

ARM-7 Based Electronic Car

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ABSTRACT-An Electronic Car has been developed using Brushless DC Motor drive. Regeneration feature has been incorporated. While in inertial motion the system generates electricity which may be used for charging the main or auxiliary batteries. The working model which we are developing consists of a 48V, 1000 Watt hub - BLDC motor operated on a 48 volt, 7 AH battery. The drive is controlled by power electronic control throttle (accelerator). Economics of capital cost and running expenditure has been planned. The additional cost (15 -20%) of Li-on batteries aids to better performance and eliminates the maintenance issues. Based on the economic comparison of conventional vehicles and electric vehicle the overall cost decreases to about 25 – 30 %. The regeneration feature can allow 5 to 7 % of energy saving. We have selected this project for improving the knowledge we have about the latest technology. And our main aim was to reduce dependence on foreign oil consumption, and zero emissions equals zero guilt. As India is growing towards Smart Country we think by making the cheapest car we can contribute towards it. The e-car holds a substantial promise for the upcoming energy and environmentally conscious era.

INTRODUCTION

Electronic car is recently a very interesting field as it tend to keep the cost of the car as less as possible and are also planning on using all the waste material with an eye on pollution. Like in 21st century the consumption of fuel has taken major hit on economic and environmental issues therefore this paper focuses to keep an Electronic car pollution free and also use less energy to drive more distance.

Recently many technologies are supposed to be implemented such as regenerative battery, less power consumptions batteries (Li-on, lead batteries), as far as survey goes US has been leading in the production of E-car. With the use of similar concept of E-car we are trying to make Electronic car the major difference being is to implement it using ARM 7 processor with multiple application to begin with like accident avoidance (Ultra sonic sensor) and are supposed to

use an wrist throttler instead of pedal throttler which in case reduces the cost and which can be further expanded with the likes of LCD display at the back and solar panel on the top of it So, that it can be converted the solar energy into the mechanical energy or electrical energy.

Organization of Paper:

While starting with literature survey we will discuss the proposed system with architecture and its test results. Then conclusion derived from the approaches we used and future scope of enhancement. At the end references used for preparing this paper are shown

LITERATURE REVIEW

This is not an original idea, to build an electric car; the idea has existed for many years. This is, however an original plan for building an electric car using inexpensive sources of parts and simple building techniques. One problem we met with was finding larger DC motors that were powerful enough to run a car, finally we found on and tend to use it [1]. Advanced Accident Avoidance System for Automobiles which focuses on the objective of this project is to efficiently avoid the collision of automobile vehicles and to provide a greatest security to the users

[2]. Digital Control Strategy for Four Quadrant Operation of Three Phase BLDC Motor With Load Variations on this papers are published by C. SheebaJoice, S. R. Paranjothi, V. JawaharSenthil Kumar . It gives knowledge about the motor to be used and the controller to be selected the motor is controlled in all the four quadrants without any loss of power; in fact energy is conserved during the regenerative period. The digital controller dsPIC30F4011, which is very advantageous over other controllers, as it combines the calculation capability of Digital Signal Processor and controlling capability of PIC microcontroller, to achieve precise control.

[3] Algorithms for Advanced Battery Management System by N.A chaturvedi it describes Lithium-ion (Li-ion) batteries are ubiquitous sources of energy for portable electronic

devices. Compared to alternative battery technologies, Li-ion batteries provide one of the best energy-to-weight ratios, exhibit no memory effect, and have low self-discharge when not in use.

[4] Power Electronics In Electronic Car which was described by Emadi POWER electronics plays a critical role in modern automotive systems. Hybrid electric vehicles have already been introduced into markets. Research and development in fuel cell and alternative fuel vehicles are gaining tremendous momentum as well. This paradigm shift from internal combustion engines (ICE) to electric and hybrid electric power trains will have a profound impact on the field of power electronics.

[5] these all describes replacing the ICE with a n batteries will first of all reduce the consumption of fuel like petrol and diesel which are non-renewable resources and then it will also use the batteries which will run for longer period of time are also renewable sources of energies. [7], which provides the necessary information yet about the power consumption of batteries by A.Emadi which helps to check the performance of the batteries to maximum effect [8], whereby the use of ARM 7 in the car gives it the electronic feature as using the controller that provides the multiple features as in LCD display, Tx, Rx with the use of RF transceiver to the multiple components which are being used .

Proposed System

Considering the need of modern technology in E-Car that uses components and features that may cost up to 3-4 lacs but pattern or methods used in this may reduce the cost by drastic amount about 1 lac

System Architecture

Microcontroller ARM (LPC2148)

The LPC2148 microcontrollers are based on a 32/16 bit ARM7TDMI-S™ CPU. With real-time emulation and embedded trace support, that combines the microcontroller With 32 kB, 64 kB and 512 kB of embedded high speed Flash memory.

Alarm/Buzzer (ABI-003-RC Piezo Indicator):

The alarm panel is responsive to receipt of the

breach indication to cause an alarm condition to occur

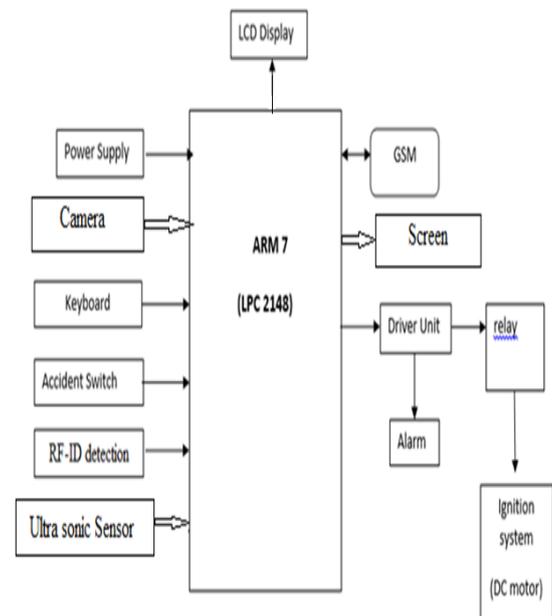


Fig. 1 ARM7 with multiple applications

Lcd interface: Most of the applications created with the CPU require some form of display. The most common way to accomplish this is with the LCD (Liquid Crystal Display). LCDs have become a cheap and easy way to get text display for embedded system Common displays are set up as 16 to 20 characters by 1 to 4 lines. Thus we use here is a 16*2 LCD display.

Driver unit (ULN2003)

The UTC ULN2003 is high-voltage, high-current daylight on drivers comprised of seven NPN Darlington pairs.

It is used to provide the high current and voltage to relay.

DC motor: In general, DC motors are similar to DC generators in construction. They may, in fact, be described as generators "running backwards". When current is passed through the armature of a DC motor, a torque is generated by magnetic reaction, and the armature revolves.

Specifications : Power 1000watts,48Vdc ,2600 Rpm No Load ,Current 20 amps,with Hall Sensors ,brushless 16Pole,18slot three phase.

Test cases and Results:

Watts consumed by Electronic device=1000Watts

Power factor of UPS = 0.5

Number of batteries in UPS = 4

Voltage of Batteries in UPS = 48

Ah rating of batteries in UPS = 7

21 min runtime of UPS.

Conclusion:

Based on the above technical, mechanical and economic analysis the electronic car embedded with regeneration feature leads to energy efficient as well as an energy saving drive lead free and batteries based vehicles is environmentally friendly and in some locations even faster than driving. Unfortunately, E-cars adoption rates are not high in many places due to various barriers and perceived barriers to more widespread use. This paper explores the use of a 1000W BLDC Motor in an electronic car. The main aim was to ensure that when the rider is Accelerating or going downhill, energy would be conserved and even generated. The results have shown that a major reduction can be made in the number of miles driven by petrol vehicles with substantial savings.

Future enhancement:

One of the biggest advantage of electric cars is that they are extremely affordable. It costs less than a penny per mile to ride an e-car. It is much cheaper than gas. Electronic cars make journeys, especially those involving hills, less daunting than they would be on a conventional car. The assistance provided by an electronic car will extend the range that we're able to travel, making it an option for journeys that we might formerly only have considered doing by normal car. After all, some electronic cars have a range of up to 20 miles.

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