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Mileage Improvement in Electric Vehicle

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Abstract

The project intends to increase the driving range of electric vehicles. that can be handled with a variety of solutions; one of them is optimizing the speed according to the current battery percentage. In our paper, we do not only calculate speed according to battery percentage we also take the inputs like the overall vehicle load and car tier air pressure and the current location and destination for the distance calculation. normally a petrol or diesel vehicle can travel long distance by re-fueling at regular intervals the refuel time is also less so we need not worry about the breakdowns. but which is a major problem in electric vehicle the recharging time is not short as compared to re-fueling so it is mandatory to plan the journey and electric vehicles are not used for a long journey because of their long charging time and minimum availability of charging doc in our country. our paper provides the beginner to plan their journey and provides the drivers to achieve more distance comparing with regular distance normally achieved,it help battery lifetime and increase the efficiency of the battery.

Keywords: Electric Vehicle, ATmega8, improving mileage, load, speed recommendation

1. Introduction

The electric vehicle industry is booming in our country. We can witness many Electric two-wheelers on the road. Soon we can witness many electric four-wheelers on the road.

The driving range of an EV is directly proportional to the battery pack capacity used in the electric vehicle. In our country, we have the Hyundai Kona with a driving range of 452 km when fully charged. The driving range mentioned by the manufacturer will not be the same in a real-time environment. practically we did not have enough charging stations as compared to the gas station so we can not charge our vehicle if the battery drains in the middle. Recharging an electric vehicle is also not a quick process like re-fuelling a combustion engine vehicle. This makes the EV vehicle undesirable for long-distance travel.

This paper deals with a new technology that calculates the desirable speed at which the electric vehicle has to travel to cover the maximum distance

In present days there are more electric two-wheelers compared to heavy vehicles. The current features in the vehicles are that can able show the millage according to battery percentage and the mileage can vary according to modes in the vehicle like eco-mode, sports mode, warp mode. the mileage reduces accordingly and the value also not accurate practically. because the values are tested while manufacturing, the value changes according to the usage of the battery because it's the nature of the battery that lifetime starts reducing.

In the market, the commonly use battery's are li-ion and li-polymers, mostly li-ion batteries are used because of their large capacity.

we aim to increase the mileage compared to the current electric vehicle available in the market and also maintaining the battery life by following our suggestion

2.Methodology

The automatic guidance mainly detect the battery percentage load and the speed, the proposed system works as follows:

The present battery percentage is collected from the electric vehicle in their database.The loads of the overall vehicles is calculated by placing specific sensors under the vehicle. The speed is regularly calculated the produce the recommended speed according to battery capacity All inputs are given to the microcontroller, the algorithm runs and produce the output to the user

3.Block Diagram Of Proposed Work

Whenever we are starting our vehicle. the system initially takes basic inputs like load of the overall vehicle, current speed, and battery percentage. the GPS used in the car gives us the current location and destination which is used to calculate the distance for our journey. the destination location input is received from the user. then it is sent to a microcontroller.

The input collected from vehicles are the current location of the vehicle using GPS, available battery capacity and, the current speed of the vehicle then these data are sent to the microcontroller. the microcontroller runs the program and sent the optimum speed from a microcontroller to the display

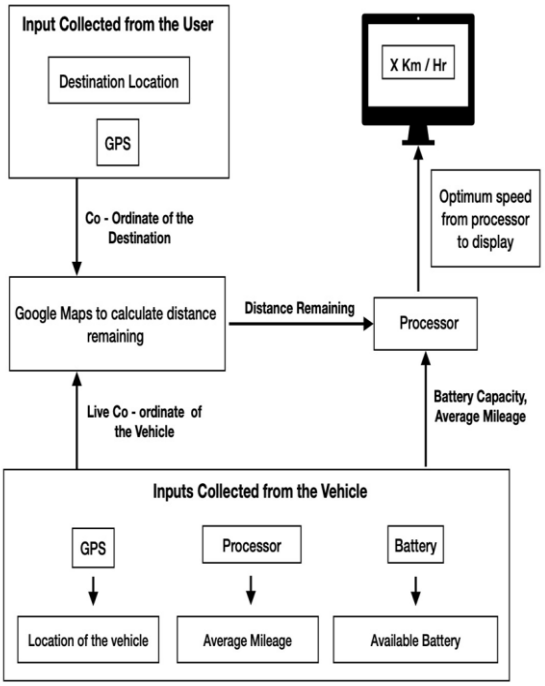

Fig1: Block Diagram of Proposed Work

Table 1: Top mileage of Electric Vehicle

S. No	Brand	Battery Type	Battery Capacity	Mileage
1	Tata Nexon	Lithium Polymer	30.2KWH	312 Km
2	Hyundai Kona	Lithium Polymer	39.2KWH	452Km
3	Mahindra E Verito	Lithium Polymer	21.2KWH	140Km
4	MG ZS	Lithium ion	44.5KWH	419Km
5	Mercedes Benz EQC	Lithium ion	80KWH	455-471Km

The above table is shown that the top mileage electric vehicle in each brand with their battery capacity and battery type. from the above table, we know that Hyundai Kona, MS ZS, and Mercedes Benz EQC give maximum mileage due to the presence of Li-ion batteries they provide maximum storage of power which directly increases the distance of the vehicle. these are the top-selling vehicles in India. the tata Nexon like vehicles regenerate power to charge the batteries while applying brake and during non-acceleration period

4 Hardware Description :

ATmega8 is a CMOS technology-based 8bit Microcontroller that belongs to the AVR class Microcontroller. Atmel corporation offers AVR Microcontrollers, which is formed in 1996. ATmega8

is built on RISC architecture. the main feature of this microcontroller it does not contain any accumulator register and the benefit is it can store operation in any register, that defined by an instruction.

Except for 5-pin all other pins in the Atmega8 microcontroller supports two signals. There are 28 pins in the Atmega8 microcontroller in which 9,10,14,15,16,17,18,19 pins used for port B, for port C 1 and 23,24,25,26,27,28 pins is used, for port D 2,3,4,5,6,11,12 pins are used.

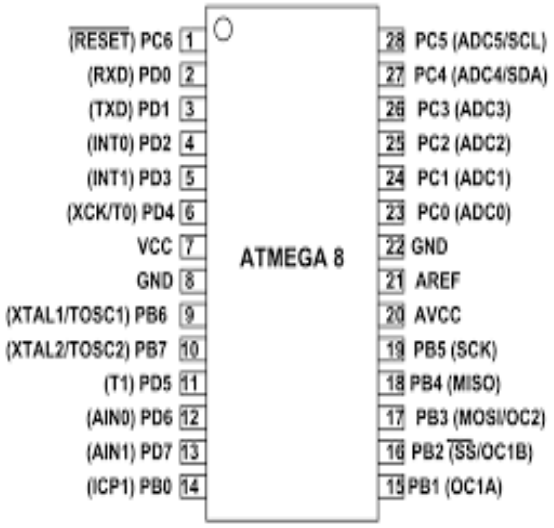

Fig 2: Pin details of ATMEGA8

This microcontroller consists of blocks like: Memory, I/O Ports, Interrupts, Timer/Counter, Serial Peripheral Interface, USART, Two-Wire Interface, Analog Comparator, ADC.

the ATmega8 microcontroller is the fastest and consumes less power to work and it has different saving modes. its has different version like 8bit, 16bit, 32bit.

Fig 3: Load Sensor

The load cell consists of a bridge resister, a load cell is used to measure weight. load cell is a transducer that converts some form of physical parameter into an electrical signal. the physical parameter is force. normally an industry uses strain gauge load cell. load cells come in many shapes and sizes popular types are S-shaped, miniature compression, tension links, bending beam they are used based on the application.

Load cell works on the concept of Wheatstone bridge. It is nothing but consists of four resistors in which two resistors are connected parallel and the

other two connected in series and two junctions are connected to the input and the other two junctions are connected to the output. out of four one is variable resistance which is strain gauge

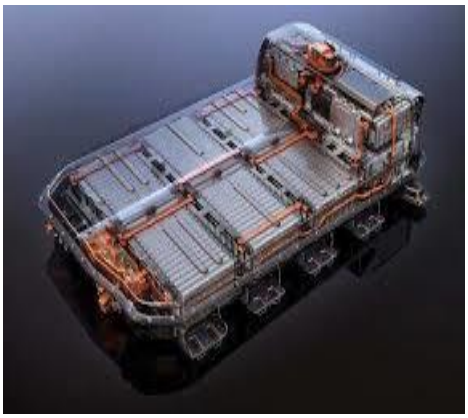

Fig 4: Lithium Polymer battery arrangement

There are varieties of batteries available in the market like Li-ion, Li-polymer, solid-state batteries, aluminum-air batteries. in which li-ion batteries are majorly used. It is one of the oldest inventions, comparing to Li-ion Li-polymer is the latest invention, the Li-ion batteries are made only with particular shape but in Li-polymer batteries it can be made in different shape as we like to do because of gel substance electrode which is the main advantage in Li-polymer batteries.

The energy density is more in Li-ionbatteries compared to Li-polymer batteries but the initial thrust is higher in polymer batteries compared to Li-ion. Nowadays the solid-state batteries are in testing because they give higher mileage and do not produce heat while charging because the electrode is in solid-state. In future the li-sulfur batteries play a major role.

IC7805:

Fig 5: IC7805 Voltage Regulator

IC7805 is one of the IC chips. if a circuit requires constant 5V dc supply IC7805 is used. the first pin is used as input, the second pin is common and the last pin is used as output. using this IC we can max input of 30V-35V dc. this IC is most commonly used in mobile chargers to give a constant 5V as output.

4.1.Variable Resistors:

Fig 6: Variable Resistor

POT-HG is the active variable resistor that allows to change the resistance. In most of the variable resistors, the center pin is the output pin and the other two pins are the input pin. the polarity does not matter in the variable resistor. where ever the adjustable voltage requires potentiometer can be used. In this, we are using to adjust the speed, load, and distance.

5 Embedded Software

Proteus is software mostly used for electronic design automation.the software is mostly used by electronic design engineers and by technicians to create printed board circuits. the proteus available in different languages.

The proteus works well in windows mostly used for simulation purpose the microcontrollers like Atmega8,Atmega16,Atmega32,PIC10,PIC12,PIC16,PIC18,PIC24,dsPIC33 Microcontroller,

8086,8051,ARM7 microcontrollers like everything available in this software. for injection of program to the micro controller we use code vision AVR Evaluation and Arduino IDE,the file should be in HEX or COf file.

The system is performed by getting the overall load of the car by eliminating the actual weight of the car the load is calculated with the help of a load sensor which is place under the vehicle

Then the current battery percentage is getting as input from the car which is an inbuilt facility

The current speed is regularly monitored and send as input.

These three parameters are given as input to the ATmega8 microcontroller which is already programmed with specific coding based on our need, the algorithm runs and produces input at regular intervals.If the distance is high and the battery is low the display provides the recommended speed to reach maximum distance. which is not shown in current electric vehicles

6 Uniqueness And Features Of Proposed Work

The available vehicles in the market and in the industry can display us the average mileage and the overall distance the vehicle can travel with the available battery reserve which is calculated based on the average mileage of the previous journey.

The uniqueness in our project is as follows:

- The optimum speed that is to be maintained to reach maximum distance will be displayed for the current journey.
- For every five minutes the optimum speed will be calculated and updated to the display as external factors and other conditions affect battery level during travelling.
- The optimum speed can be also provided as an input the Cruise control feature of the car if the car has that particular feature.

Our project has the following feature:

- Optimum speed to reach maximum possible distance will be displayed to the user.
- The optimum speed will be continuously calculated and updated at an interval of 5 minutes.

- By sticking on to the optimum speed specified by the program user can reach the maximum possible distance with his / her battery capacity.

7.Results And Discussion

In the display, it shows battery percentage as 92%, total Kilometers(TKM) as 6Km, Time as 15, then the current speed of the vehicle as 50, and the recommended speed as 80. the display shows maximum speed as the recommended speed because the battery percentage is maximum and the distance is also less distance, if the distance is high and battery percentage is also low it recommend we lower speed the achieve maximum distance. finally, we can compare the distance achieved by running the motor at different speeds and another by running the motor with recommended speed. In result, we get maximum distance only by following the display recommendation

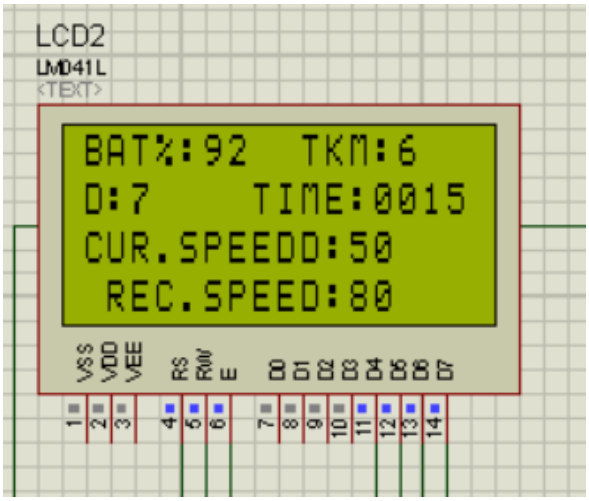

Fig 7: Results obtained from the simulation

8. Conclusio

The method is made to increase the mileage of electric vehicle more than normally achieved which creates the people a good concepts again electric vehicle there are more ideas are created in our society like fixing a turbine in a vehicle to recharge the battery while running but the disadvantage is which increases the overall load of the vehicle which directly affects the speed and mileage of the vehicle

by considering these factors we developed a method that guides you to reach the maximum possible distance with the available battery.

The main weakness in electric vehicles is mileage we can overcome them with this method in future lithium-sulfur battery would come because now only they registered pattern rights it may take some more time to avail in the market if its comes the efficiency will be higher and the cost too. whenever the technology develops we should go along with it and expand its efficiency.

The main advantage is ours does not require any extra hardware the whole thing happen with cost less and everything is already inbuilt if the vehicle follows our guide the battery lifetime also increases due to proper usage of the whole system

9 Future Scope Of Proposed Work

To extend the scope of our proposed system. Besides, we are going to add the air pressure monitoring. It also plays a major role in the vehicle if the correct psi is not maintained properly the pressure will create in the tie that causes the production of heat in the tier that directly affects the battery because it consumes more power. and instead of using aluminum or copper made of motors printed PCB made of motors are used to reduce the load of the vehicle.

If correct pressure is maintained the vehicle will run with the most efficient it will be added in the future as an alarm indicator if its falls from the average value.

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