight = 25 Watt solar panel.

However, you may notice that mostly during the summer seasons you may normally get around 10 hours of reasonable amount of sunshine, but the winter season may produce roughly around 4-5 hours of effective sunshine. Contemplating the above scenario, you too might agree and recommend considering the worst possible sunshine hour into calculation so that even on the weakest of sunshines your load keeps running optimally.

Calculating Battery Ah:(c)Once you have calculated the solar panel as per the above calculations, it's time to calculate the AH rating for the batteries that might be required for operating the specified load under all conditions. If the selected battery is rated at 12V, in that case:

Dividing 250 Watt hours by 8 Volts = 31.25 Amp Hours of reserve battery power.

Total watts / battery voltage = Amp hour

250 Watt hours / 8 Volts = 31.25 Amp Hours

This is single battery calculation. We are use two battery's in this project. And calculations of those two batteries are:

2 x 8 Volts batterys are connected in parallel.

1 battery =31.25 Amp hours x 2= 62.5 Amp hour

Evaluating Charger Controller Specifications:

(d)Now, to figure out how big your charger controler would need to be for the above calculated parameters, you might need to take your solar panel current or the Amperage specs into consideration, which may be simply gotten by dividing the panel's wattage rating with its voltage rating (Ohms law remember)

Solar panel watt/battery voltage=charger rating in amps

25/8 = 3.125 Amps.

Results:

Sr.no	Name of components	Therotical values	Practical values
1.	Solar panel	12V,2A,25W	11.6-12v
2.	battery	8V,32Ah	8v
3.	Battery charger	12V,3Amps	12v

V.   CONCLUSION

In this paper we focus on the factors like global warming, EV development, Increase in cost of fuel, noise pollution, Energy Conservation and to rectify those issue with the help of conventional energy sources. Environment protection and energy crisis have important role in the development of EV. However, HEV is growing in faster rate for consumers 'satisfaction currently and will be doing it in the future. The main issue of HEV is how to optimize the multiple energy sources to obtain best fuel economy or low emission at lower cost.

VI.   REFERENCES

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