Design, assemble, test a complete four wheeler electric vehicle and implement auxiliary battery switching mechanism

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Abstract-Electric vehicles ‹ii e crew/i/iy ‹i mu.isive fmll iii tlte glob‹il utitoinotive issiJtiiU for ifie *gore.sts. Elet'tric vell it'les combine the clotible ‹iJv uuabe oj energ\ effectiveness mmcl being e‹'ofriendlx ‹›ii ci globril scnie thereb›' bein g cut iJecil choice for the* cc›n.stiniei-.v. *An electric vehicle is ci combinution o/ electronic tackle, iietw orL di.syci t‹•lies, sojns›are oJae rcitions unJ w trim g into one trite grcite‹l systeiit that controls on ever- aclclin3 iiunibet oj i!ehicle fuitctiotis its the arens of vehicle control, body and security, infotainment, active safety, and other comfort, convenience, rind conttectivity functionality. The elec'tric vehicle dt ivetruin ofj!e re* new *f!ree lone in terms' of ele‹'tric vehicle infrastructures w'l1ile leaclin g to new cllcillen, es iii terms o[n1eeting ‹ill conclitions. When Jesiturn g the cirmature j'or EV if's oblig itorv to use morlellin g* mid *siinulcition tool.s,* w *ifJ .syeci fic consi lercitioit o[electric pos ertrain, incluJin g bntte* rn *, yoiver electronics, electric motors, Jetector.s, cinâ* c *ontrol .5 stem.*

I. INTRODUCTION

Electric vehicles have an electric motor and a battery rather of a combustion machine and a energy tank. The architecture becomes simple and manageable for the element position. These variations bear extensive adaptation for safe battery integration. The pivotal factors of electric vehicles are traction battery, DC- DC motor, electric motor, power motor, on- board charging harborage, controller, supplementary battery, thermal cooling system and transmission system. The architecture of an electric vehicle consists of a motor that is tone- starting and can be easily controlled by an input current.

They produce steady affair power and speed, because of this the machine is lighter than an ICE. fully electric vehicles, also appertained to as battery electric vehicles (BEVs), have an electric motor rather of an internal combustion machine. The vehicle uses a large number of traction batteries to give power to the electric motor and it must be plugged into an electric power source or charging device, which is also known as Electric Vehicle Supply Equipment. Electric automotives correspond of an electric motor that is powered by a battery. There are numerous distinct orders of electric vehicles among which some operate purely on electricity thus called pure

electric vehicles, and some can also run on conventional energies like petrol and diesel along with electric current. Plug- in electric vehicles run purely on electricity and get all their energy when they are plugged in to charge whereas hybrid automotive run mainly on electricity, but they also have a traditional energy machine, so you can also use petrol or diesel if they run out. These automotive will produce emigrations when running on energy, but not when running on electricity. Plug- in automotive can be plugged into an electricity source and recharge their battery.

H. WORKING OF ELECTRIC VEHICLE

In electric vehicles, additional batteries provide power to the electric vehicle's accessories. The charging dock enables the vehicle to derive energy from an external power source to recharge the secondary battery. This device converts the high voltage DC power from the traction battery pack to the low voltage DC power needed to power the vehicle's accessories and charge the auxiliary battery. Using the power of the automobile battery pack, this drives our vehicle motor. Some vehicles use engine generators that perform driver and

rejuvenating functions. The onboard plate receives the incoming electric current from the charging station and changes it into DC power so that the traction battery is completely charged. It also communicates battery characteristics such as voltage, current, temperature and state of charge when the suit and charging pack are charged. The power electronics regulator regulates the flow of electrical energy sent by the traction battery, the speed of the traction motor and the torque produced. The heating (cooling) system maintains the correct operating temperature range of the device, electric motor, electric electronics and other factors. The traction battery pack stores electricity to be used by the traction motor. The transmission energy from the electric motor is stored as mechanical energy and then provided to the vehicle so that motion is initiated.

IH. ISSUES FACED BY ELECTRIC VEHICLE

As the demand for EVs grows, so do the challenges for the design team. Current EV design challenges are limited to driving range, high cost, batteries problems, with long charging times and charging infrastructure. One of the main challenges of vehicle electrification is limited driving range lithium-ion battery. Battery design is limited by size and mass package. The increase in mass requires more energy to propel the vehicle and adversely affect vehicle handling, acceleration and braking. Beyond this all batteries perform less well over time, providing limited driving range. Reliability of powertrain components such as battery, motor and power electronic components are not immune to environmental stress.

IV. AUXILIARY BATTERY SWITCHING MECHANISM

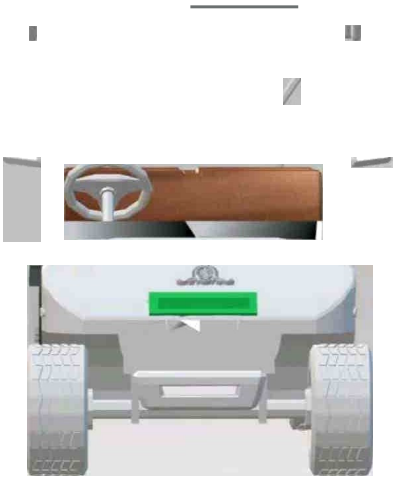
The additional battery can be used as a safety backup when backing up the main battery provide constant voltage for the required or special vehicle system. Many electric automobiles can also use the Start/Stop system and ADAS (Advanced Driver-Assistance Systems). Many automotive use auxiliary battery together with the primary vehicle's starter battery because there is no 12 volt battery.

It is used to crank the motor and usually only provides 12 volts to power electronics and accessories will have very low energy consumption. Some auxiliary batteries are actually visible more like a motorcycle battery than a car battery, this is due to low power consumption. Some conventional vehicles may use dual battery systems in their base. The battery provides power to the starter motor while maintaining the necessary power for the engine Starting engine control system (EMS) is required. Battery helps to study additional e1ecti‘ica1 accessories. Dual battery systems are used by many vehicles, each of these systems has a utility for the Start / Stop function of the electric vehicle.

V. PERFORMANCE PARAMETERS CONSIDERED IN VEHICLE DESIGN

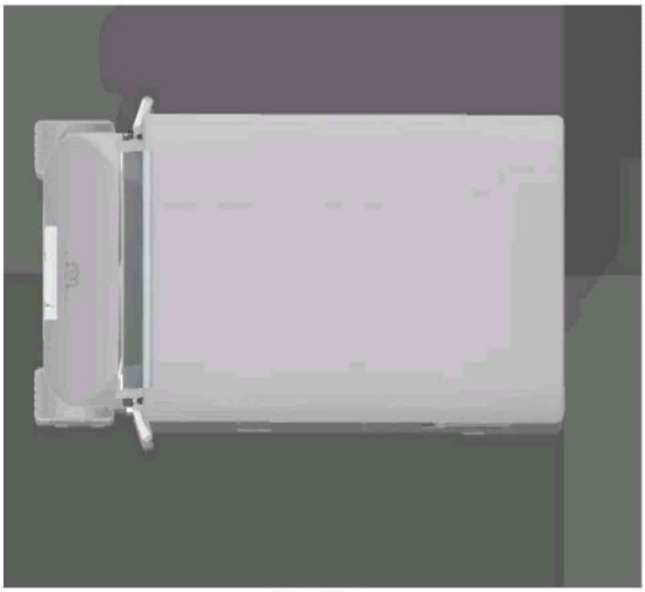
Performance Parameters	Numerical value
1. Top speed	23.5km/hr
2. Range	50 km
3. Chargine Duration	100%-9 hours
4. Traction capacity	1000 kg (inclusive of external load)
5. Battery	60 volts,48 Ah
6. Acceleration	0.295 m/s^2
7. Rollins Resistance	465.7 N
8. Torque	1008.97 Nm

VI. 3-DIMENSIONAL ELECTRIC VEHCILE MODEL DESIGNED USING FUSION 360 SOFTWARE



Front view

Rear View



Top View

Side view

VII. SOFTWARES USED

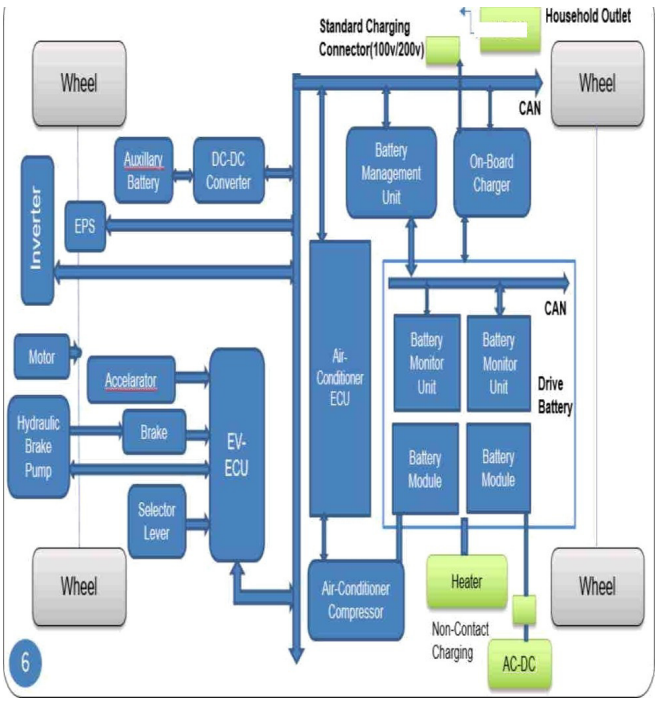
Fusion 360: Fusion 360 is a CAD tool from Autodesk that needs no introduction. From the developer of industry standard tools.

Like AutoCAD and Inventor, there is a new modeling software aimed at this: Fusion 360. Fusion 360 is a great tool for accurately modeling 2D and 3D objects, but you can do much more like animating your design, rendering objects, simulating loads, even CNC prepares the model for operation. Many small and large businesses use the platform to design and prototype their products because Fusion 360 offers CAD, CAM, and CAE capabilities. Once you get used to the interface and commands, your workflow is only limited by your imagination.

The Fusion 360 has several work environments, each providing users with this services. The first thing you see when you open Fusion 360 is an empty modeling plane and a design toolbar, because the design environment is used by default. The environment in the upper left corner of the screen can be changed. 3D geometry in this tool is created using a sketch, and you can create one using the Create sketch button in the upper corner.

Paint 3D: Paint 3D includes many of the features found in the original Paint app, as well as the ability to create your own animations, especially 3D objects, within the app. It contains many art tools: markers, calligraphy pens, oil brushes, watercolor brushes, pencils, erasers, crayons, pixel pens, sprayers and filling tools. One of them can be any color you want, and each has its own features, such as choosing the thickness and opacity of the line. Canvas has a base model that can be imported directly. Colors can be sampled from the swatch tool for easy selection based on existing colors on the canvas, or you can choose manually by entering six color values. Includes a cutting tool to cut the shape. The software allows you to insert stickers, textures, and embed able images directly into the 3D model. You can also create Paint 3D stickers from image files. 2D objects can be "transformed" into 3D objects using only the built-in tools. Both 2D and 3D can be created for vascular characteristics and types.

VITI.ELECTRIC VEHICLE ARCHITECTURE



Electric motors are used as the main machine in EVs. Its function is to convert the energy stored in the battery pack into mechanical stir. This motor must have a high starting torque to insure fast acceleration. Machine affair is transferred to the vehicle directly or via a transaxle. When the EV accelerates, the electric motor operates in drive mode and power flows from the battery to the EV's bus. So the battery is out in drive mode. Still, when the EV thickets, the machine acts as a creator (regenerative braking) and the inflow of power from the EV drive to the battery. The battery is thus charged during retardation. The EV board bowl is used to convert the AC force into a DC voltage of the applicable value. All these are controlled by a computer, so they are termed as called smart chargers. Fresh batteries of the applicable voltage are generally used for lights and infotainment. As is used in electric automobiles to power all accessories, there's no volition in EVs to keep fresh batteries charged. thus, the EVS uses a DC- DC motor that takes its input from the main battery and generates 13.5 V that's used to charge the supplementary battery. The battery is presumably the most important part of an EV, as it determines the weight, cost, range, and performance of the EV. The function of the motor regulator is to acclimate the inflow of power from the battery pack to the motor in proportion to the pressure applied to the accelerator regulators used in EVs are computer controlled. It provides excellent speed control with optimal energy use during acceleration and retardation therefore, operators allow energy to inflow in both directions. The power standing of the regulator depends on the voltage and current range.

The EV control unit (EV- ECU) is the control unit for managing the operation of the electric vehicle. EV- ECU must have the most suitable control technology of powertrain operation (machine and transmission) and electrical electronics operation practices (inverter and battery), and compact, light and low-cost technology of powertrain ECU development. It also implements the integration of control and monitoring of colorful EV functions and has a feather light casing. It also has portability by using advanced microcomputer and LSI systems. Heating system (cooling) maintains the proper operating temperature range of the machine, electric motor, electronics and other factors. Traction battery stores electricity for use with

electric traction motors. The tr‹insmission transmits mechanical power from the electric traction motor to drive the vehicle.

The CAN (Controller Area Network) control system is a simple two- line periodical machine system developed by Bosch in the eai‘ly 1980s for automotive operations.

A control system is needed to control the distributed electrical system in any vehicle. In electric vehicles, the distributed power system is controlled by the CAN control system unit. The CAN control system consists of one CAN master control knot and four CAN load bumps. All CAN points are connected to a crooked brace line, the CAN machine, to shoot and admit dispatches. The CAN control system is responsible for icing so that flash currents don't accumulate to reach the maximum power limit that can be handed by a fresh power unit (power motor). This is done by adding a time detention to the software between high- demand loads similar as headlights. CAN w‹is chosen to replace the old plant control system because it reduced the weight and complexity of wiring in the vehicle.

CONCLUSIONS

So, after a detailed review of EVs, the fact that electric vehicles are more efficient and combined with the cost of electricity means that chai‘ging an electric vehicle is cheaper than filling up with petrol or diesel for your travel requirements. Driving an electric vehicle can help reduce your carbon footprint as there will be no tailpipe emissions. Elecfi‘ic vehicles have very low maintenance costs because they have no moving parts like internal combustion vehicles.

Electric vehicles have lower maintenance requirements than conventional gasoline or diesel vehicles. Therefore, the annual cost of running an electric vehicle is very low. Because there is no engine under the hood, electric vehicles have the ability to run silently. With the increasing number of electric vehicles, there is a need to create momentum in the number charging stations to meet the increasing demand and maintain proper control system that coordinates the charging cycle of each vehicle, so that some charging stations are not overloaded by vehicles ‹ind others are empty.

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