SMART CONVEYANCE FOR PHYSICALLY
CHALLENGED PEOPLE

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INTRODUCTION:
An automobile is a self propelled machine used on the ground for transportation of
passengers and goods from one place to another. There is a separate branch called Automobile
Engineering which deals with various aspects related to wide range of automobiles.
Automobile includes car, bus, truck, jeep, motorcycle etc. Automobile or Automotive refers to
one which itself can move. Today, of course, the automobile vehicle has become a basic
necessity. Business of making and servicing automobiles has become one of the biggest
businesses in the world. I.C engines are used in order to obtain motive power of the vehicle.
In recent years, huge changes are made in the design of automobiles to provide safety, ease of
operation, reliability, comfort and less fuel consumption.

In such a world where everything relies on transportation, there is no proper platform
for physically challenged people to commute independently. They have to rely on others to
complete their daily travel needs. There is great scope for automobiles customized specially
for physically challenged people. Hence we decided to design and develop a four wheeler
which helps physically challenged people who have no legs to commute easily without other’s
help.

We have designed in such a way that a physically handicapped person who has no legs
can easily move from one place to another without anybody’s help. They can go shopping,
they can go to a movie, they can commute easily to work etc. They can do this all, while
sitting on their wheel chair. Our vehicle has been designed in such a way that it can
accommodate the wheelchair and the physically handicapped persons can guide it inside our
vehicle all by them.

OBJECTIVE:

1. Physically handicapped people depend on the others for several works. By this project
   problem of dependency can be eliminated.

2. The safety of the person is most important while travelling from one place to another.
   Hence this gives maximum safety for disabled people by locking the wheelchair to the
   locking system.

3. Since this vehicle is driven by the disabled people, the drive of the vehicle must be
effortless. Hence it is made convenient to drive.
4. The cost of the vehicle manufactured by the automobile industry is always expensive. Hence the use of this vehicle is very minimum due to unaffordable price. So this car is designed and developed to disabled people in affordable price.

**METHODOLOGY:**

**Testing Of NANO**

We started off with designing the prototype model which was a very important task to us. We gathered all the required information and started designing. We designed it cautiously and took Tata Nano for reference. Since Tata Nano is the world’s cheapest car and India’s smallest selling car, we decided to choose it to keep our project car’s dimension in check. Moreover Tata Nano’s design is tried and tested. Hence if the dimension is kept similar, the testing stage could be eliminated as we had very limited funds to complete the project. Keeping this in mind we designed the car and after several fine tunes and changes, we finally came to a proper design with all the requirements. We then started searching for a place to carry out the project work. We were successful in getting a place for ourselves at G.M. Engineers at Peenya Industrial Area, who helped us a lot in completing the project successfully. We listed all the materials required and started purchasing them in stages. We started the project by first building the chassis for the vehicle.

**Chassis**

We then incorporated the wheels to the chassis. Initially we attached 16 inches spoke wheels. Why spoke wheels? In any wheel, it’s the tyres that come first while absorbing the shocks. And in case of spoke wheels, the flexible property of the spokes play important role in absorbing shocks next to the rubber of tyres.

**Wheel Mechanism**

We ran into a problem of ride height. 16 inches wheels were too high for the physically challenged to get in and out with a wheel chair. Hence we had to reduce the height at the back side since it’s where the ramp would be made. We attached the 8 inches wheels at the rear and the ground clearance was considerably reduced.

**Steering Mechanism**

We then started to make the steering mechanism which was one of the major designs in our project. We needed to incorporate handle instead of a steering wheel which was a very challenging task to our team. We used the design of a go-kart steering mechanism so that it’s easier for a physically challenged person. We gave brakes, accelerator and other switches on the handle bar itself.

**Engine and Gearbox**

We had to make a very effective power train for our vehicle. We chose 110cc 4-stroke petrol engine with CVT gear box for easy drivability. Giving a manual gearbox would be very useful at times but it would be very difficult to a physically handicapped person to operate everything at once. Hence we chose automatic CVT gearbox to make it easier. We placed the Engine on the front right corner. Reverse gearbox was very important and it’s not easily available with such a small displacement engine. Hence we took a gearbox from Bajaj Auto Rickshaw and incorporated it to our vehicle so its usability is increased. It comes in very handy at all times. It’s mandatory for a four wheel vehicle. Now connecting from engine to the rear wheel was a very difficult task. We have many types of power transmission like chain driven, belt drive, shaft driven etc. Shaft driven is widely used in big vehicles. But it would
eat up the floor space as there was a need for a differential. We needed flat floor for movement of wheelchair. Belt drive is costlier hence we chose chain driven. We used sprocket to connect the chain from engine to the rear wheel. We ran into two major problems. One was that speed was way too much. Secondly the chain was slipping from the sprocket as the distance was more. We had to reduce the speed and the distance so we used different sprocket set and reduced the speed to one fourth of the actual speed. And we placed a chain tensioner so that the chain is tightened and it doesn’t come off the sprocket.

Ramp Mechanism
We then came to the ramp part. The ramp is a major part of our project. We had to make the ramp in such a way that it should accommodate the movement of wheelchair. We had to make a mechanism to open and close the ramp from outside as well as inside. We then planned to make a coiling drum which coils a steel rope which in turn connected to the ramp through a pulley. When the drum is operated in anticlockwise direction the ramp closes. When the drum is operated in clockwise direction it opens. The drum is placed at such a strategic location that it can be operated from outside as well as inside even while sitting on a wheelchair.

Body of the Vehicle
Our next major task was to build the body of the vehicle. The body of any vehicle should be light in weight yet sturdy hence we decided to put fiber glass as body panes since it is very light in weight compared to sheet metal. For the strength and safety we built safety pillars similar to the A-pillar, B-pillar, C-pillar of a car. We provided angular rods to serve this purpose. This is as safe as that of any other passenger cars. We covered the entire body with fiber glass with 30% visibility. For the front windshield we used clear and 100% transparent fiber glass which is completely unbreakable. For the flooring we have used plywood which is long lasting and even takes heavy loads and does not deform under sudden shock loads.

CONCLUSION:
Main objective of our project is to transform the life of physically challenged people in this modern world. Today everyone is caring about their own life, leaving these kind of people alone and unattended. So we decided to make some changes to their life and we designed and developed the whole project, especially for the challenged ones in their life who have no legs. The project was a real challenge for our team, and completing it is a great success. Our car, HOPE, was designed, implemented and tested successfully which is a boon for the physically handicapped person who has no legs. Now even they can enjoy comfortable and luxurious life as a normal person while being independent.

FUTURE WORK:
1. Battery and Solar operated vehicle for the disabled.
2. Smart unfolds of the rear door which is used for wheel chair accommodation.
3. Advanced Auto gear shift to enhance power.
4. Additional Cameras and Sensors for added safety.
5. Airbags and ABS for Passenger safety.
7. Pneumatic/Hydraulic suspension setup for increase and decrease of ground clearance when required.
8. Additional seats to accommodate more passengers.
9. Air Condition system for comfort.