

GURU-E-VAHAN 2K23

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Abstract—

Now day's EV vehicles are overtaking Conventional Vehicles, so we are manufacturing the first ever EV Vehicle of Guru Gobind Singh polytechnic. As EV Vehicle require less maintenance, creates less sound, and less pollution it is most Suitable in our college. It will be two-seater, 4-wheeler vehicle, which can run 20-30 km/hr This vehicle will be like touring vehicle. This is a Concept named as Guru-e-Vahan i.e. Electric vehicle of Guru Gobind Singh polytechnic. This Concept of Guru Vahan will be followed every year by third year Students. Every year as major project Guru Vahan will be manufactured Some updation. The reason behind starting this concept is as this vehicle will be manufactured every year with upgradations with some new technology it will surely lead to an Invention that will be helpful to society.

Keyword-Guru-e-Vahan, electric vehicle, less pollution, less noise.

INTRODUCTION

EV is a shortened acronym for an electric vehicle. EVs are vehicles that are either a partially or fully powered on electric power. The motor vehicle industry has been the leading consumer of fossil fuel worldwide resulting in adverse effects on the environment. This study used secondary sources of information from previous research in scholarly journals, Google scholar as well as eBooks, case studies, science direct, research gate, and google books to investigate. The findings show that some of the major milestones achieved in the electric car development include: the reduction of charging time for effectiveness in use, the introduction of super capacitors that ensures increased charge storage, and

with greater effective electromotive force. Additionally, some governments in developed countries do offer subsidies to support electric car manufacturing companies and customers purchasing electric vehicles in order to meet their carbon dioxide pollution reduction obligations, reduce production costs, and make EVs more affordable. Additional findings include: the belief that Electric Vehicles have adverse effects on the environment compared to standard vehicles, that this is due to the fact that a lot of fossil fuels are consumed during the manufacturing of Electric vehicles. The conclusion is that more research and study should be done to provide insight into the manufacturing process of Electric Vehicles. There is not much data available to conclude a strong foothold regarding fossil fuel consumption when making Electric Vehicles. Areas for further study include investigating the current state of more efficient energy storage technologies, longevity of storage batteries beyond current 5-7 years of life.

As now day's EV vehicles are overtaking Conventional Vehicles, so we are manufacturing the first ever EV Vehicle of Guru Gobind Singh polytechnic. As EV Vehicle require less maintenance, creates less sound, and less pollution it is most Suitable in our college. It will be two-seater, 4-wheeler vehicle, which can run 20-30 km/hr This vehicle will be like touring vehicle. This is a Concept named as Guru-e-Vahan i.e. Electric vehicle of Guru Gobind Singh polytechnic. This Concept of Guru Vahan will be followed every year by third year Students. Every year as major project Guru Vahan will be manufactured Some updation. The reason behind starting this concept is as this vehicle will be manufactured every year with upgradations with some new technology it will surely lead to an Invention that will be helpful to society. Now as we are first to manufacture such vehicle in our Polytechnic. Our Vahan will be named as GURU-E-VAHAN 2K23. 2K23 will be like a model number of our Vahan as we are manufacturing it in 2023. Every year when Guru-e-Vahan will be manufactured its model number will be the year number in which it will be manufactured just like how large standard Automobile industries do. Electric vehicle has low running costs as they have fewer moving parts for maintaining and also very environmentally friendly as they use little or no fossil fuels (petrol or diesel). While some EVs used lead acid or nickel metal hydride batteries, the standard for modern battery electric vehicles is now considered to be lithium ion batteries as they have a greater longevity and are excellent at retaining energy, with a self-discharge rate of just 5% per month. Despite this improved efficiency, there are still challenges with these batteries as they can experience thermal runaway, which have, for example, caused fires or explosions in the Tesla model S, although efforts have been made to improve the safety of these batteries. It can cost as little as £7.80 to fully charge an electric car from home and can even be free in public car parks.

OBJECTIVE:

- TO BUILD UP A VEHICLE WHICH WILL NO LEAD TO POLLUTION.
- TO BUILD UP A VEHICLE WHICH WILL NOT CREATE NOISE AS OUR VEHICLE WILL BE USED IN OUR COLLEGE AND DISTURBANCE WILL NOT CREATE.
- OBJECTIVE BEHIND THIS CONCEPT IS AS THIS VEHICLE WILL BE MANUFACTURED EVERY YEAR WITH UPGRADATIONS WITH SOME NEW TECHNOLOGY IT WILL SURELY LEAD TO AN INVENTION THAT WILL BE HELPFUL TO SOCIETY.

COMPONENTS OF GURU-E-VAHAN 2K23

- **Components**

1. **Battery**

Battery type: - Lead acid

Voltage: - 12V

No. of batteries: - 4

Total voltage rated: - 48V

Current: - 65Ah

Connected in: - Series

2. **Controller**

Controller Electric Vehicles controller is one of the main components of the battery powered vehicle that governs its complete operation. The work of this controller is to take electrical power from the battery and supplies to the electric drive motor. Based on

the use and position of accelerator, controller delivers the power level; zero power when the accelerator is not being used and is stopped, full power when the driver accelerates the speed and any power level in between when driving at different speeds. The technical specification of the electric controller is heat resistant, compatibility with almost all motors, speed locking facility, speed switching facility, reverse switching, overload protection, deliver high torque and control other electrical systems.

• Controller used in Guru-e-Vahan 2K2 is smart controller which has four indication lights which on blinking Indicates the fault occurred due to Motor, Controller, Throttle, Over load.

1. Red light: Motor Fault
2. Yellow Light: Controller Fault
3. Green light: Throttle fault
4. Blue light: Over load fault

3. MOTOR: -

Motor used in Guru-Vahan 2k23 is Brushless DC motor.

Specifications:

- Required Voltage: 48V
- Power: 1000W
- Rpm: 3000

4. DC- DC CONVERTER

Electric Vehicles use two different power systems, a high voltage battery (200V to 450V DC) for traction & a low-voltage (12V) one for supplying all the electric appliances in the vehicle. Traditionally, the low-voltage battery was charged from the alternator. But in today's vehicles, it gets all the power from the high voltage battery pack. However, in specific electric car architectures, this low-voltage battery should be ready to help recharge the high-voltage battery pack in order to provide energy for cranking the car. DC/DC converters can be designed to transfer power in only 1 direction, from the input to the output. However, almost all DC/DC converter topologies can be made bidirectional. DC-DC converters play a key role in helping one choose the voltage variation of the devices and in controlling the power flow in each of the devices used in the EV powertrain.

5. BEARING: -

The NTN bearing unit is a combination of a radial ball bearing, seal, and a housing of high-grade cast on or pressed steel, which comes in various shapes. The outer surface of the bearing and the internal surface of the housing are spherical, so that the unit is self-aligning. The inside construction of the ball bearing for the unit is such that steel balls and retainers of the same type as in series 62 and 63 of the NTN deep groove ball bearing are used. A duplex seal consisting of a combination of an oil proof synthetic rubber seal and a slinger, unique to NTN, is provided on both sides.

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• KEY MECHANICAL CONTROL SYSTEMS

1. DOUBLE WISHBONE TYPE SUSPENSION SYSTEM.

A double-wishbone is an independent suspension design that can be found at the front, rear, or all four wheels. In this context, "independent" means that a single wheel's movement is not affected by the other three wheels. In other words, it's free to move (somewhat) independently of the chassis. This design offers several advantages, specifically in high performance on- and off-road environments. The key benefit is that, unlike a similar MacPherson strut setup, a double wishbone design doesn't significantly affect wheel camber with suspension travel. That means a consistent tire contact patch with the road, regardless of body roll or road bumps.

2. CHAIN DRIVE TRANSMISSION SYSTEM

A chain is made up of a series of links with the links held together with steel pins. This arrange makes a chain a strong, long lasting way of transmitting rotary motion from one gear wheel to another. Chain drive has one main advantage over

a traditional gear train. Only two gear wheels and a chain are needed to transmit rotary motion over a distance. With a traditional gear train, many gears must be arranged meshing with each other in order to transmit motion.

3. STEERING MECHANISM

In Guru-e-Vahan 2K23 Rack and pinion type steering system. This type of steering gear is used on light vehicles like cars and in power steering. Maruti 800 cars employ this steering gear. It is simple, light and responsive. It occupies very small space and uses lesser number of linkage components compared to the worm and wheel type of gear. The rotary motion of the steering wheel is transmitted to the pinion of the steering gear through universal joints (not shown). The pinion is in mesh with a rack. The circular motion of the pinion is transferred into the linear rack movement, which is further relayed through the ball joints and tie rods to the stub axles for the wheels to be steered. A slot in the housing permits the inner tie rod ends to move with the rack. This type, viz, the center take off design can be mounted high, saving space and shortening the length of the steering column. Compared with the end take off design, this is also affected less by bump steer. When the toe of wheels changes as they go over a bump or through a depression on the end, the vehicle is said to have bump steer.

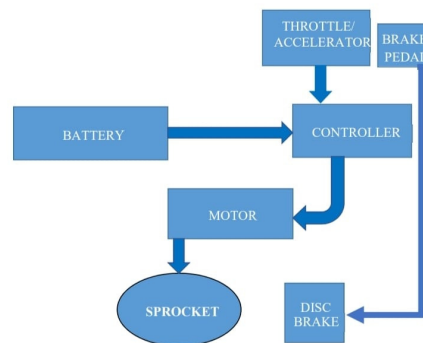
4. BRAKING SYSTEM.

- In Guru-e-Vahan 2K23 disc brake system is used for braking.
- Disc brake used is of Maruti 800.

A disc brake consists of a cast iron disc bolted to the wheel hub and a stationary housing called caliper. The caliper is connected to some stationary part of the vehicle, like the axle casing or the stub axle and is cast in two parts, each part containing a piston. In between each piston and the disc there is a friction pad held in position by retaining pins, spring plates etc. Passages are drilled in the caliper for the fluid to enter or leave each housing. These passages are also connected to another one for bleeding. Each cylinder contains a rubber sealing ring between the cylinder and the piston. When the brakes are applied, hydraulically actuated pistons move the friction pads into contact with the disc, applying equal and opposite forces on the later. On releasing the brakes, the rubber sealing rings act as return springs and retract the pistons and the friction pads away from the disc.

• WORKING PRINCIPLE

Working Layout of Guru-e-Vahan 2K23



• ADVANTAGES, DISADVANTAGE AND FUTURE DEVELOPMENT OF GURU-E-VAHAN 2K23

Advantages:

1. Low cost
2. Easy to drive

3. Sufficient speed
4. Nice aesthetic look

Disadvantages:

1. Long radius turning as no differential used.
2. Battery charging is difficult.

Future innovation / Updation:

1. Regenerative braking system
2. Wireless charging
3. Controlled reverse charging.



• **Conclusion**

We conclude that we successfully manufactured a vehicle which meets our project objectives. As our vehicle creates no air pollution. World concerns on climate change and the rapid vanishing of global crude oil stock, besides air quality degradation caused by exhaust gas and car noise in megacities, guarantee a steady struggle to replace world noisy ICE-based fleet by a silent EVbased one in the coming decades. We successfully manufactured a vehicle which creates less noise than IC engine vehicles. To that end, in spite of the enormous progress in EV technology, the following barriers are still to be overcome, before widespread use of EVs: first, the price of EVs, mainly due to battery cost, has to be lowered - which can be the result of present and future investigations on battery technology; secondly, the driving range of EVs has to be significantly extended, at reasonable battery prices: finally, huge investments in infrastructure for EVs have to be carried out. The latter is a very complex problem, which deserves cooperation of governments, carmakers, technical societies, researchers, etc. to establish standards. for instance, for battery charging infrastructure and power grid energy taxes.

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