

# ELECTRIC VELOCIPEDE

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**Abstract** - The electric velocipede offers a cleaner relief to travel short to medium distances rather than driving a gasoline-powered car. There is growing demand for Electric Velocipede in India as there will be less air pollution, lower maintenance cost and reduced noise using Electric-Bikes

**Key Words:** Electric Velocipede, Eco- Friendly, Gasoline-Powered, Lower Maintenance, Reduced Noise, Pollution Free

## 1. INTRODUCTION

When thinking of possible projects, we all decided that we wanted to do something that would somehow be beneficial to the planet. We decided that the electric velocipede would be the best fit. The electric velocipede offers a cleaner relief to travel short to medium distances rather than driving a gasoline powered car. There is growing demand for Electric Velocipede in India as there will be less air pollution, lower maintenance cost and reduced noise using Electric-Velocipedes. Structural Analysis is carried out to support the validating designs and improving the existing designs. The frame is brace in the better design at the critical locations. Vibrational characteristics are also studied and we arrived at eco-friendly design.

### 1.1 Velocipede

A velocipede is a manual vehicle with one or more wheels. The most usual type of velocipede is the bicycle. The term 'velocipede' is mainly used as a collective term for the different forerunners of among the early velocipedes there were designs with one, two, three, four, and even five wheels. Some two wheel designs had pedals fitted on the front wheel, while three & four wheel designs sometimes used bar and levers to drive the rear wheels.

### 1.2 Electric Velocipede

Electric velocipede is used in law enforcement, security patrolling and leisure. New ride- sharing systems have made electric velocipedes easily accessible. Electric velocipedes can pose as an environmentally friendly alternative personal mode of transportation that has appeal in urban settings and for short distances but are not exempt from the susceptibility users may experience in road traffic injuries same to disclosure pedestrians and bicyclists have shared the roads. For example, Israel has seen over 120,000 imports of e- bike and e-velocipedes over a two-year period, but due

to poor cycling infrastructure, cyclists are often forced onto pedestrian sidewalks, and pedestrians use bike lanes and thus increase the risk of traffic collision

## 2. METHODOLOGY

Like all automobiles models also need a frame work. The framework is very important since it's very basic components of an automobile. Frame is that the structure that supports the complete load applied on the vehicle. So a frame must be design so as to hold the load demands of the prototype. The foremost important part in frame design is that the selection of the prototype. For this model we are using an easy frame design. The planning of the identical has been shown below.

### 2.1 Design

After reviewing and studying finally came to understand that what would be design. The point is to develop a light weight and ergonomic design. The entire vehicle is deliberated on AUTOCAD.

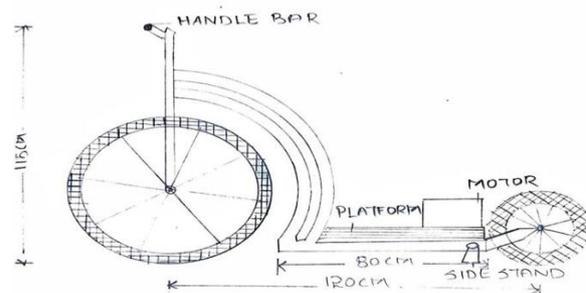


Fig -1: Design layout- side view

Diameter of front wheel = 65 cm

Length of the platform = 80 cm

Diameter of rear wheel = 15 cm

Height of the velocipede = 115 cm

Distance between the center axis of front and rear wheel = 120 cm

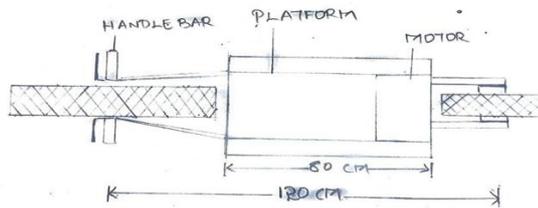


Fig -1: Design layout- top view

## 2.2 Components

The physical setup of this project is given below and it's been explained as follows; Motor 24v 350w, battery, accelerator, chain & sprocket, control unit, jack for charger, odometer, aluminium pipes and ply woods.

**Motor 24v 350w-** A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most familiar types rely on the forces fabricated by magnetic fields. Almost all types of DC motors have internal mechanism, either electro-mechanical or electronic to periodically change the direction of current in part of the motor.

**Battery pack-**A battery pack could be a set of any number of (preferably) identical batteries or individual battery cells. They will be configured in a series and parallel or a combination of both to deliver the specified voltage, capacity, or power density. The term battery pack is commonly employed in relevance to radio-controlled hobby toys and battery electric vehicles. Components of battery packs include the individual batteries and that they inter connects which offer electrical conductivity between them. Rechargeable battery packs often contain a temperature sensor, which the device uses to detect the top of charging. Interconnects are found in batteries as they're the part which connects each cell, though batteries are most frequently only arranged in serial strings

**Accelerator-** Accelerator is used to increase and decrease the speed of the vehicle. It regulates the energy flow supplied to the wheel of the velocipede. This accelerator shows the speed of the vehicle with the digital speedometer on it.

**Chain & Sprocket-**This drive could be a variety of power transmission within which a roller chain engages with two or more toothed wheels or sprockets, utilized in engines as a drive from crankshaft to camshaft. Chain and sprocket drives are accustomed perform three basic functions, transmitting power, conveying materials, and for timing purposes. Chain and sprocket drives are normally used to transmit power from one component to another component. Specifically,

they carry speed and torque through the practice of a linked chain and sprockets.

**Control unit-** An electronic control unit (ECU) is any embedded system in automotive electronics that controls one or more of the electrical systems or subsystems in a vehicle.

**Jack for charger-** This is the jack for charging the battery of the electric velocipede. The plug of the charger has two pins.

**Odometer-** An odometer is an instrument used for measuring the distance traveled by a vehicle, such as a bicycle or car. The device may be electronic, mechanical, or a combination of the two (electromechanical).

**Aluminium pipes-** It is a extruded product that is larger used for all varieties of making projects where lightweight and corrosion resistance is a main concern. Here the aluminium pipes are used for the construction of the chassis of the electric velocipede.

**Ply woods-** Plywood is a material constructed from thin layers or "plies" of wood coating that are glued jointly with abutting layers having their wood grain rotated up to 90 degrees to one another. It is an engineered wood from the family of manufactured boards which include medium-density fiberboard (MDF) and particle board (chipboard). Here it is used to make the standing platform of the driver.

## 3. RESULT AND DISCUSSION

While you might feel that the low speed can stop you from traveling long distances, electric velocipedes are the best way to travel in crowded cities, and to reach your office on time, every day. This will also use it to travel surrounding your neighborhood and nearby shops etc.. You would also be contributing to the environment and reducing your carbon footprint. This speed limit works to your advantage too; transports departments usually do not allow them to drive on highways or on roads, they think are fast getaways. Electric velocipedes are ideal transport solutions within by lanes and city roads. Their small size and lightweight designs which will helps them to get away from traffic congestion.

### 3.1 Working

Here electric assist motor, commonly remarked because the mid-drive system, is increasing in popularity. With this system, the electric motor isn't built into the wheel but is sometimes mounted near the underside bracket shell. In addition typical configurations, a cog or wheel on the motor drives a belt or chain that engages with a pulley or sprocket fixed to one of the arms of the bicycle's crank set. Thus the propulsion is provided at the pedals instead of at the wheel, being eventually applied to the wheel via the bicycle's standard drive train.

Here the ability (power) is applied through the chain and sprocket, power is usually limited to around 250–500 watts to guard against fast decline on the drivetrain. An electrical mid-drive combined with an internal gear hub at the rear hub may require care thanks to the shortage of a clutch mechanism to melt the shock to the gears at the moment of re-engagement. A continuously variable transmission or a completely automatic internal gear hub may reduce the shocks because of the viscosity of oils used for liquid coupling rather than the mechanical couplings of the traditional internal gear hubs.

When the vehicle is turned ON, the current from the battery is supplied to the DC motor. When the vehicle is accelerated, the input from accelerator is sent to ECU and ECU delivers the output voltage required to run the motor. The rear wheel is driven by the motor using chain and sprocket mechanism. Thus wheel starts rotating and velocipede moves forward. The handle bar connected to the front wheel assembly is used to steer the velocipede. The odometer connected to the ECU measures the distance travelled by the velocipede. Systems like headlights and horns are also provided. The brakes are attached to the handle bars and it is connected to the front wheel assembly.

E-velocipedes use rechargeable batteries, electric motors and a few style of control. The battery structure (systems) in use involve locked lead-acid (SLA), nickel-cadmium (NiCad), nickel-metal hydride (NiMH) or lithium-ion polymer (Li-ion). Batteries vary in line with the voltage, total charge capacity (amp hours), weight, the quantity of charging cycles before performance degrades, and talent to handle over-voltage charging conditions. The energy costs of operating e-velocipedes are small, but there will be considerable battery replacement costs. The lifespan of an electric battery pack varies looking on the short of usage. Shallow discharge/recharge cycles will help extend the general battery life. Here we used lead acid battery.

There are two distinct sorts of controllers designed to match either a brushed motor or brushless motor. Brushless motors become more common because the value of controllers continues to decrease. Controllers for brushless motors, E-velocipedes require high initial torque and thus models that use brushless motors typically have Hall sensor commutation for speed and angle measurement. An electronic controller provides assistance as a function of the sensor inputs, the vehicle speed and thus the desired force. The controllers commonly permit input via of potentiometer or Hall Effect twist grip (or thumb-operated lever throttle), closed-loop speed control for precise rate (speed) regulation, protection logic for over-voltage, over-current and thermal protection. Velocipedes with a pedal assist function typically have a disc on the crank shaft featuring a hoop of magnets engaged with a Hall sensor giving rise to a series of pulses, the frequency of which is proportional to pedaling rate (speed). The controller uses pulse width modulation to manage the power to the motor. Sometimes support is provided for regenerative braking but infrequent braking

and also the tiny mass of bicycles limits recovered energy. Controllers for brushed motors, these also are utilized in E-velocipedes but are becoming less common thanks to their intrinsic lower efficiency. Controllers for brushed motors are nevertheless much easy and cheaper because of the fact they do not require hall sensor response and are typically designed to be open-loop controllers. Some controllers can handle multiple voltages.

### 3.2 Advantages

Easy to travel at short distances, low manufacturing cost, long term charge capacity, compact and simple design, eco-friendly & probably designed for all ages.

### 3.3 Limitation

Less power, not suitable for off road conditions, load carrying capacity is less and it can only afford one passenger at a time.

## 4. CONCLUSIONS

This project work has provided us a superb opportunity and skill, to use our limited knowledge. We gained lots of practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work.

It is a delight to possess an electrical velocipede. The best part about an electric velocipede is it low maintenance and over all life cycle cost. Because it doesn't run on petrol, it saves lots of cash for you and therefore the family. Secondly, thanks to its design, traveling on that is kind of comfortable. Remember, the velocipede is cheaper to take care of than a scooter, so cost wise it's absolutely feasible. Moreover with no noxious fumes beginning the environment remains clean.

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