

Category For Idea Submission:

- Innovative approaches to improving battery range in an Electric Vehicle

Project title:

AIR FRICTION POWERED DYNAMO

Team Name:

- Team AeroDyno

Team Member names along with Project Guide/mentor:

Yagnesh S : team member/student

Deepan Raj: team member/student

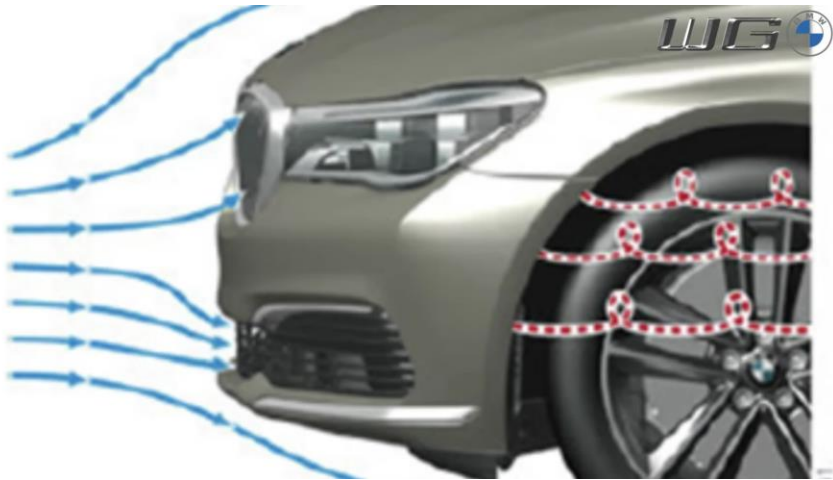
Dr. Beaulah Jeyavathana R : Mentor

Dr. Uma M : Mentor

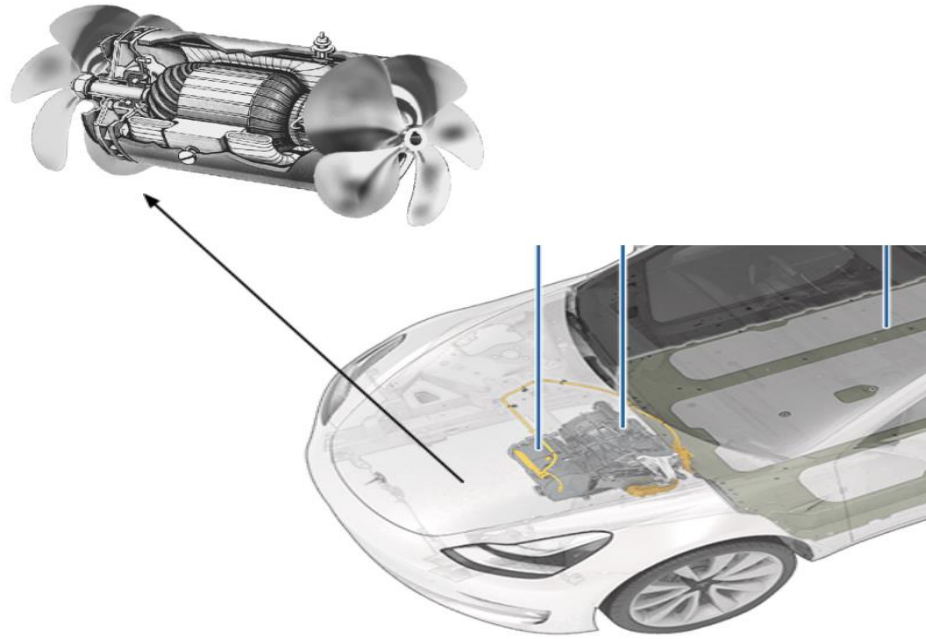


What is the innovation in your idea?

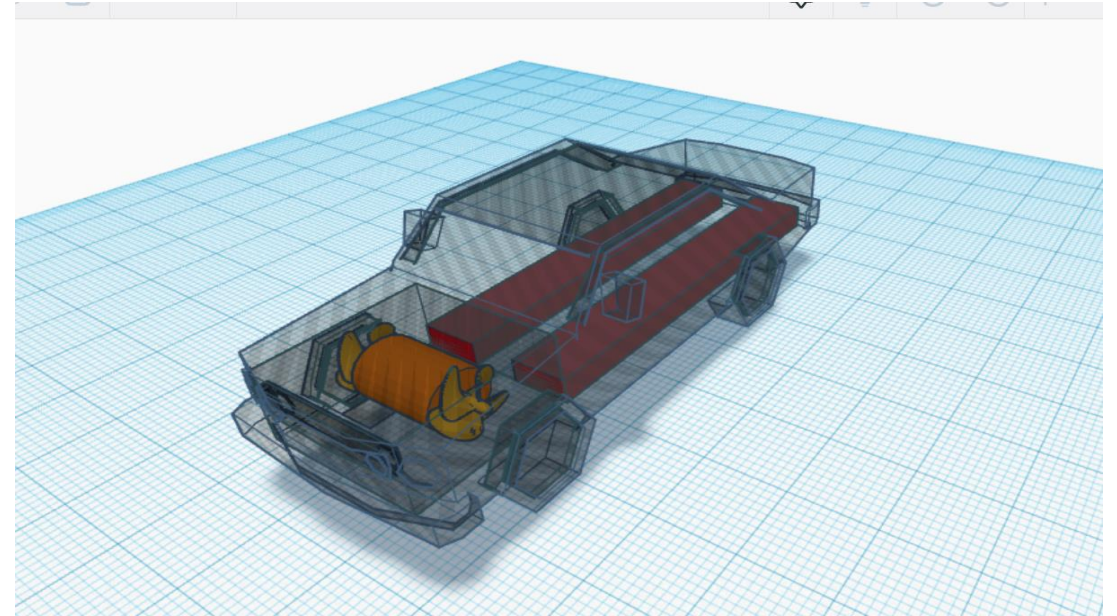
- The idea is to utilize the opposing air force generated by the car when it's on motion. Since most IC car has engine in the front part and they also have a radiator to cool down the coolant to cool down the engine, the cars are designed with small air intake grille.
- In electric car, the motors don't occupy much of the space and batteries also placed in the chassis of the vehicle, the front hood is mostly used for storage purpose and no air grille are given these cars. So, we can utilize this space and add an electric generator which utilizes the air which comes through the grille to charge its batteries. The air which comes in will have its own way out, so thus it's like an air vent, and can also improve the dynamics of the vehicle.



This image is a basic representation of air through the front grille.



- This image represents the generator in the front part of the car.

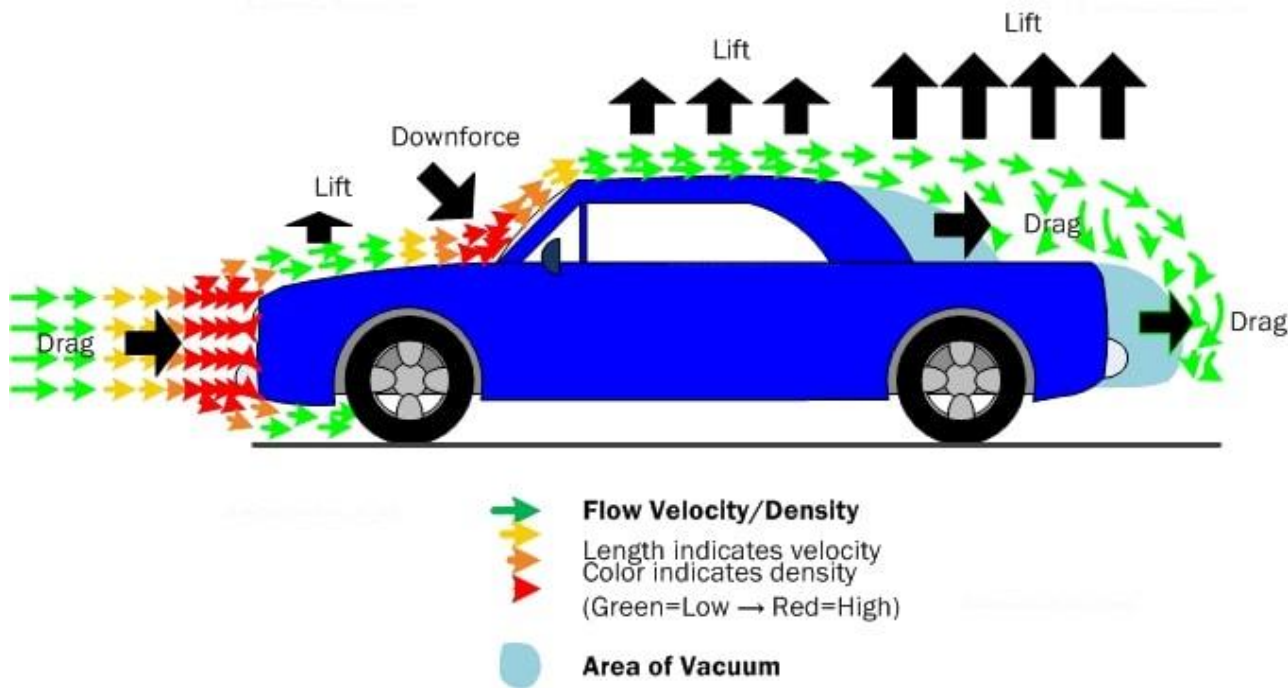


Key Differentiators:

- In the current EV Charging method u can only charge the car when its idle or when its parked, u can't charge it while moving, so our method is to use the opposing air force created by the car to charge its batteries through a generator. In basic, the car is gonna have its own wind mill to charge its batteries.
- There are some method like regenerative breaking used by tesla cars, where they can produce some electricity whenever the driver hits the break. But our idea is quite different And it's a new solution to implement in electric vehicles.
- In most Electric Cars, the front hood is used for storage purpose as well as the boot space, so we can utilize the front hood by implementing this method.

- The aerodynamics of the car would still be normal, since air vents are present in the car.
- BMW cars already uses this opposing air to cool down their engines at high temp. These car doesn't show a big difference in the aerodynamic forces.
- The force created by the generator while its rotating due to the air force won't be big enough to affect the car's center of gravity or the vibrational change.

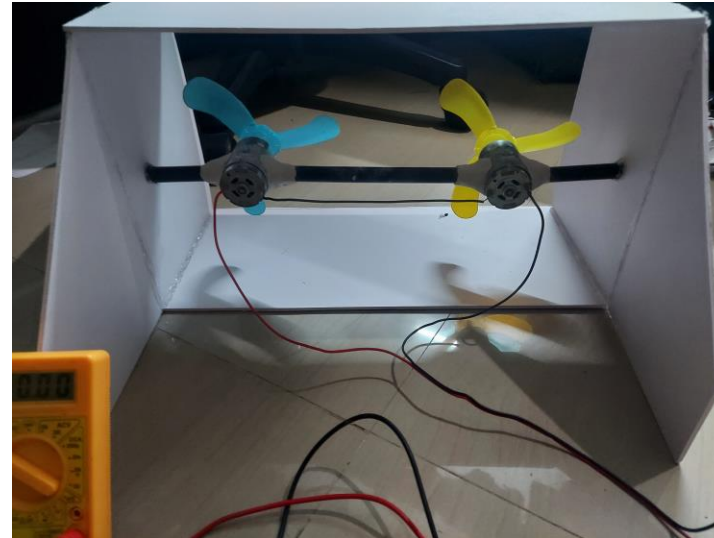
Drag, Lift and Downforce From Over Body Flow



- As you can see the red area in the image is the part where the car experience high opposing force, so our idea is to utilize this force and also create a more aerodynamic model.

Prototype/Proof of concept

- Here I attached some images and videos of the prototype model, this is a basic research model created to verify the working concept of our idea, And it performed well, please refer to the images and videos.

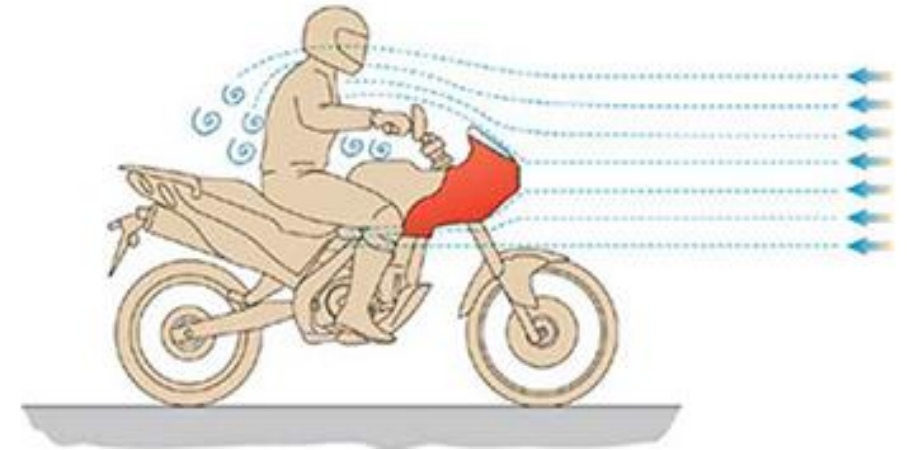


- We used 2 12v dc motor as generators and connected the propellers to it, this model was tested in motor bike and car to check whether it could produce electricity by harnessing the opposing wind force and it did.

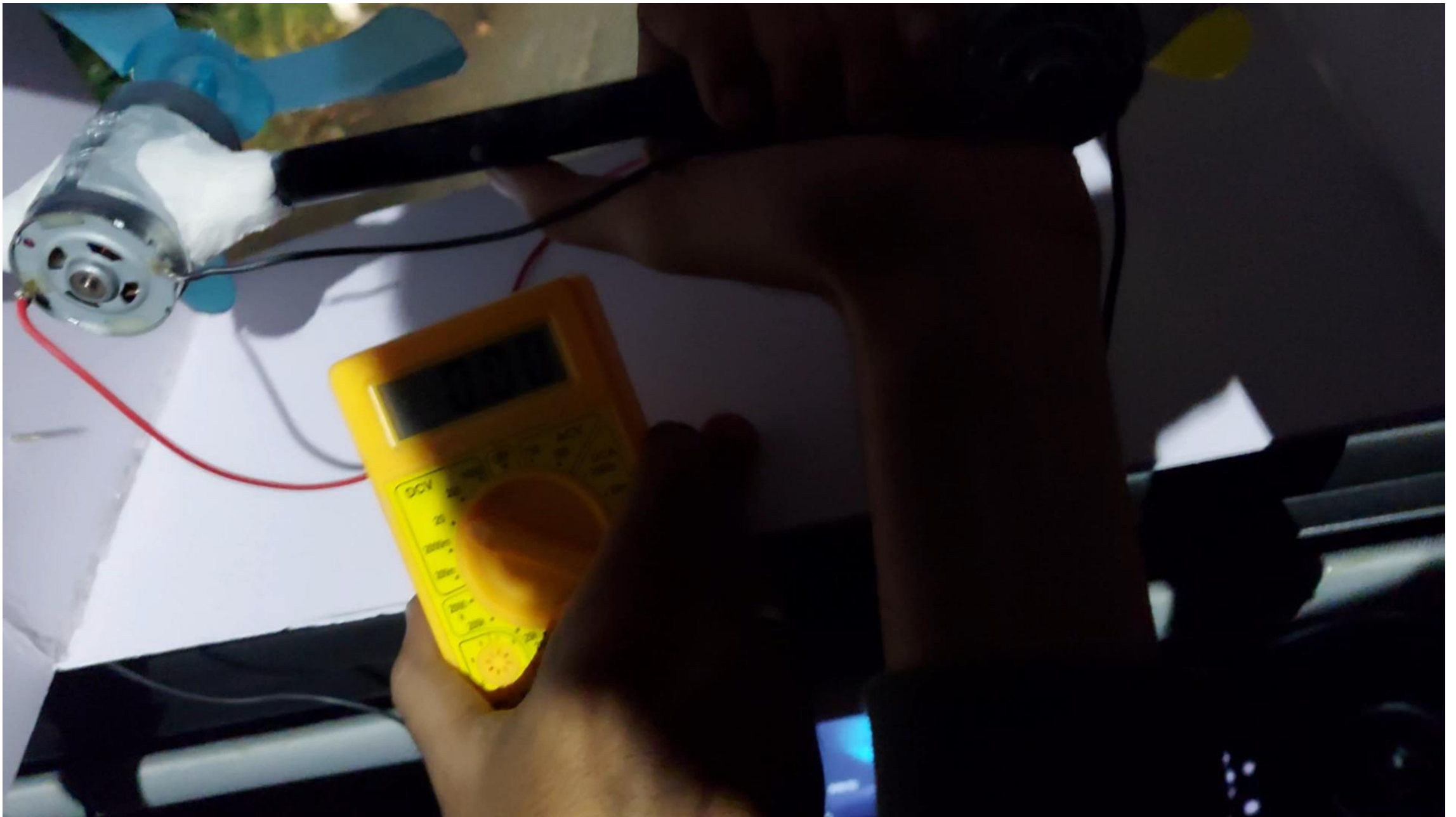
NOTE:- this is not the actual prototype of what we are implying, this is a model(research model) to represent the working concept and proof of concept.

Prototype/Proof of concept

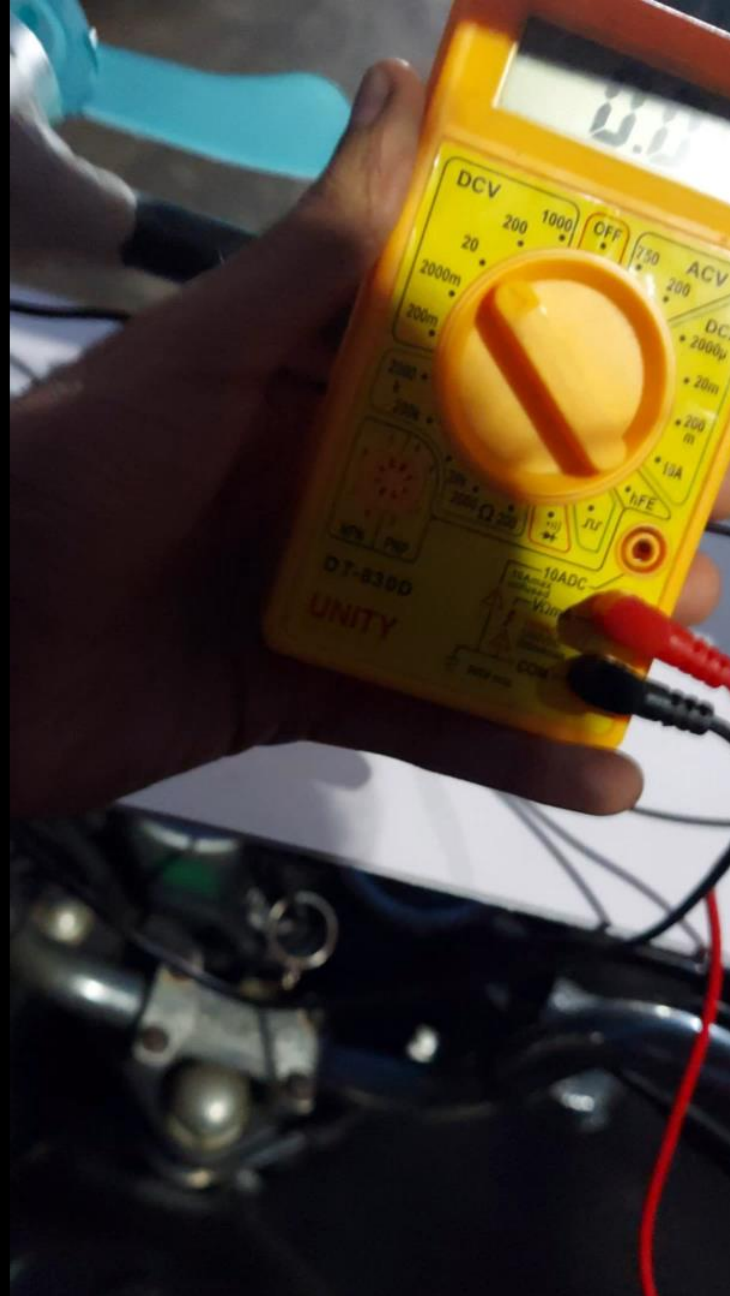
- Here I attach the videos and images of the conducted test.



NOTE:- this is not the actual prototype of what we are implying, this is a model(research model) to represent the working concept and proof of concept.



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Prototype/Proof of concept

- In the first video, we kept the model in the rooftop of the car and observed the voltage it produced at different speeds.

- At 50kmph - 15 volt
- At 40kmph - 13 volt
- At 30kmph - 10 volt
- From 10 kmph to 30 kmph – 4 to 11 volts.

Since these dc motors are not specifically made for generator purposes, they have high torque, so at low wind speed they didn't start to rotate.

- The wind speed was about 14kmph (at rest).
- This model is only built to verify the working of idea, and it worked, so the actual prototype may even work better with proper generator.

NOTE:- this is not the actual prototype of what we are implying, this is a model(research model) to represent the working concept and proof of concept.

Technical Details and Reports

- The model consisted of 2 12v dc motors connected in series, and it's been kept in my car and tested in different speeds. The details are as follows:-
 - At 50kmph - 15 volt
 - At 40kmph - 13 volt
 - At 30kmph - 10 volt
 - From 10 kmph to 30 kmph – 4 to 11 volts.
- The mileage isn't a factor in the conducted research as the model wasn't heavy enough or didn't exert any big opposing force
- Details of the research:-
 - Wind speed:- normal – 14km/h
 - Temperature:- 22 deg Celsius
 - Start / End time:- 18:36 pm to 18:40 pm
 - Max voltage generated – 16 volts at 52 kmph (didn't tested it past 55kmph)
 - Min voltage generated – 4 volts at 10 kmph
- So, with dc motor, which is not an efficient generator, we got the above outputs, it can be efficiently increased if an actual generator with less torque and with more power output is used. So thus, the research was conducted with a basic model.

Technical Details and Reports

- The efficiency of main model can't be determined as we didn't develop an actual generator due to short period of time, so I hope it would be efficient if we use a good generator and air venting system.
- The battery capacity changes from car to car, same kind of generator can't be used for all cars.
- With the conducted research, 15 volt produced at 50kmph by 2x12v dc motors, so its 50% efficient (roughly) at an average speed of a car. At the same speed we can even generate a good amount electricity with a generator of high number of coil rotations and high magnetic field, since magnetic field and number of coil rotations is directly proportional to the amount of current a generator produces.

Future Plans/potential next steps

- When we install it in on an actual car it can be improvised like, only when the car goes on certain speed or more than that, this generator comes in action since the opposing force is directly proportional to cars speed, and when the car is in urban mode this grille can be closed so that it can be well maintained with no dust and water issues.
- Building an efficient generator is crucial step in the progress, right now I used dc motors as generators for the model, and It worked well, so next I would be building an actual prototype which can be installed in the car.
- A car with this system can be built, if the prototype works in an actual car.
- We still didn't patent this idea, so I guess patenting this would be my next step.
- Creating an all-new Electric Car with this concept will also be our goal.

Thank you



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