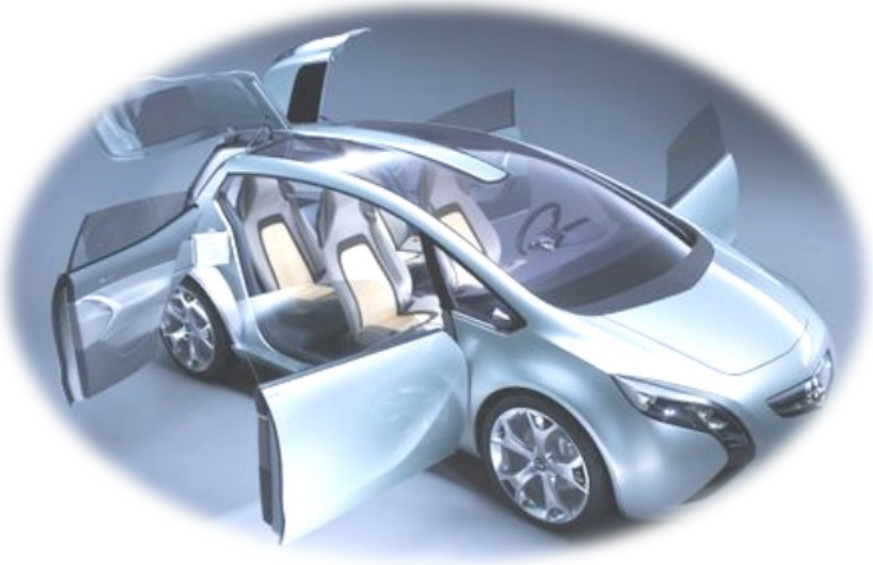
IIT Roorkee Student Section

PROPOSAL FOR

ELECTRIC CAR



PRESENTED BY:-

ASME (AMERICAN SOCIETY OF MECHANICAL ENGINEERS) STUDENT SECTION

INDIAN INSTITUTE OF TECHNOLOGY, ROORKEE

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OBJECTIVE

The survival of the human race, the development of pollution-free vehicles that can resolve the problem of the dwindling natural resources and the dream of recovering a cleaner planet - All of these require the development of cutting-edge technologies. Innovation in transformation of existing manufacturing frame should be followed and joining in market leading companies' network is essential. Throughout these efforts, we could keep our environment clean and maintain the economic growth sustainable. Most of the cars currently sold use gasoline engines and internal combustion engines. As the Oil price is soaring and is expected to raise more, it is questioned if it is possible to keep up with the affordability of gasoline engine cars! Further, Nitro dioxin (NOx), carbon dioxin (CO2) and hydrocarbon (CH) included in exhaust gas from cars are the main factor of smog and air pollution. In order to decrease air pollution, governments are inaugurating regulations and reinforcing the existing ones, therefore for the mechanical engineers, it became critical to develop eco-friendly cars. There are two main trends in the eco-friendly car industry. One is to focus on reducing pollution from the existing gasoline and diesel engines and improving the efficiency, and the second trend is to develop new eco-friendly cars. Recent movements are more weighted on the latter, including hybrid cars, electric cars and fuel cell cars.

The **ELECTRIC CAR** is a vehicle that utilizes chemical energy stored in rechargeable battery packs, and electric motors and motor controllers instead of an internal combustion engine(ICE).

Electric cars were among the earliest automobiles. They produce no exhaust fumes, and minimal pollution if charged from most forms of renewable energy. Many are capable of acceleration exceeding that of conventional vehicles, are quiet, and do not produce noxious fumes. Electric cars reduce dependence on petroleum and decrease or eliminate greenhouse gas emissions, depending on how their electricity is produced.

Electric cars are expected to be cheaper to make and maintain than internal combustion engine vehicles because they have many fewer parts. Using regenerative braking, a feature which is standard on many electric and hybrid vehicles, a significant portion of the energy expended during acceleration may be recovered during braking, increasing the efficiency of

the vehicle. In general terms an electric car is a rechargeable battery electric vehicle.

The principle of the present work is to design and build an electric car that will use chemical energy stored in rechargeable battery packs, and electric motors and motor controllers instead of an internal combustion engine (ICE). Electric cars will reduce dependence on petroleum and decrease or eliminate greenhouse gas emissions.

COMPARISON TO INTERNAL COMBUSTION VEHICLES

➢ COST

While gasoline powered cars typically average 5-23 L/100 km, electric cars can average the equivalent of 1.5 L/100 km with a typical cost of 1 Re per km. In contrast, gasoline-powered ICEVs currently cost about four to six times as much. The total cost of ownership for modern EVs depends primarily on the cost of the batteries , the type and capacity of which determine several factors such as travel range, top speed, battery lifetime and recharging time; several trade-offs exist. The cost of batteries is primarily a *life-cycle cost*, which is highly dependent upon both the initial cost, longevity of the battery and the vehicle, and the battery, charger, motor, and motor power regulator energy-throughput efficiency

➢ MAINTENANCE

ELECTRIC CARS, particularly those using AC or brushless DC motors, have far fewer parts to wear out. An ICE vehicle on the other hand will have many mechanical, fluid, and electrical parts that may include some of the following: pistons, connecting rods, crankshafts, cylinder walls, valves, valve springs, valve guides, camshafts, cambelts, lifters, pushrods, rocker arms, oil pumps, fuel pumps, water pumps, radiators, gearbox (rarely used in EV's), clutch, distributors, spark plugs, air filters, oil filters, coolant and vacuum hoses, injectors, carburetors, turbos, superchargers, gaskets, seals and bearings. All of these parts may wear out over time.

Both hybrids and EVs can use regenerative braking, which greatly reduces wear and tear on friction brakes

➢ ACCELERATION PERFORMANCE

Although some electric vehicles have very small motors, 20 hp (15 kW) or less and therefore have modest acceleration, the relatively constant torque of an electric motor even at very low speeds tends to increase the acceleration performance of an electric vehicle for the same rated motor power. Another early solution was American Motors' experimental Amitron piggyback system of batteries with one type designed for sustained speeds while a different set boosted acceleration when needed.

Electric vehicles can also utilize a direct motor-to-wheel configuration which increases the amount of available power. Having multiple motors connected directly to the wheels allows for each of the wheels to be used for both propulsion and as braking systems, thereby increasing traction. In some cases, the motor can be housed directly in the wheel, such as in the Whispering Wheel design, which lowers the vehicle's center of gravity and reduces the number of moving parts. When not fitted with an axle, differential, or transmission, electric vehicles have less drive train rotational inertia.

A gearless or single gear design in some ELECTRIC VEHICLES eliminates the need for gear shifting, giving such vehicles both smoother acceleration and smoother braking. Because the torque of an electric motor is a function of current, not rotational speed, electric vehicles have a high torque over a larger range of speeds during acceleration, as compared to an internal combustion engine. As there is no delay in developing torque in an EV, EV drivers report generally high satisfaction with acceleration.

➢ ECO-FRIENDLY

Electric cars create less pollution than gasoline-powered cars, so they are an environmentally friendly alternative to gasoline-powered vehicles (especially in cities).

An electric car is a car powered by an electric motor rather than a gasoline engine.

INTERESTING FACTS ABOUT EV’s

Here are some interesting statistics:

- The range of this car is about 80 km.
- The 0-to-100 kph time is about 15 seconds.
- It takes about 12 kilowatt-hours of electricity to charge the car after an 80-km trip.
- The batteries weigh about 500 kg.
- The batteries last three to four years.

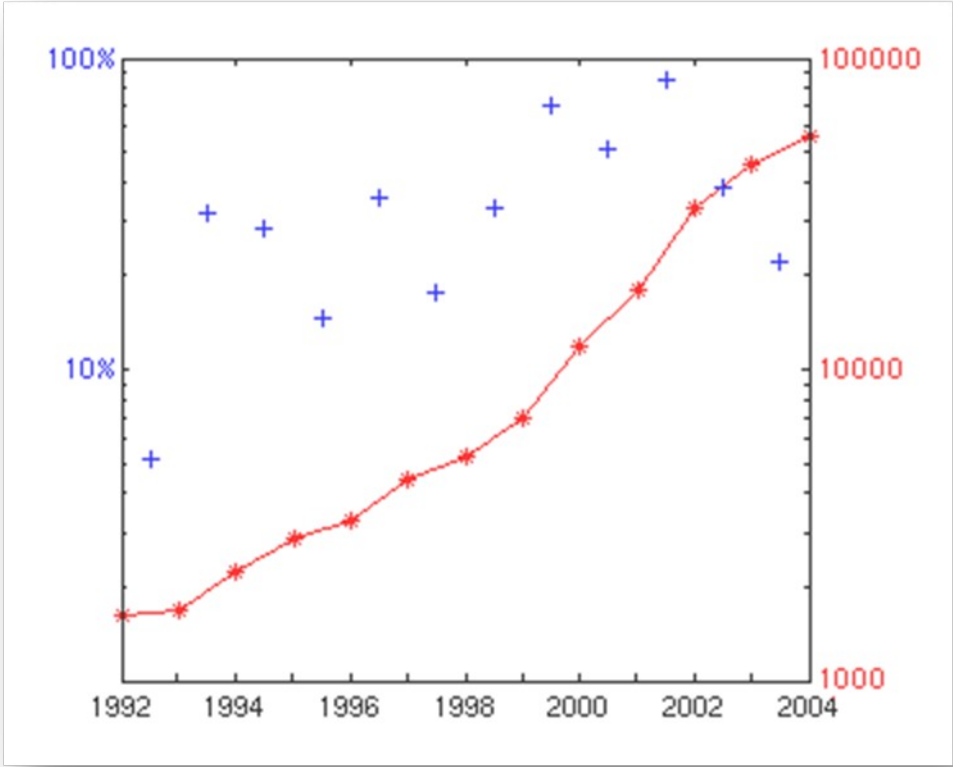
To compare the cost per mile of gasoline cars to this electric car, here's an example. Electricity in North Carolina is about 8 cents per kilowatt-hour right now (4 cents if you use time-of-use billing and recharge at night). That means that for a full recharge, it costs $1 (or 50 cents with time-of-use billing). The cost per mile is therefore 2 cents per mile, or 1 cent with time-of-use. If gasoline costs $1.20 per gallon and a car gets 30 miles to the gallon, then the cost per mile is 4 cents per mile for gasoline.

Clearly, the "fuel" for electric vehicles costs a lot less per mile than it does for gasoline vehicles. And for many, the 50-mile range is not a limitation -- the average person living in a city or suburb seldom drives more than 30 or 40 miles per day.

To be completely fair, however, we should also include the cost of battery replacement. Batteries are the weak link in electric cars at the moment. Battery replacement for this car runs about $2,000. The batteries will last 20,000 miles or so, for about 10 cents per mile.

USE

Following graph shows the increasing use of electric cars in present day life and hence can be concluded that its use is increasing day by day.



Hence this car can be a great boom to automobile industry.

BUDGET

COMPONENTS	COST
The **electric motor (“Lynch” electric motor)**	Rs. 35,000/-
The motor's **controller(300-volt, 50-kilowatt "U.S. Electric Car” controller)**	Rs. 20,000/-
The **batteries(“Energizer” batteries)**	Rs. 6,000/-
The **Magna-Charge System**	Rs. 4,000/-
The **vacuum pump(“Hughes”)**	Rs. 20,000/-
The **potentiometers**	Rs. 2,000/-
The **transistors**(**Large “Toshiba” transistors**)	Rs. 9,000/-
The **electric water/ceramic heater**	Rs. 30,000/-
The **dc to dc converter**	Rs. 10,000/-
The **accessory battery**	Rs. 3000/-
The **voltmeter**	Rs. 2000/-
The **relay**	Rs. 4000/-

This makes our estimated budget Rs. 1,45,000/- approximately. But this budget is tentative.

The rest of components required are available in our Laboratory, including **chassis, cable lugs and wires**.

WHY TO FUND FOR THE PROJECT?

This is the first question that comes to the mind of the investor. There are several reasons for why to fund for it-

1. Most importantly is the publicity of the company. After the completion of the project we intend to present the car in **Auto-Expo 2010** to be held in New Delhi. If you sponsor the project then it may add to the image and publicity of your company. We will be engaging banners, posters, and flexes of your company in **Auto-Expo 2010** with stickers bearing **ASME IIT ROORKEE** and **the logo of your company** to be attached on the car wherever we take it for the showcasing.

2. Secondly this car is cheaper as compared to other cars hence can be proved a great boon for the industry. These cars will become more common in use as soon as it is launched as common people are greatly affected by the increasing rates of gasoline. It will enhance your image as promoters of **Research and Development**.

3. Finally it will promote your company among the students of our campus since your company's name will get associated with our venture. The **name and logo of your company** will feature on our website and various other paraphernalia of the ASME events, ensuring enormous publicity to your company. This, along with extensive coverage in the media makes the brand image of the sponsors as indelible from minds of people and your **company name** would become an integral part with **ASME IIT ROORKEE's** achievements.

Mail your queries to: asme.iitr@gmail.com