

# Regenerative Hybrid Bike

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**Abstract**— First we study about this project properly by taking survey in market and take the reactions of various companies and also from many people about electric and hybrid bikes , then we decide to make the hybrid bike that is convenient to use and easy to run for travelling on both petrol and electric speed . In electric bike you need to charge the battery for electric motor if your vehicle get stop while travelling; but if our vehicle or bike will hybrid that is runs on both engine and motor then there is no tension for battery charging.

If your vehicle get stop because of battery charging down, then also you can use engine as alternative source for travelling, so for that we decide to use different hybrid bike.

This will make huge amount of impact on automobile industry and also some amount of impact would also be very effective from environmental point of view.

There are many hybrid bikes are available as a project in the market for personal use and also for selling purpose.

But that bikes are normal like other, but we introduce different hybrid bike in the market as our project that very helpful to all and also it reduces pollution and also it is in the legal requirements.

Also this hybrid bike project help us to go to future plan industry that is electrical that also helps to reduce the pollution and safe to environment.

**Keywords**—*Hybrid , requirements*

## I. INTRODUCTION



This hybrid bike is made by using Pulsar 150 bike in which it runs on both engine and electric motor also. In which we use DC electric hub motor for rear wheel to convert it into hybrid bike and this motor easily take weight upto 500 kg when it runs .Also this take less space because it located in the wheel hub so it looks like regular wheel. Then we use regenerative controller for control this electric motor and we fix this under the seat. This new regenerative controller has many features and it is special type of controller that we make specially by giving order. In which this controller is programmable means we can program it by using software as per our requirements. Also it has another main feature that helps to charge the lithium – ion battery while running in the form of regenerative system. This charging happens when you run this bike on engine above the 40 km / h speed continuously and turning the electric ignition of this electric motor, then the motor rotates as per engine speed because we give the chain drive to this electric motor that rotates and produces energy in it.That energy taken by regenerative controller and it send that regenerated power to lithium – ion battery for charging. This happens when you run the bike on engine and the calculations to charge this lithium – ion battery while running it on the engine above the 40 km / h speed for about

30 km distance on petrol, then the lithium – ion battery will full charge and it depends on the road conditions. The backup of the lithium – ion battery is also good, means you covered 40 km distance on 70 km / h speed of electric motor on full charge battery condition easily. Also we give another option to charge this lithium – ion battery that is plug in option, means if you travel on motor and charging gets low and you have few time, then you can use lithium – ion battery charger to charge this lithium – ion battery. This charger is AC to DC charger and it's small in size so you can fix this charger under the seat where we give few space by taking this point. For this electric motor, we use lithium – ion battery having 72 volts / 30 ah rating because this rating is choose as per our electric motor rating. Lithium – ion battery that we used is also special type, because we give our shape that is v – shaped lithium – ion battery. This is special type of battery because there are rectangular and square shape battery is available in the market. We fix this lithium – ion battery in the air filter location in the bike, for this we remove the air filter from bike and fix this lithium – ion battery in the air filter location. Also we make few changes like we make our customized air filter because we have space issue in the bike related to air filter. For that we use hollow pipe and make holes into this pipe and stick sponge into the pipe to filter the air and this filter also gives the performance that we want to engine. After that we use electric thumb throttle to control the speed of electric motor and we fix it before the regular throttle of bike in the handle. Also we remove the headlamp and signals of this bike and fix one steel panel on which our team name is printed and we use small lamps and we fix that lamps on the top side of that panel. We made this project in 5 months duration, because we face many difficulties but after that we achieve the success and this is fresh and unique project. Our new regenerative charging system and lithium – ion battery make this project and we don't make any changes in the bike and we use the space that given in the pulsar 150 bike. Also it is convertible, means if you run the bike on engine and you want run it on motor, and then you want slowdown the bike and take it on neutral and give the electric throttle of motor, then bike runs on motor. If you run the bike on motor and you want to run it on engine, then you want to slow down the speed of electric motor and start the engine and run it on engine. There are many hybrid bike concepts in the market; but our technology is new and unique technology also we will add new concepts that introduce in the future.

## II. LITERATE SURVEY AND REVIEW

In India, there are less technologies are implemented as compared to other countries, also we use BS – 4 and slowly moves towards BS-6 for future automobile life. Also there are much more prices of petrol and diesels are in India and that are increases and decreases daily and also will increase in future. Then the level of petrol and diesel are low and may be finish at any time, so we need to use this petrol and diesel very safely and don't waste it. Also this petrol and diesel are increases pollution in the environment and there are many gases occurs from exhaust like NOx, CO2 and PM Etc. For this reason many countries start working with electric vehicles and hybrid vehicles and also implement this technology. Hybrid technology is the best way to save the

fuel and also reduce the pollution and easy to implement in India, because there are many electric vehicles are available; but there is no more charging stations are available in India; but still India is working on charging stations. There are few hybrid bikes are available in the market and are not implement with high and new technology; but our aim is to make the hybrid bike that implemented with all new and high technologies that make it unique. For this we take survey on prices of petrol and diesel by going on petrol pumps and ask the public about the petrol and diesel rate and also take reaction of petrol pump employees and also public about the increasing and decreasing the price of petrol and diesel. Also we discuss about electric bikes with people and take reactions of peoples and that reactions are such positive reaction and they said if the requirement of people are successfully complete about electric bikes, then they also happily accept electric bikes in future.

**Bhagyesh Patil [1]** investigates about hybrid bikes present in the market and what technology they used to run that hybrid bike and also search the components.

**Pranit Ambre [2]** he helps in dismantling and assembling the components in this research project and also help to find components for this project.

**Pranav Kansara [3]** helps in all electrical components connections to make this hybrid bike properly and search about new technologies that can be added in the future to this bike.

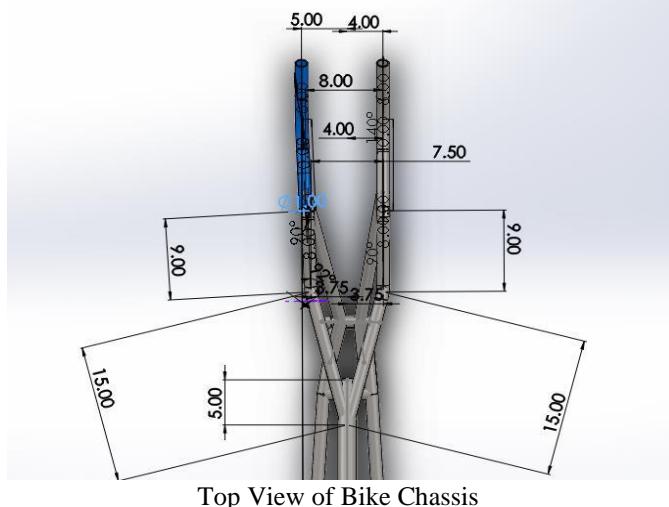
**Harsh Prajapati [4]** Deals with dismantling and assembling all mechanical components in this regenerative hybrid bike project.

## III. TOOLS

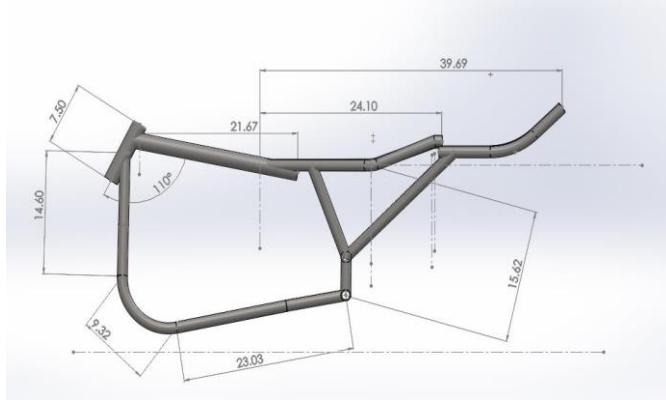
For this research project that is regenerative hybrid bike, we just show the design of bike chassis in which we done some changes like small cutting and we show the 3D drawing of bike chassis only. We use solid works for 3D drawing to make

The basic design of bike chassis only; but there is no another component is shown in the design.

## IV. DESIGN AND MODELING

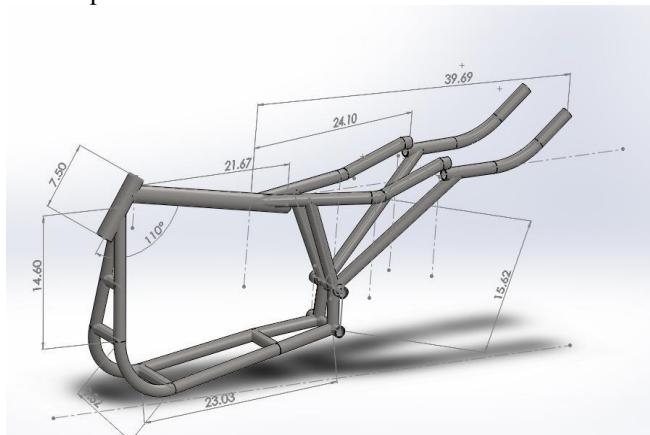


In the design we make only chassis design were we make small changes in bike chassis and this design is in 3d by using Solid work software. This design represents the work that we done on the chassis of the bike because we make many changes and also we change the positions of few components that are not shown; but from this design for the reference. In the above design we show the top view, side view and isometric view of the bike chassis. The design part took around 4 to 5 days to complete. As it was important because for reference and also for presentation. The above design tell us where we work more and what changes we done on the bike chassis. In which we cut the chassis from upper side where the v – shape in which air filter of bike is located for fitting the lithium – ion battery in that v – shape. Also we slightly bend the v- shape to make it little bigger for easily fitting the lithium – ion battery. After cutting and bending we weld the cutting portion to make the chassis like old chassis properly. This all changes are shown in above design and we only make this chassis design for reference, also in the above figure we show the all dimensions that are see by top view.



Side view of Bike chassis

In the above design, we show the side view of our bike chassis and also we mention all the dimensions. Also we shows the angle of bending part in the chassis to show our chassis properly. And we show the cutting area where we extend the chassis in the upper side and also we show the welded part.



Isometric View of Bike chassis

In the above figure we show the isometric view of our bike chassis and also show the both side pipes. We also display all bending parts and angle of its bended area and cut parts

also. This above mentioned figure helps us to know both side pipes of the chassis that does not show in the side view.

## V. METHODOLOGY



## VI. RESULTS AND CONCLUSION

We dismantle and assemble the bike in proper way and also convert the regular petrol bike in Hybrid bike by adding some components. That components are lithium – ion battery, electric hub motor, regenerative controller, electric throttle etc. and also we fitted this all components in that given bike space. We don't extend the bike chassis or other parts; but we only remove the air filter also lead acid battery from its original place and give then another place. We fit lithium – ion battery in air filter area and we reduce the size of air filter and make the circular air filter and also we fit the lead acid battery at back side of the bike under the seat. Then we also make another changes that are we removed the headlight and fit one plane steel sheet and on that we fix two small lights for headlight purpose to give different look to bike. Also we

face more difficulties while making this project like charging of lithium – ion battery, giving space to extra components, controller, motor and especially rear wheel brakes. We face more difficulties in rear wheel braking system, in which we attach disc brake at rear wheel also and we use the caliper assembly that use in front disc brake wheel that was two piston caliper assembly . Then we used master cylinder and reservoir of Pulsar 220 rear wheel disc system that was very difficult to set the position of this brake components in the bike at rear wheel. Also our lithium – ion battery gives the good and proper backup to run the bike on electric motor and also charging is done while running the bike on engine . Our Hybrid bike properly runs on both engine and electric motor and also all components are fitted properly. The look of this hybrid bike is like custom bike because we use steel sheets as side covers and both back and front side we again use thick steel plates to cover and support the head and tail lights. Also we don't use the pulsar bike seat and instead of this we make new seat by using L – shaped iron strips by welding them as per design of the space because our controller was fitted under the seat and also lead acid battery was also fitted under this seat. We also take many trials as per our requirements and take the reviews of the working of all components and also face many difficulties while making this project. Finally we make the Hybrid bike properly and it works properly on both engine and also on electric motor. We will add more technologies in this hybrid bike like boosting the engine power and from that charge the lithium – ion battery to save more fuel also we will make it convertible in running condition that also saves time in the future .

## VII. REFERENCES

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