Design and Development of Smart Operated Battery for New Generation Vehicles

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***Abstract*—** Electric vehicles are the major demand of automobile industries as new generation vehicles. In this research paper a novel model is projected for hybrid vehicles which have the dual engines which can switch on hydrocarbon & electricity. Major problem arises in this type of vehicles is dependency over the hydrocarbons which are depleting at a very faster rate over a certain period of a time. Our designed circuit minimizes the dependency over the hydrocarbons using the set of batteries & a circuit which can charge itself while running on the electricity. Switching of the batteries allow this to do very significantly reducing the operating cost of the vehicles. This will also result in reducing the carbon footprint which is a great problem for human life.

Keywords*—Batteries; Environment; Hydrocarbon; Smart Vehicle; Switching.*

I. INTRODUCTION

We live in a world where everything can be controlled and operated automatically due to which the life of every citizen has become easier the main change which has occur in the past are the automobile industries. In the past it was difficult to buy general purpose vehicle which result in less consumption of natural fuels, since after a time of globalization the need every citizen in the world has drastically increased due to which the things which were least required are now having more priority. As the time change the growth of automobile industry also increased which result in the increase of GHG (Green House Gas) emission [1].

To overcome this problem, we are designing a certain type of circuit which would be capable of powering the vehicles by using only their own energy. The general idea is to design and development of a kind of smart operated battery circuit that is capable of producing enough amount of energy to power the vehicle and reduces the dependency of the vehicle on hydrocarbon.

This research paper presents a circuit, which is being designed for hybrid vehicles having dual engines which can switch for hydrocarbon & electricity.

II. SYSTEM MODEL

The system model consists of the multiple batteries having output as 12 V and a relay that is used to switching of the battery consumption.

The controller which is used to control the overall functioning of the circuit is Atmega16 which consist of 40 pins. In this model chassis is used to replicate the electric car in which four motors are used as wheels to run the chassis. The motors are powered by the circuit we have designed by using the 12v rechargeable batteries.

Components Used:

i. 330-ohm Resistor:

Fig 1: Resistor

Resistor is a two terminal electronic component that provide electrical resistance as the element of a circuit. In electronic circuits, resistors reduce the flow of current in the circuit [2]. It also adjusts the flow of signal levels, to divide voltages, terminate the transmission lines and bias active elements.

ii. 5v Relay:

Relay is an electrically worked switch, which utilizes an electromagnet to precisely work as a switch. For controlling a circuit by a definite power signal, transfers are generally utilized [3].

Fig 2: Relay

iii. ATmega16:

Fig 3: ATmega16

AT mega 16 is a 8-bit microcontroller of Atmel's Mega AVR family with low power utilization. Atmega16 depends on improved RISC (Reduced Instruction Set Computing) design with 131 directions. The guidelines in atmega16 were executed in one machine cycle [4]. Atmega16 can chip away at an extreme recurrence of 16MHz.

ATmega16 has 16 KB programmable glimmer memory, static RAM of 1 KB and EEPROM of 512 Bytes. The perseverance cycle of glimmer memory is 10,000 and of EEPROM is 100,000, separately [5].

ATmega16 is a 40-stick microcontroller. There are 32 I/O (input/yield) lines that are isolated into four 8-bit ports assigned as PORT-A, PORT-B, PORT-C and PORT-D.

ATmega16 has different in-constructed peripherals like USART, ADC, Analog Comparator, SPI, JTAG and so forth. Each Input/yield stick has an elective assignment identified with in-fabricated peripherals.

The stick portrayal of ATmega16 is demonstrated as follows:

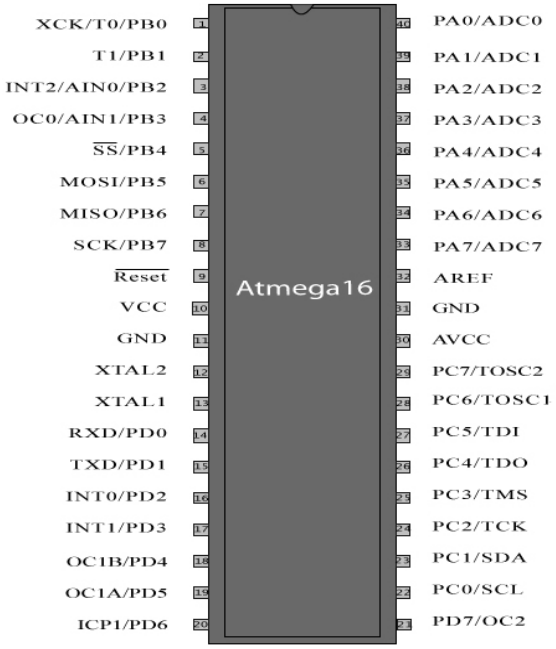

Fig 4: PIN diagram of ATmega16

iv. LED 5mm:

A light emitting diode is the semiconductor light source that emits light when flow of current takes place through it [6]. Electron holes recombine with electrons in semiconductor, photons is released in form of energy i.e. electroluminescence effect.

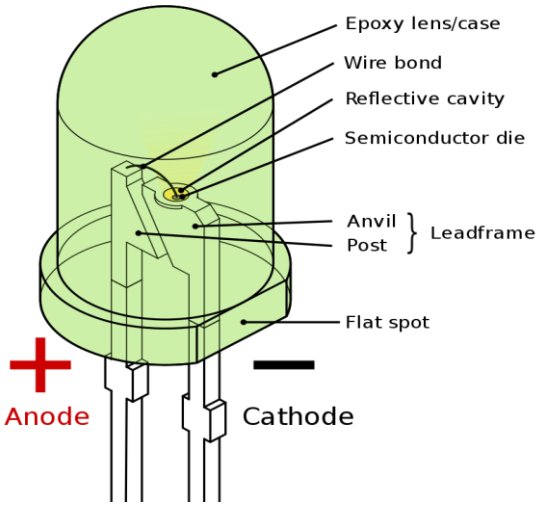

Fig 5: LED

v. IC 7805:

IC 7805 is a voltage controller IC, which give a coordinated power supply in the electronic circuit. A voltage controller IC keeps up the yield voltage at a relentless regard [7]. 7805 IC is a person from 78xx plan of fixed straight voltage controllers, which is used to take care of fluctuations.

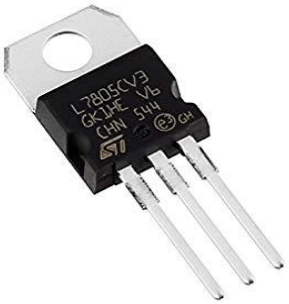

Fig 6: IC 7805

III. DESIGNING

Designing is an important part of this research paper. It has two parts i.e. PCB designing and Circuit Designing.

A.PCB designing:

The designing of PCB is done on Eagle 7.2. PCB of FR-2 type & single sided PCB is used. On the PCB components are placed according to the circuit design and the connection are created by routing & after this the process of etching is done by the help of $FeCl_3$. After, the etching, drilling is done through the drilling machine [8]. All the blue part shown in the figure is the amount of copper that is left on the PCB.

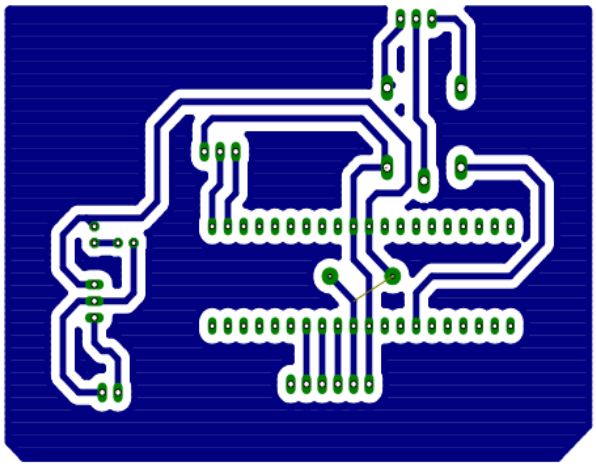

Fig 7: PCB Layout

B. Circuit Designing:

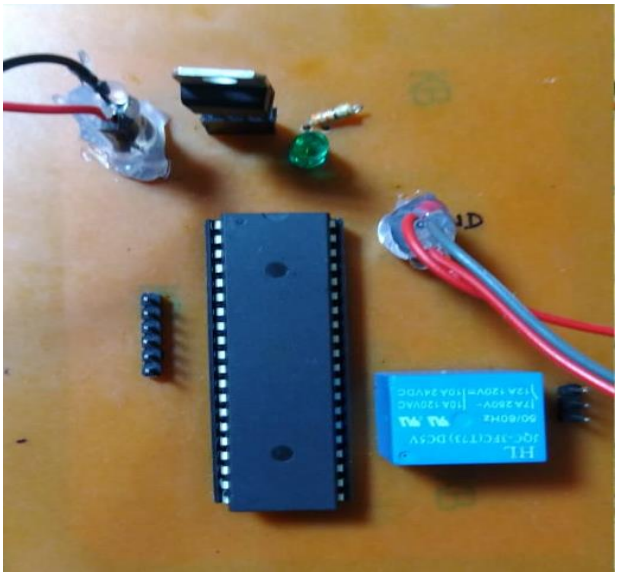

Fig 8: PCB Circuit

In this circuit, AT Mega 16 is used for reading the analog signal from battery & PORT D is used for sending the digital data on relay, which is then toggling the wheels of the car. In this circuit, regulators are also for converting the 12V DC supply to 5V DC supply to operate the microcontroller; a led is also connected to show that power is ON.

C. Software Used:

i. Eagle 7.2

Eagle is known as a scriptable electronic design automation application having schematic capture, printed circuit board layout, auto-router and computer-aided manufacturing features. Eagle Stands for effectively appropriate graphical format manager and is created by Cad Soft Computer GmbH.

ii. Proteus 8.5

The proteus plan suite is a finished programming answer for circuit reproduction and PCB structure [9]. It contains a few modules for schematic catch, firmware IDE and PCB format that show up as tabs inside a solitary, coordinated application.

iii. Atmel Studio 6

Atmel Studio is significant programming, which is intended for equipment designers to help them make microcontroller applications, and furthermore troubleshoot them [10]. Atmel Studio is an incorporated improvement stage that utilizes Microsoft Visual Studio shell. This program skillfully handles applications written in C/C++ and furthermore in low level computing construct.

IV. RESULT & DISCUSSION

Circuit is working as per the introduction given above. Power on the wheel sets is getting shifted from front to back & vice-versa, also the power from alternate motors are charging the batteries & switching of batteries on voltage basis is also done [11]. This process is so fast that the vehicle would also not decrease it speed and the shifting of the power from one motor to another would be done smoothly. This prototype is helpful for new generation vehicles to increase the efficiency of the car without increasing the cost of the vehicles. The circuitry which we have created can be installed in the current working cars. This prototype will help in reducing the carbon footprints.

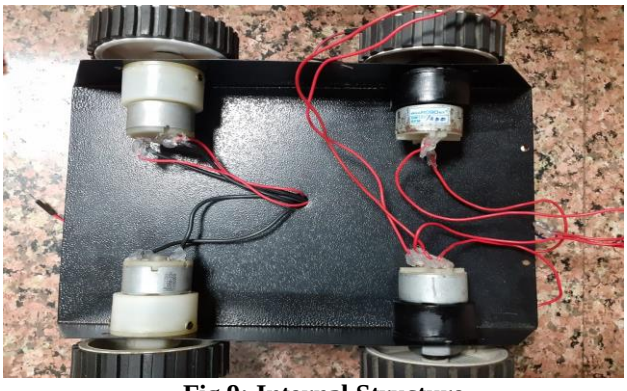

Fig 9: Internal Structure

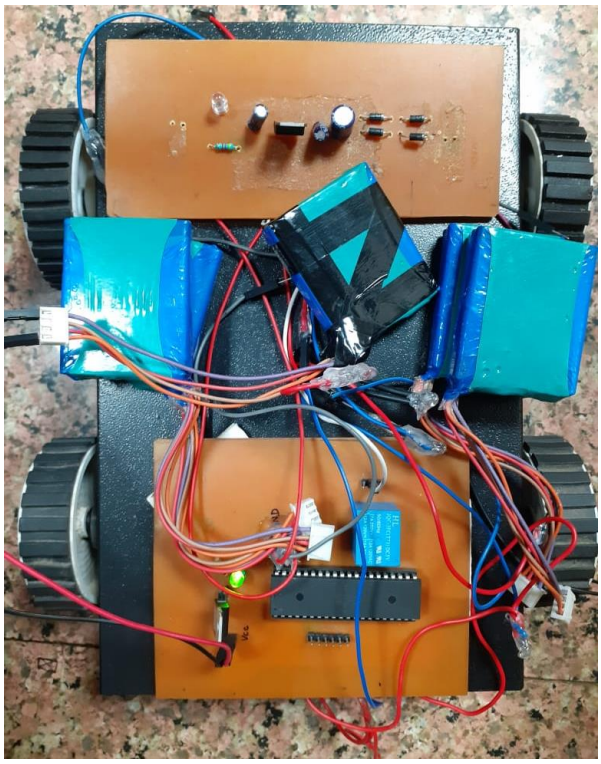

Fig 10: Final Structure

V. CONCLUSION

The proposed model, which we have described in this paper, is working as we are obtaining the required amount of power to rotate the wheels of the vehicle and the relay. It is used to trigger the power from one set of front motors to rear motors and vice-versa. The general idea is to design and development of a kind of smart operated battery circuit that is capable of producing enough amount of energy to power the vehicle and reduces the dependency of the vehicle on hydrocarbon. This prototype will help in reducing the carbon footprints. This model will be cost efficient and help the future generation to utilize the new type of power source to power their vehicles.

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