

AIRBAG SYSTEM FOR TWO-WHEELER VEHICLE SYSTEM

**A MINI PROJECT REPORT
SUBMITTED BY**

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In partial fulfillment for the award of the degree of

BACHELOR OF TECHNOLOGY

IN

MECHANICAL ENGINEERING

Under the supervision of

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**Department of Mechanical Engineering
KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE: WARANGAL**

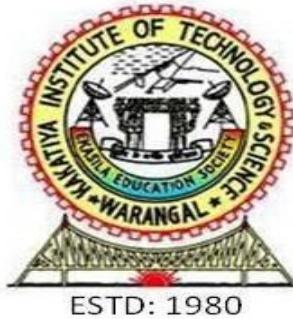
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DEPARTMENT OF MECHANICAL ENGINEERING

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CERTIFICATE

This is to certify that G.SAI SHASHANK (B18ME008), M.NIKHITHA (B18ME009), E. VAMSHIDHAR REDDY (B18ME011), has carried out the Bonafede Mini project report entitled, "**AIRBAG SYSTEM FOR TWO-WHEELER VEHICLE SYSTEM**" in partial fulfillment of their Requirement for the award of the degree of Bachelor of Technology in Mechanical Engineering.

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ABSTRACT

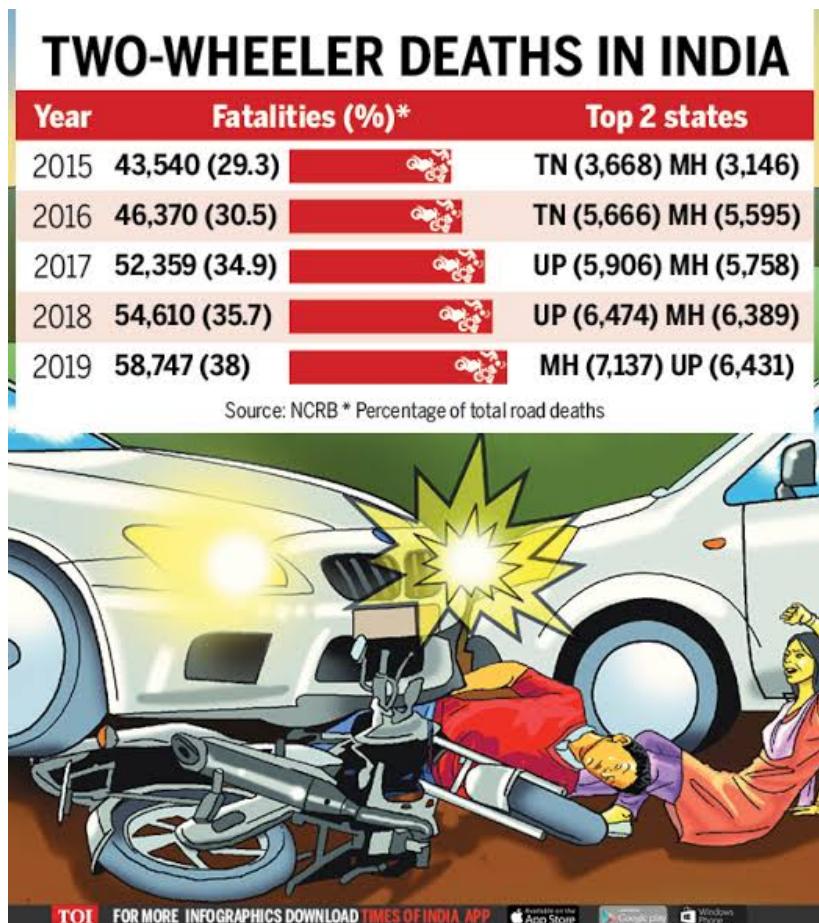
The concept of this airbag system is “To reduce the injuries to a rider when impacting with an opposing vehicle and/or opposing object in frontal collisions by absorbing rider kinetic energy and by reducing rider separation velocity from motorcycle in the forward direction.” With the help of the ANGLE sensor with an angle indicator and airbag control unit and the large frequency vibration for to open the air bag. Airbags in cars operate by using the steering handle and dash as a support with which to oppose the force of the person being propelled forwards. On a two-wheeler there is no such support, So by extending a large airbag upwards in just 0.04 seconds, the driver will be protected through a combination of the bag and the support of the vehicle/hard object they collide with. There is usage of the battery of bike for working system. The research will also include the working, construction, installation, and the problems regarding airbags. Some of the limitations use in deploying airbags is that two-wheeler riders are less likely to be in a fixed area with respect to the airbag at the point of accident and the lack of supporting surface. The nature of such impacts will be analyzed in the simulation for the proposed airbag system to estimate the head accelerations when the initial contact with the airbag is during the deployment time.

Keywords: Airbag, Two-Wheeler Automotive, Impact, Design, Analysis, Injuries.

1. INTRODUCTION

The term airbag concept came from four wheeler. The concept of this airbag system is to reduce the injuries to a rider when impacting with an opposing vehicle. Airbag system is also used in two-wheeler with help of crash sensor, inflator, angle sensor and with an angle indicator and sense of the collision and the vary difference in the vibration to open the air bag.

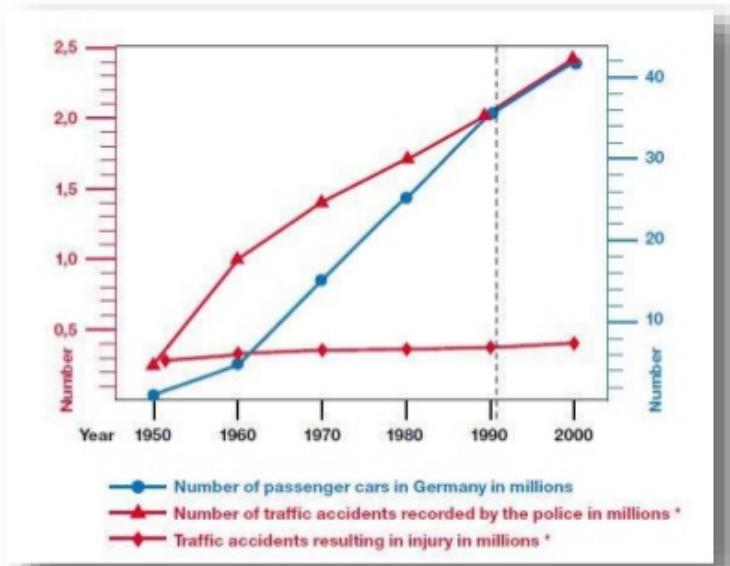
The two wheeler death rate of India is increasing drastically from 29.3% in 2015 to 38% in 2019, this is not a small number in order decrease this number we can add the air bags to the motorcycle such that it may come down hence this can reduce the death rate by 8% to 12%. In four-wheeler the operation is based on the impact of two vehicles or accident of another object.



In the two-wheeler system there is attachment of the airbag system in between and at both sides of the motorcycle and also in the front at the back of the fuel tank, whereas in the scooty there is an installation of three air bags which is under the dashboard and to the side wards and these operates based upon the angle sensor on either sides and also crash sensor which for the front air bag .

There is usage of the battery of two-wheeler for working of system. There are two cases when system runs by both the Angle difference calculation and collision of the two bikes or by the any collide of bike with any object with the help of crash sensors, angle sensors, inflators and battery.

Graph >> Accidents occurs yearly in Germany



1. How Does Airbag System work? -

The airbag system is one of the most important parts of your vehicle's safety components. Airbag deployment has saved thousands of lives through the years. But how exactly do they work? The airbag system is extremely complex and needs to activate within milliseconds after a crash occurs to ensure the protection of the driver and passenger's life's.



There are following instruments used for the two wheeler Airbag system:-

1.1.1 Air bag

1.1.2 Design of strong leather grip technology air bag

1.1.3 Sensors

1.1.4 Angle sensor:

1.1.5 Chemical reactions:

1.1.6 Inflator:

1.1.1 Air bag:

Air bags are stretchable textures or different materials that are firmly pressed in different area all through your vehicle. These packs are compacted and kept in a little territory. When there is a mishap, the airbags top off with air rapidly to give a cushioning framework to individuals on the cruiser so they are not tossed around in case of an accident..

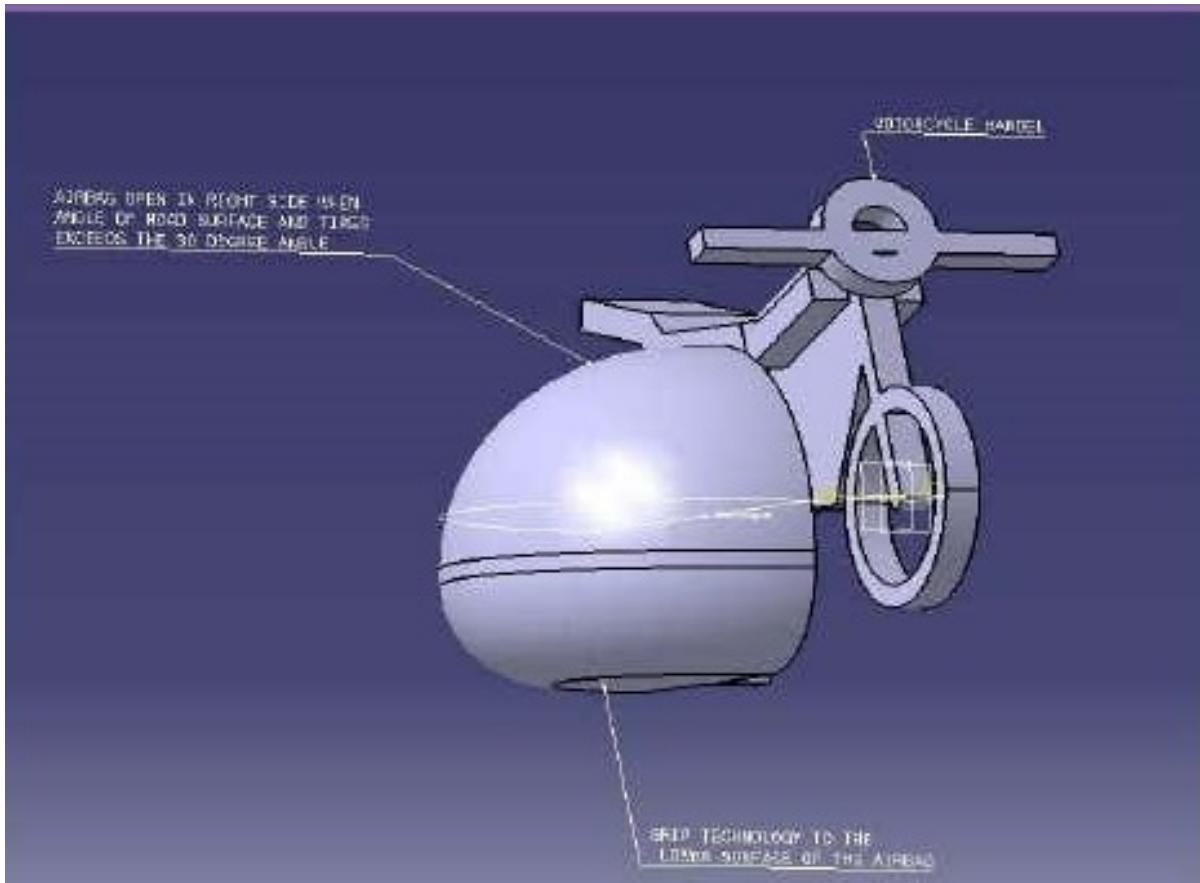


An airbag is a vehicle inhabitant limitation framework utilizing a pack intended to swell incredibly immediately, at that point rapidly empty during a collision. It comprises of the airbag pad, an adaptable texture pack, a swelling module, and an effect sensor. The reason for the airbag is to give a vehicle inhabitant a delicate padding and limitation during an accident occasion. It can lessen wounds between the thrashing inhabitant and the inside of the vehicle.



1.1.2 Design of strong leather grip technology air bag:

Generally the materials used for air bags are woven nylon fabric and these are made in different sizes and shapes according to the requirement of the vehicle, the air bag required to this concept is slightly different from what we seen earlier because these are slightly thin and various grips in order to get resist from scratch and drag from different force applied on it whenever the motor cycle bend to one side this will play the role. Especially in case of accident happened due to the cornering. These air bags are completely custom designed air bags with specific material and shapes where it will not be available in the market.



1.1.3 Crash Sensors:-

The main pieces of the achievement of the airbag framework are the sensors. These little bits of gadgets are intended for when the vehicle has been harmed in a mishap. They react to a few distinct arrangements of issues including unexpected stop of the bike, expanded pressing factor as bits of the bike are moved because of the power of the crash, and point between street surface and tires of bike. Various kinds of sensors estimating wheel speed, seat inhabitant status, brake pressing factor and sway, and other vehicle status markers are checked by the airbag control unit situated in the front bit of the lodge.

The sensors hand-off signs to the airbag control unit, which examines the information and can organize wellbeing highlights like safety belt lock, programmed entryway locks, just as airbag organisation.

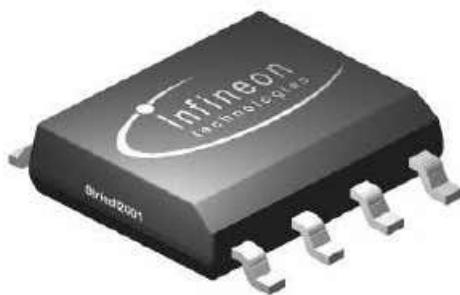


GT-93 Crash Sensor

There are two sorts of airbags sensors in car are electrical and mechanical. Electrical sensors fluctuate in plan. Some utilization an electromechanical ball and cylinder system, which fundamentally comprises of little cylinder comprising a circuit switch and ball that is held togetherby a little magnet. On the off chance that a crash happens the ball is opens from the magnet and moves forward in tube, hitting a switch that finishes the electrical circuit. Mechanical sensors work free of the electrical framework and react correspondingly to the electrical sensors, the accomplishment of the air pack depends on the accident sensors working or on exact as well as outrageous rapidly. thus, the most costly and mechanically progressed part of the airbag framework is put in the sensors.

1.1.4 Angle sensor:

The TLE5012B is a 360° point sensor that follow the direction of an attractive field. This is accomplished by estimating sine and cosine point segments with solid incorporated Giant Magneto Resistance (iGMR)elements. High accuracy point esteems are accomplished over temperature and lifetime utilizing inward autocalibration calculation. Information interchanges are refined with a bi-directional SSC Interface that is SPI viable. The point sensor will run when the sensor is initiated then it will gauge the point between street surface and the tires of the bicycle. This marker will give signal about the degree in which the bicycle will turn/slant. At the point when the point is under 30 degree to one side or the left side, at that point the point sensor will convey the message to inflators and the inflators will dynamic subsequently the airbag will be opened on the particular side of the bicycle on which side the bicycle is twisted ,this point sensor assumes a significant part in ensuring the knees and significant wounds to the driver.



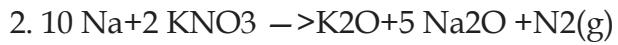
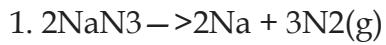
angle sensor (TLE5012B)

1.1.5 Chemical reactions:

Inside the airbag there is a gas generator combination of NaN₃, KNO₃, and SiO₂. At the point when the vehicle goes through a head-on impact, a progression of three compound responses inside the gas generator produces gas (N₂) to fill the airbag and convert NaN₃, which is profoundly poisonous, to innocuous glass. Sodium Azide (NaN₃) can deteriorate at 300°C to deliver sodium metal (Na) and nitrogen gas (N₂). The signal from the affirmation sensor touches off the gas generator combination by an electrical drive, making the high temperature condition vital for NaN₃ to decay.

The nitrogen gas that is produced then fills the airbag. The motivation behind the KNO₃ and SiO₂ is to eliminate the sodium metal which is exceptionally responsive and conceivably touchy by changing it over to an innocuous material. In the first place, the sodium responds with potassium nitrate (KNO₃) to deliver potassium oxide (K₂O), sodium oxide (Na₂O), and extra N₂ gas. The nitrogen in the subsequent response likewise fills the airbag and the metal oxides respond with silicon dioxide (SiO₂) in the last response to deliver silicate glass, which is innocuous and stable. First period metal oxides, for example, Na₂O and K₂O are exceptionally receptive so it is risky to permit them to be protected finished result airbag explosion.

The consuming charge creates idle gas which quickly blows up the airbag in roughly 20 to 30 milliseconds. Airbag frameworks contained a combination of sodium azide (NaN₃), KNO₃, and SiO₂. For instance, in a vehicle a regular driver-side air sack contains roughly 50-80 g of NaN₃, with the bigger traveler side airbag containing around 250 g. Inside around 40 milliseconds of effect, every one of these segments respond in three separate responses that produce nitrogen gas. The responses, all together, are as per the following:



Calculation of the amount of gas needed: Nitrogen is an inert gas whose behavior can be approx. As an ideal gas at the temperature and pressure of the inflating airbag. Thus, the ideal gas law provides a good approximation of the relationship between the pressure and volume of the airbag and the amount of N₂ it contains.

$$\mathbf{PV=nRT}$$

Where ,

P is the pressure in atmospheres.

V is the volume in liters.

n is the number of moles of gas.

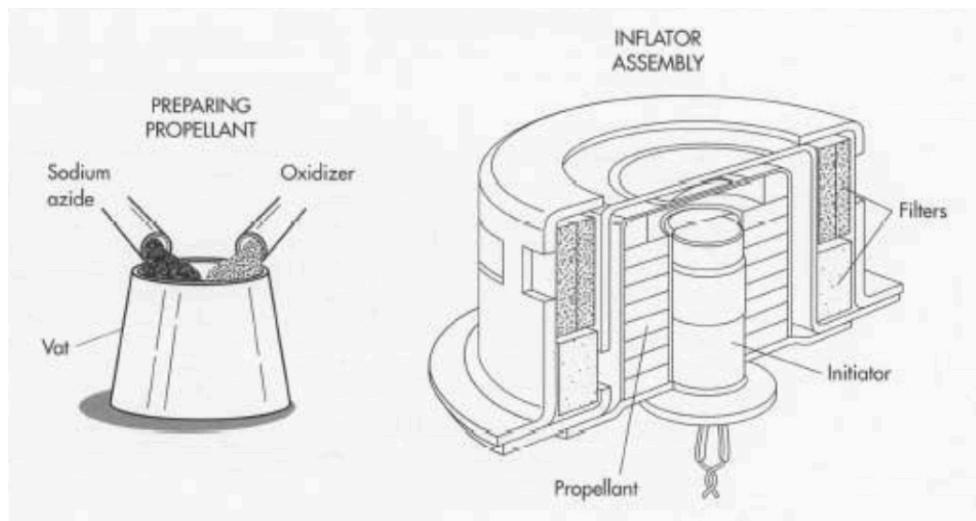
R is the gas constant.

T is the temperature in kelvin



1.1.6 Inflator:

When the control unit decides there is an accident , it conveys a message to the inflator framework. The Inflator sets off a synthetic charge, delivering a blast of nitrogen gas. Inflators produce an amount of gas with a specific structure and temperature at a controlled rate, which at that point fills the airbag framework to adequately pad a vehicle inhabitant from certain injury situations. This cycle occurs in only moment inside 25 to 50 milliseconds. That means 200 miles each hour. The airbag then will flatten itself all alone once it sends naturally.





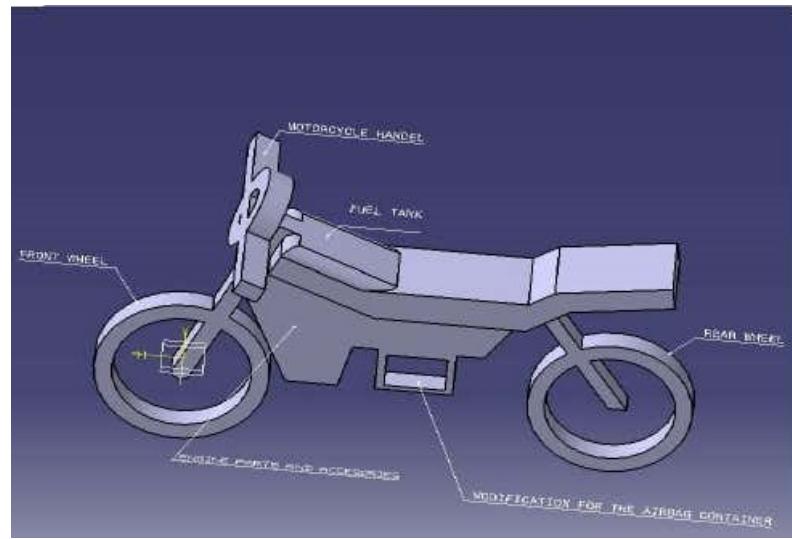
IMPLEMENTATION PROCESS:

A part of the restrictions found in passing on airbags are that bicycle riders are less disposed to be in a settled territory in regards to the airbag at the motivation behind impact and the shortfall of supporting surface. To overcome that issue the rollable iron strip is fixed behind the air bag for scooty such that whenever the air bag explode the iron strip will act like the support for not to bend beyond it this is the only way and simple way to overcome that issue. There are some specific ways to implement these iron strips at the notch of the air bag.

There is separate process for implementation air bags in the bikes and scooty.

FOR BIKE:

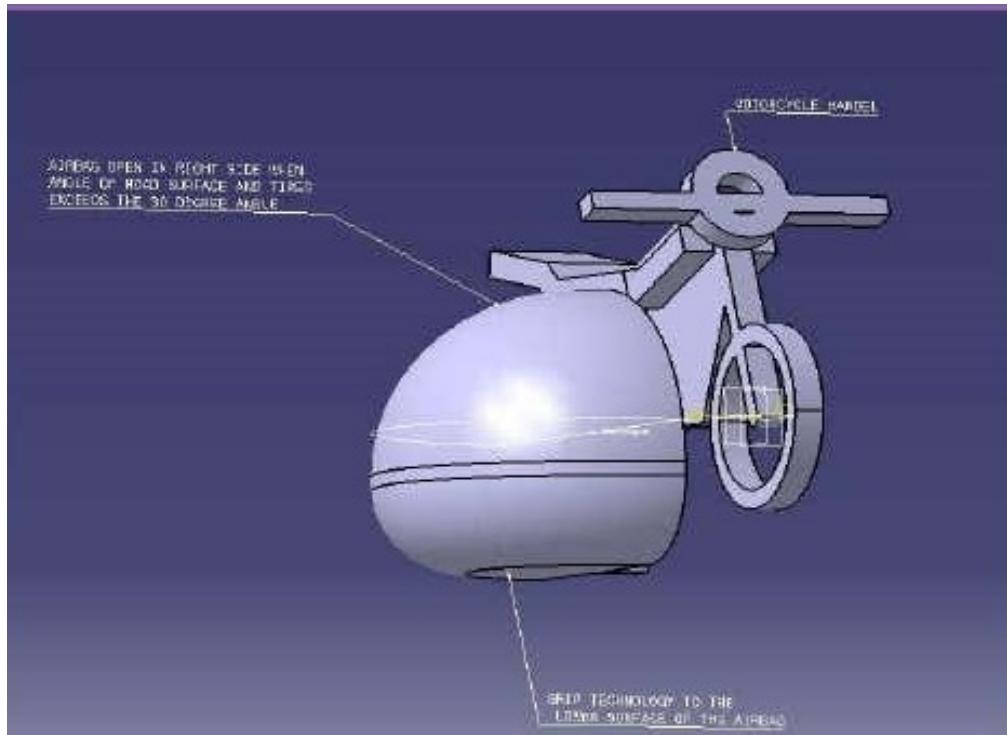
There is a small modification in the bike such that the complete air bag module will be fixed. This modification consists of iron box made up of iron strips with a door opening and closing. Door plays a major role in the air bag system where it needs to open whenever the accident or collision occurs. This iron box modifications is on both side of the vehicle.



The above design describes a normal two-wheeler vehicle

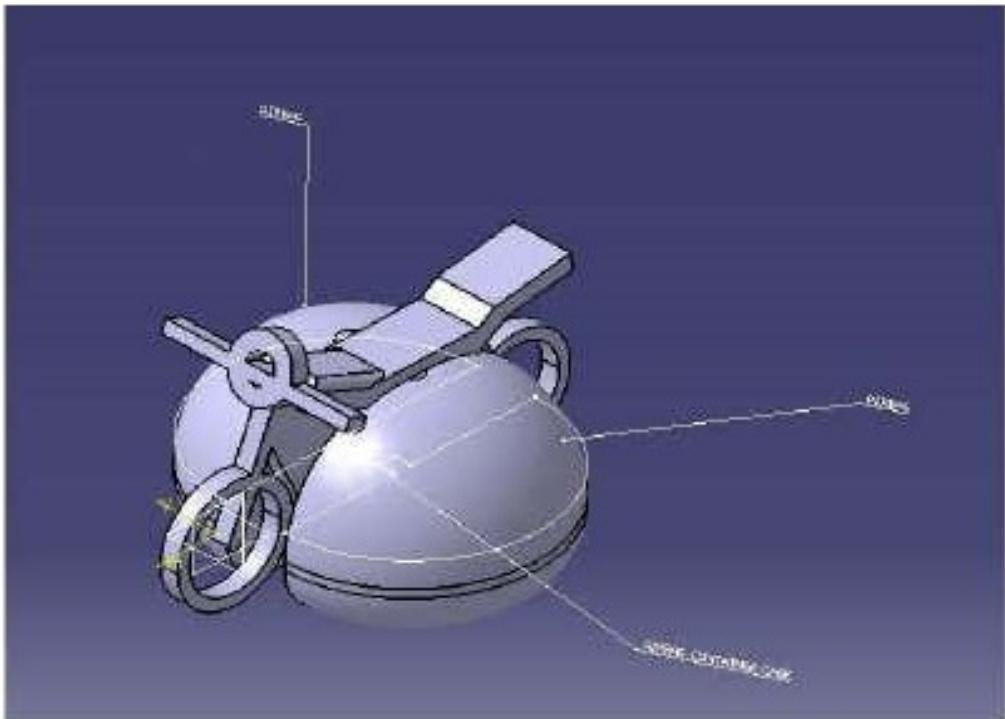
In this air bag system angle sensor plays a major role from inessential opening of air bag and this angle sensor is placed under the fuel tank such it will have good protection and from the water and dust. angle sensor must place in the Centre of line of the chassis of the motorcycle.

When rider is doing the cornering if it goes wrong means that if the motorcycle exceeds the angle more than 30 degrees and the rider is unable to control it means the degree will decrease automatically and angle sensor detects the angle and side then above given chemical reactions takes place very quickly and the air bag opens in 25-50 milliseconds of time to respective side either to right side or left side.



The above design describes the openenig of air bag when rider is about to slip out the balance

The crash sensor is placed in the front near the front tire where that is the place comes into the contact to another object if collision occurs ,same like the crash sensor is placed back of bumper in cars in that way in the motorcycle it is placed in the same place .For installation of this crash sensor near the front tire some modification need to be done to place the crash sensor and also protector need to be placed such that it won't activates the crash sensor whenever the bumps occur .

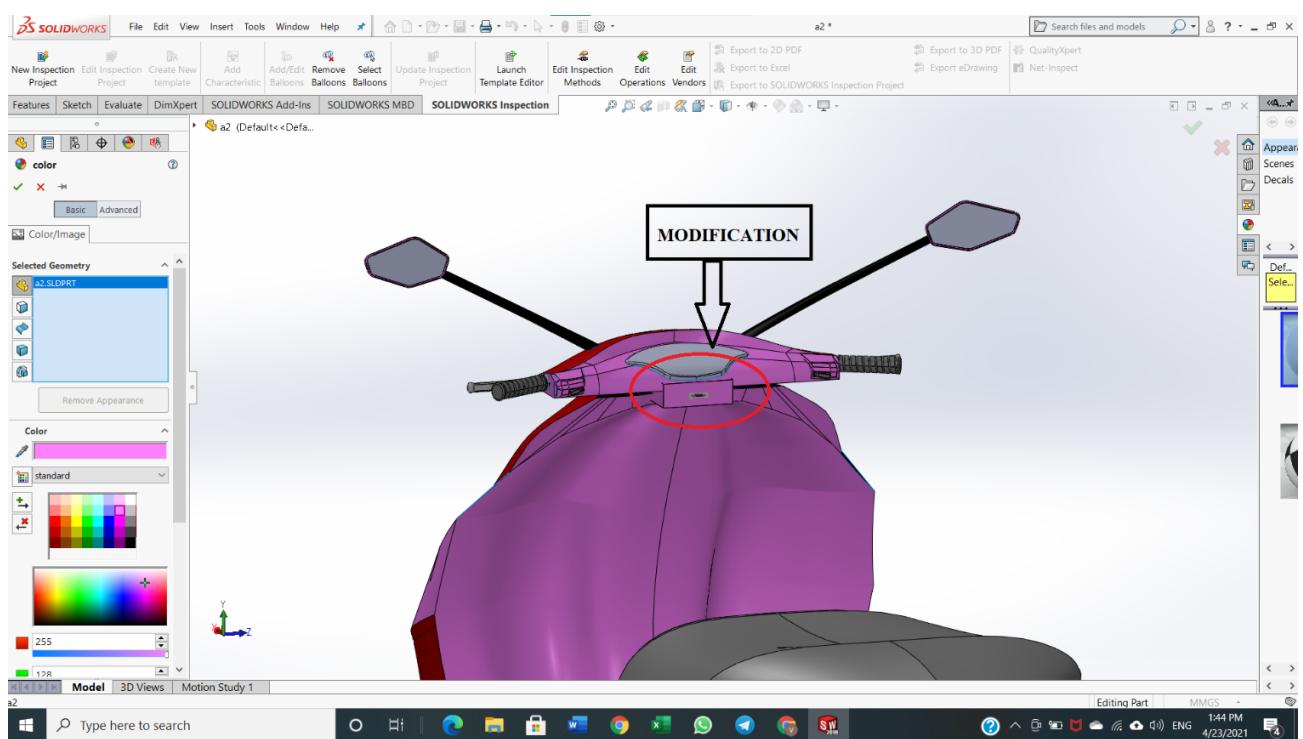


The above picture describes that the vehicle hit to an object so both the air bags opened.

If accident or collision occurs then the crash sensor detects it and sends the signal to inflators, the inflators set off a chemical charge, producing an explosion of nitrogen gas, filling up the airbag on both sides so that the rider does not lose the stability and the air bags will protect the rider from the dangerous injuries and scratches. This all process will be done in fraction of seconds that is around from 60-65 seconds. The time is little bit high because of larger are of the air bag that the volume of the air bag is around 150L-160L .

FOR SCOOTY:

In scooty there is infinitesimal modification need to done under the dashboard as show in the below figure . In this modification consists of air bag, chemicals, sensors, rollable iron strips and doors which are free to open from inside and difficult to open from outside where the torsion springs is used. The rollable iron strip is fixed behind the air bag for scooty such that whenever the air bag explodes the iron strip will act like the support to it.



In this air bag system angle sensor plays a major role from inessential opening of air bag and this angle sensor is placed under the boot space such it will have good protection and from the water and dust. Angle sensor must place in the Centre of line of the chassis of the scooty.

When rider is doing the cornering if it goes wrong means that if the scooty exceeds the angle more than 30 degrees and the rider is unable to control it means the degree will decrease automatically and angle sensor detects the angle and side then above given chemical reactions takes place very quickly and the air bag opens in 25-50 milliseconds of time to respective side either to right side or left side.

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If accident or collision occurs then the crash sensor detects it and sends the signal to inflators, the inflators set off a chemical charge, producing an explosion of nitrogen gas, filling up the airbag on both sides so that the rider does not lose the stability and protect the rider from the injuries.

If the speed is low and hit to an stationary object, then the crash sensor will send the signal to the inflator and inflator do the rest work the driver will be come towards the front at that time the front air bag will open due to the signal passed by the crash sensor and driver will be safe this scenario is show in below figure



LITERATURE REVIEW:

The initiation of the airbag dates to the 1950s when a modern designer who had worked in the US Navy met with a mishap while he was driving with his family ready. His name was John W.Hetric. Despite the fact that he and his family didn't get truly harmed in the mishap, yet this drove Hetrick to understand the requirement for a gadget that can guarantee the wellbeing of the travelers in the collision.



Subsequently, bringing his Navy designing experience to work he created models for a 'wellbeing pad gathering' for vehicles. His plan comprises of an inflatable pack associated with a tank of compacted air. The packs were situated inside the controlling wheel, in the dashboard or close to the glove box. The plan utilized a spring arrangement to detect any effect which incites the valves in the compacted air tank, delivering the air into the sack and blowing up it.

Hetrick got his airbag configuration petitioned for a patent with the United States Patent Office in 1952 and got the patent by 18 August 1953. During practically a similar period, a German designer named Walter Linderer filed for a comparable patent with the German patent office and got it near a quarter of a year after Hetrick got his on 12 November 1953. The Only Difference Between Hetrick and Linderer's plan was that in Linderer's plan the airbags were impelled by guard sway or by the driver himself.



The first government fleet to have airbags as a safety feature

Air packs have been ensnared in saving lives and diminishing dismalness related with engine vehicle crashes since their presentation during the 1970s in India. In any case, there is expanding proof appearance that air sacks can be a wellspring of injury and even demise in specific conditions. As the quantity of air pack prepared vehicles builds, air sack related wounds have happened all the more oftentimes. Along these lines, a more noteworthy familiarity with air sack related wounds is needed in criminological examinations. Here, we survey altogether the writing concerning air sack related wounds with unique respect to their temperament and causative instruments, and sum up air pack related wounds saw in grown-ups, youngsters and newborn children.

The airbags can diminish even half of traveler wounds in a fender bender. At the point when they are not utilized as expected, they can cause genuine wounds. There have been accounted for a few cases with lethal injuries. The primary point of this report is that to lessen the mishaps for vehicles as well as for the cruisers in an inventive way accordingly we can diminish the mishaps rate from 20% to 8% which is extremely large number yet additionally this is costly for assembling and furthermore for the establishment however there is no costly than life.



The First car to be domestically available with passenger airbags

Same like the air sack framework for vehicles numerous organizations began creating execution of air pack in bike since this improvement is under stage just and it isn't carried out in mid-range vehicle however this framework is exorbitant Honda advanced the new innovation that is Motorcycle Airbag System in much premium bikes ,Honda disclosed its creation bike airbag innovation in 2005, trailed by the delivery in 2006 of the Gold Wing Airbag, a creation bicycle outfitted with the world's first bike airbag. In the here and now Autoliv Inc.which is a Swedish-American auto wellbeing provider with deals to all driving vehicle producers overall is likewise imagined an air pack with an extremely novel plan as demonstrated beneath.

World
first



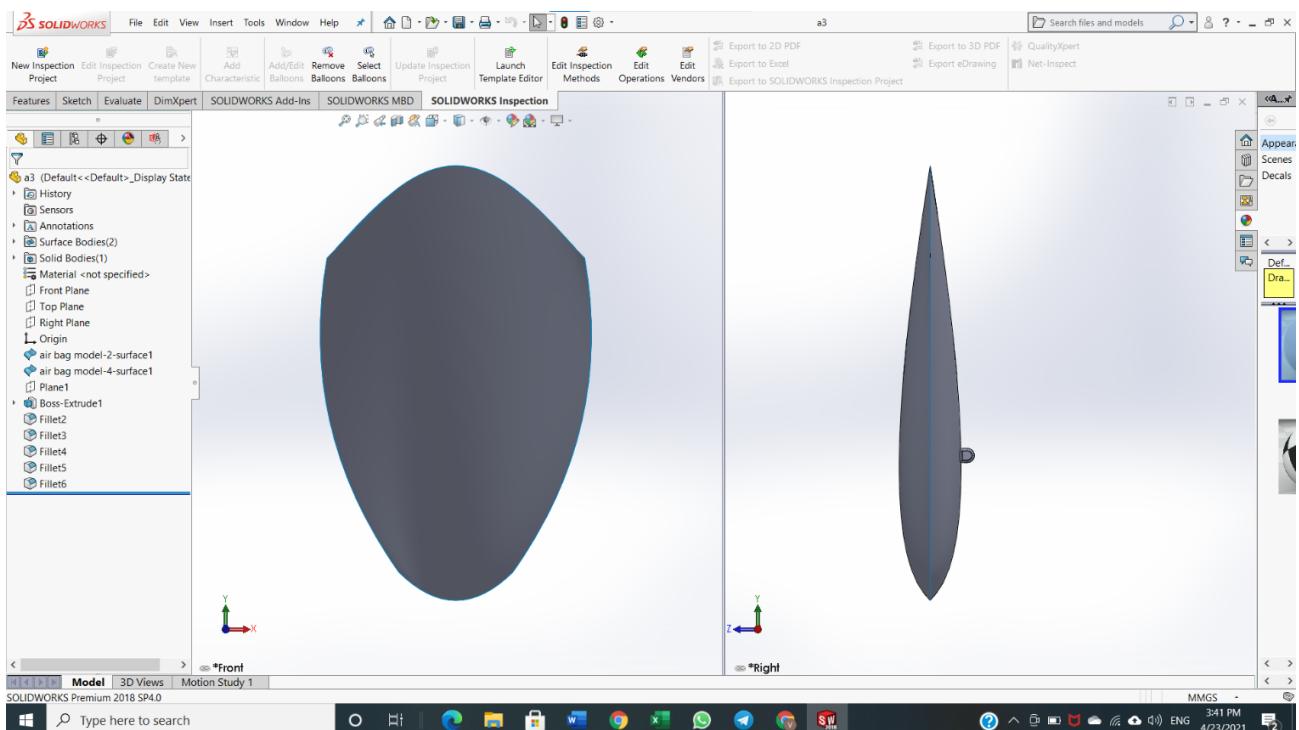
*The Gold Wing equipped with the Motorcycle Airbag System
(Airbag shown deployed)*



Autoliv Inc. two wheeler Airbag

DESIGN METHODOLOGY:

The design of air bag for two wheeler system is a challenging exercise since there will be no support to the front wards and to the besides for the air bag and also milliseconds comes under action to open the air bag in order to protect the rider from dangerous injuries and fractures. There are some limitations for this design methodology that the vehicle must be in economy and also with having the good amount of electricity in the vehicle, though if the speed of the motorcycle is more than the economy speed then driver must be able to bring the speed to economy speed by applying force on the brake and also must be in stable position just before the hitting to a object or just before the accident going to happen.



Nylon and polyamide are the only best materials present in the best price category and that it sustains the maximum force applied on it. As there is a chance of touching the

ground so to not to blast the air bag there is special plastic type layer is applied on it also the grips are added to side air bags at a specific location where the air bag touches to the ground at the initial stage of the accident such that it won't blast, and both the driver and vehicle will be away from any scratches and injuries.

The main function of this unique design of air bag is that the driver should not hit any damager and also that the airbags are very thick which are specially made only for the two-wheeler. If the rider hits to it the nylon airbag he or she should be in safe position and the airbag must not be like hard it must be smooth and able to generate the impulsion .When the air is filled in the air bag ,the air must not be filled completely there should be some gap so that it won't blast and also rider didn't feel like rocky substance .The air must be filled in the air bag so that the rider should hit the airbag and able to come back , at any cost the driver should not bounce fell out from the axis of the motorcycle .

USE OF SOLIDWORKS AS DESIGN SOFTWARE:

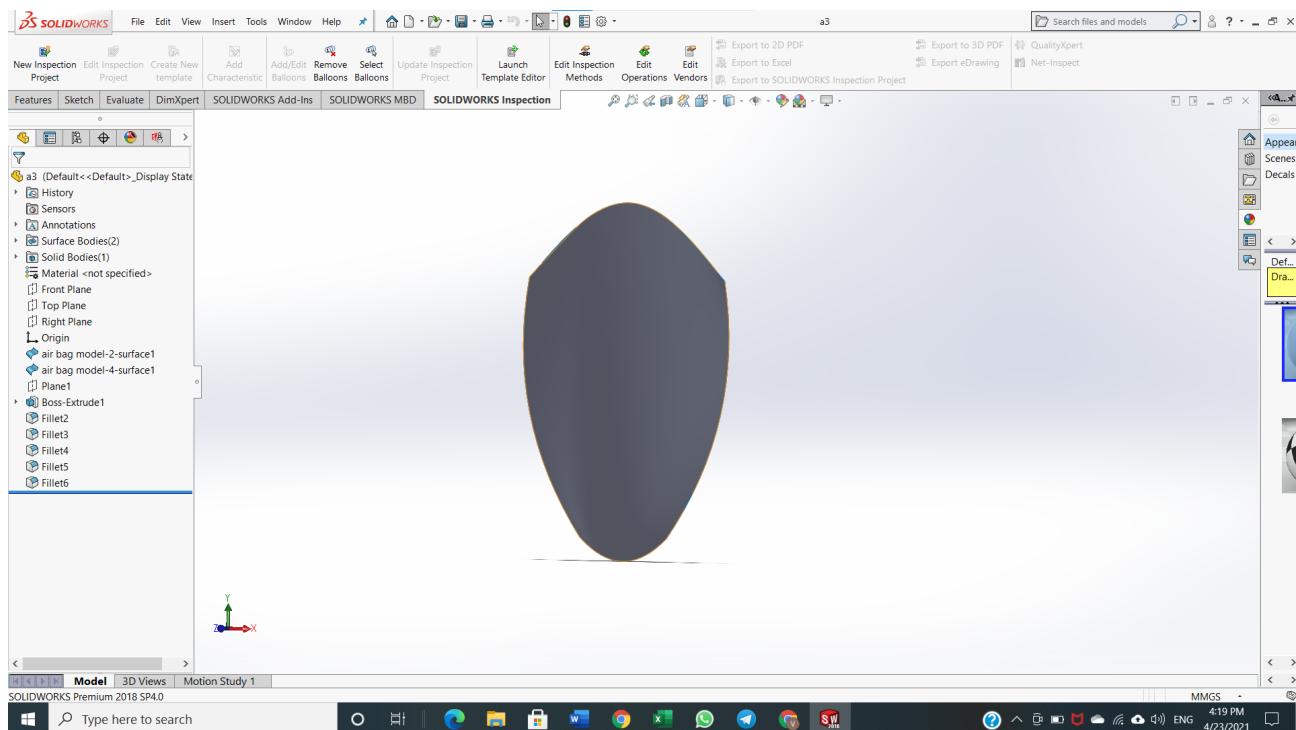
SolidWorks is a solid modeling computer-aided design and computer-aided engineering computer program published by Dassault Systems. This software has many tools which we can use and design the air bag in very short period of time.

Airbag models:

Airbag is the component which save the lives of common people on motorcycles during collisions. There are many different types of air bags of which different shapes some of the main air bags designed in solid works for the two-wheeler air bag system is shown below. There designs are especially made for the two-wheeler system and there are many unique designs for the motorcycle.

Front airbag:

- This airbag comes into play whenever the scooter hits the stationary or motion object it opens in milliseconds and protects the rider from injuries.

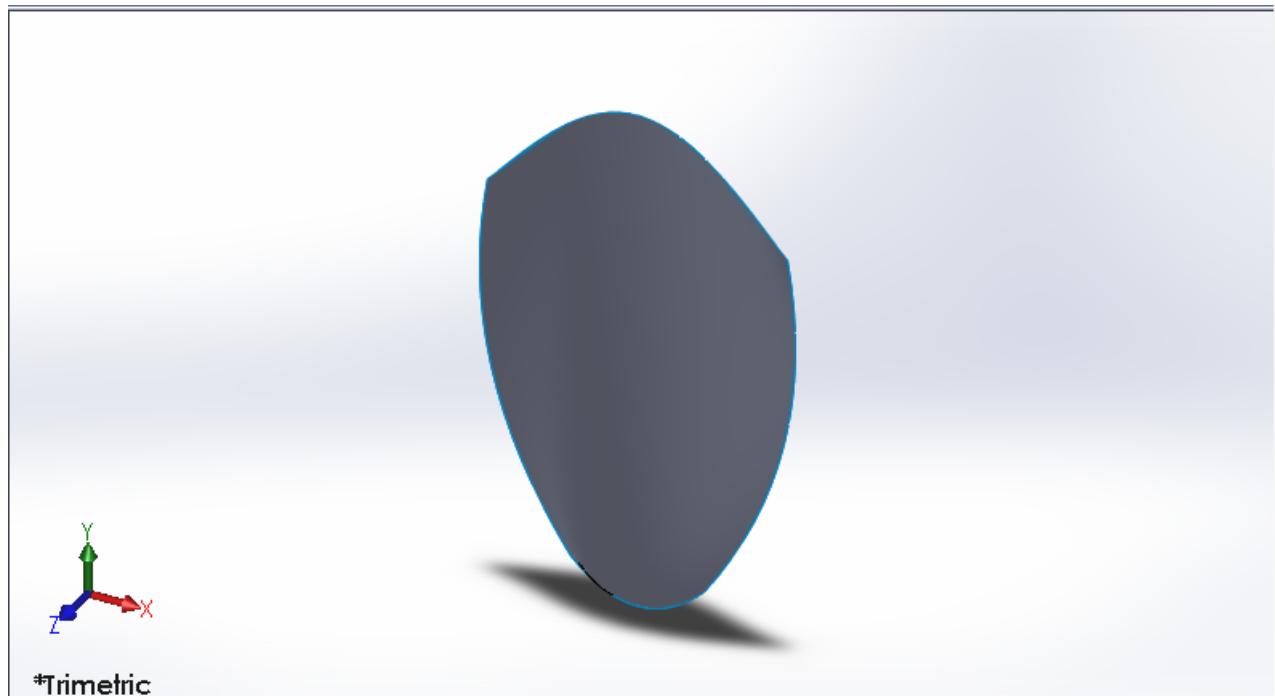


Dimensions of this airbag is :

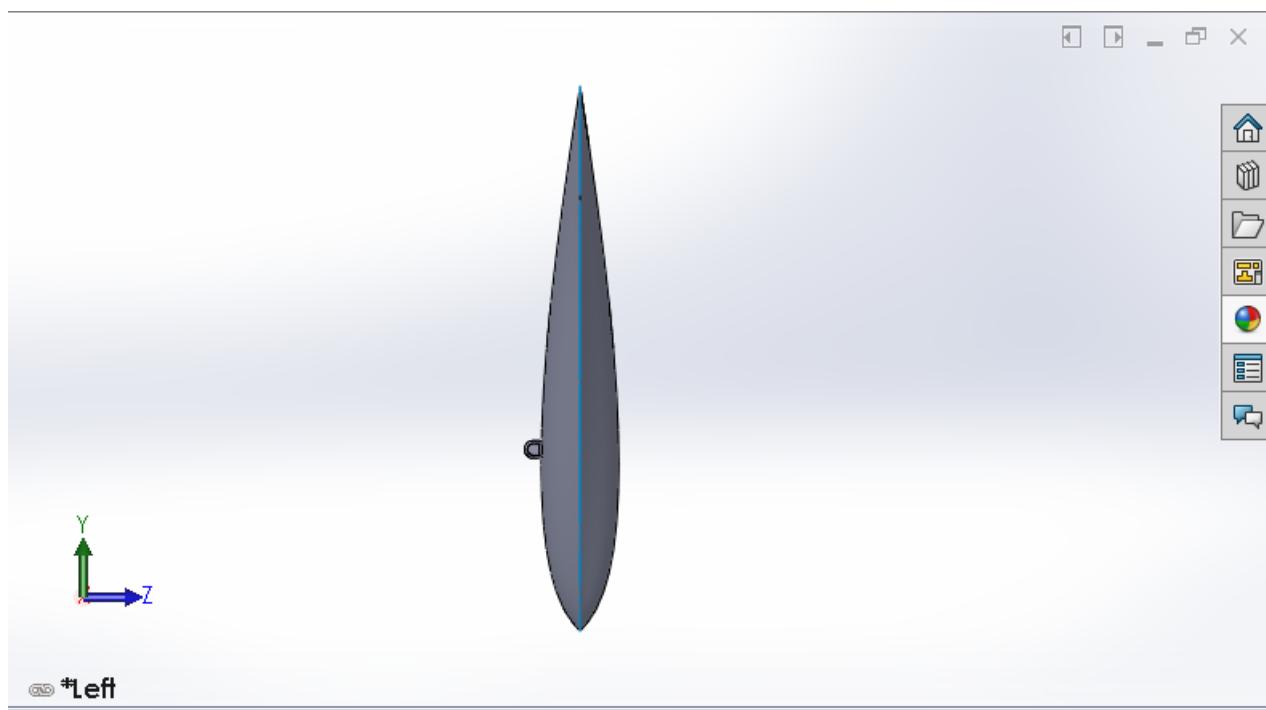
Length = 550 mm

Height = 930 mm

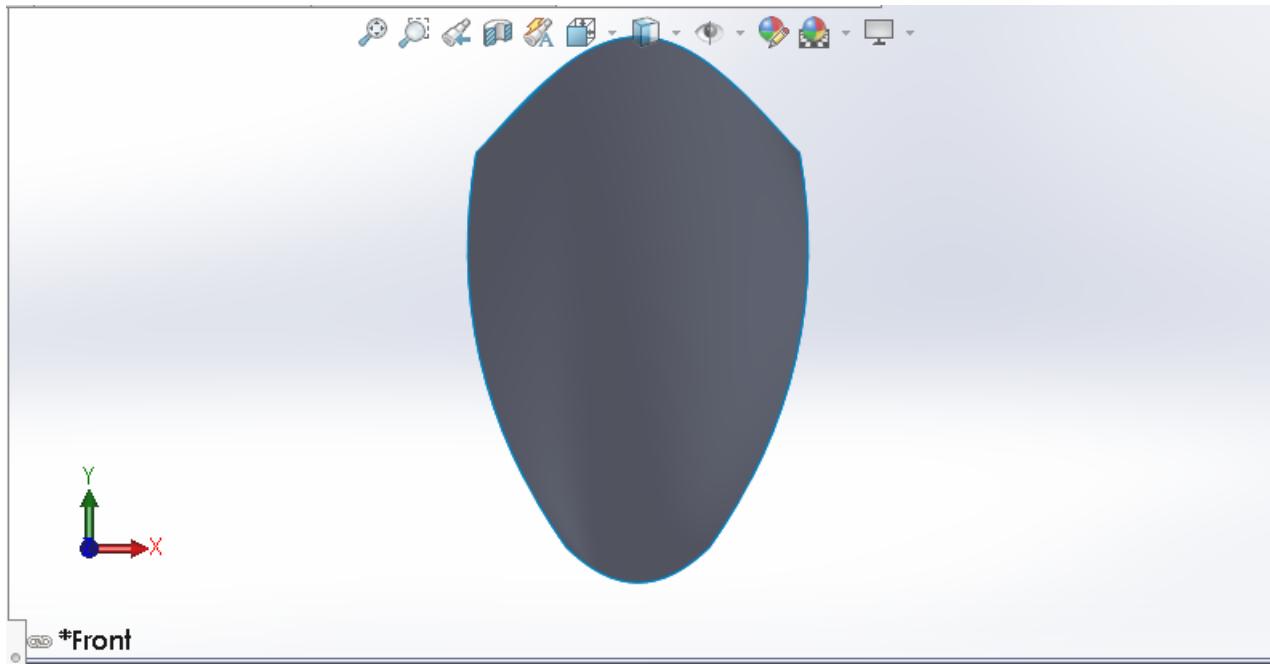
Width = 130 mm



Trimetric view of front airbag



Side view of airbag



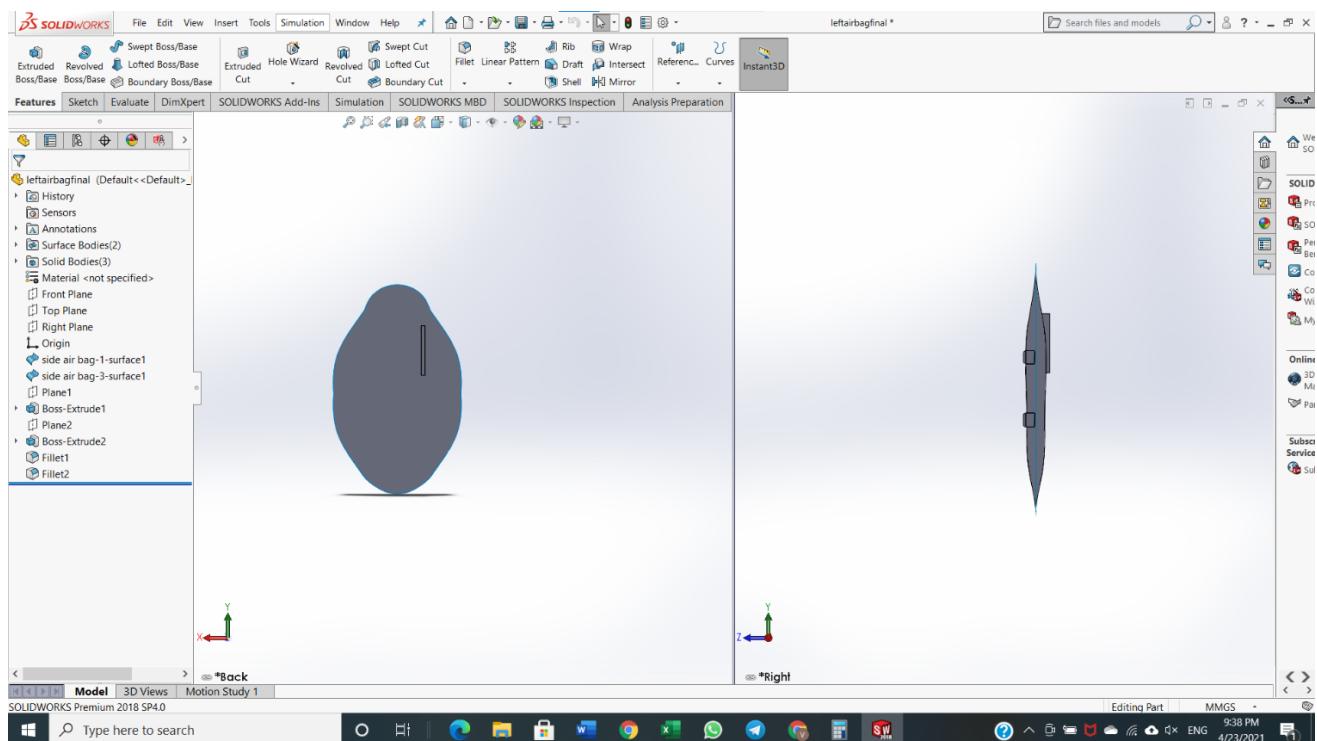
Front view of airbag

Side airbag:

This side airbag will activate whenever the vehicle inclination is less than 30 degrees and still decreasing the angle sensor comes into play and gives the signal to the inflators thus the side air bag will open in fraction of seconds. The air bag consists of small supports where it touches the ground and experience the friction, the main reason behind this supports are for not to blast the air bag due to friction between the road and the airbag if the motorcycle is in motion. For this side bags there are two different and unique design air bags are designed for left and right side in solid works.

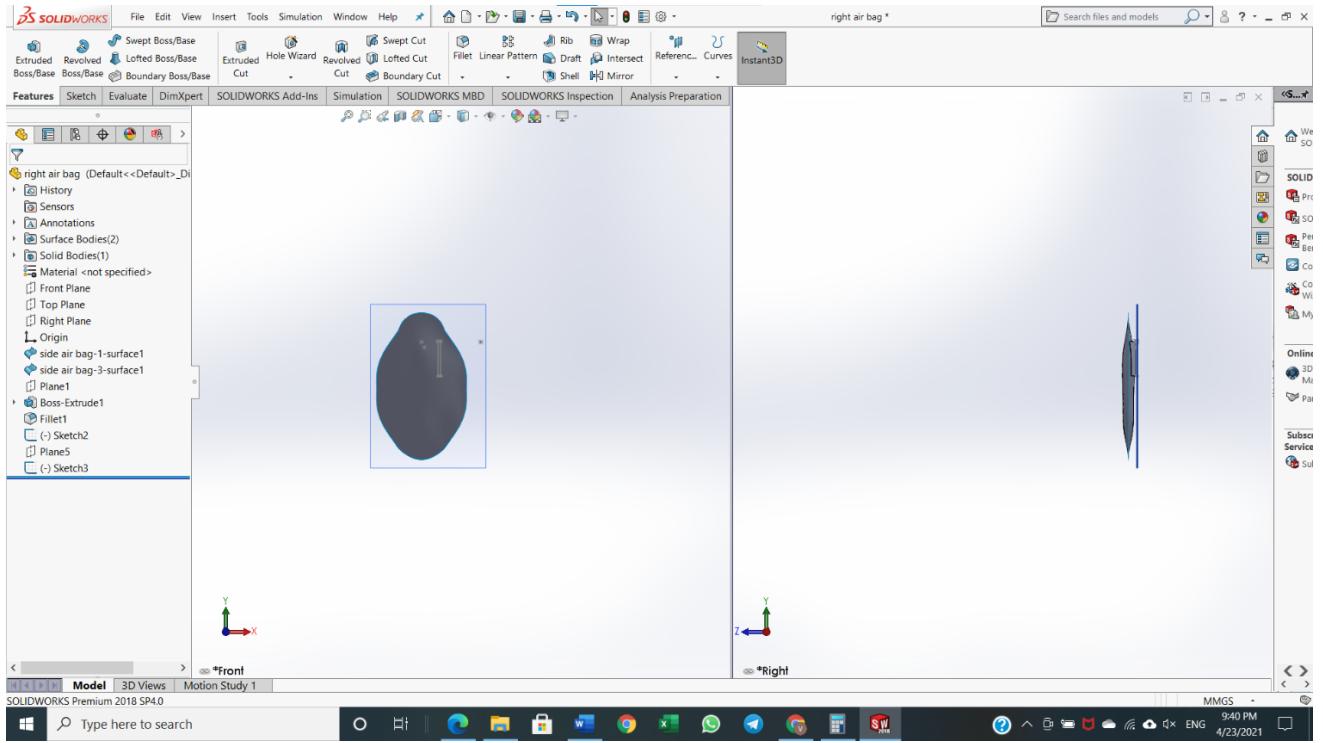
Left side air bag:

The left side air bag is different from the right side air bag because the mounting point of the air bags varies .In the below photo the right side photo contains two squares boxes structure those are supports which are made with nylon but the thickness is very high when compared to the main part of the air bag.



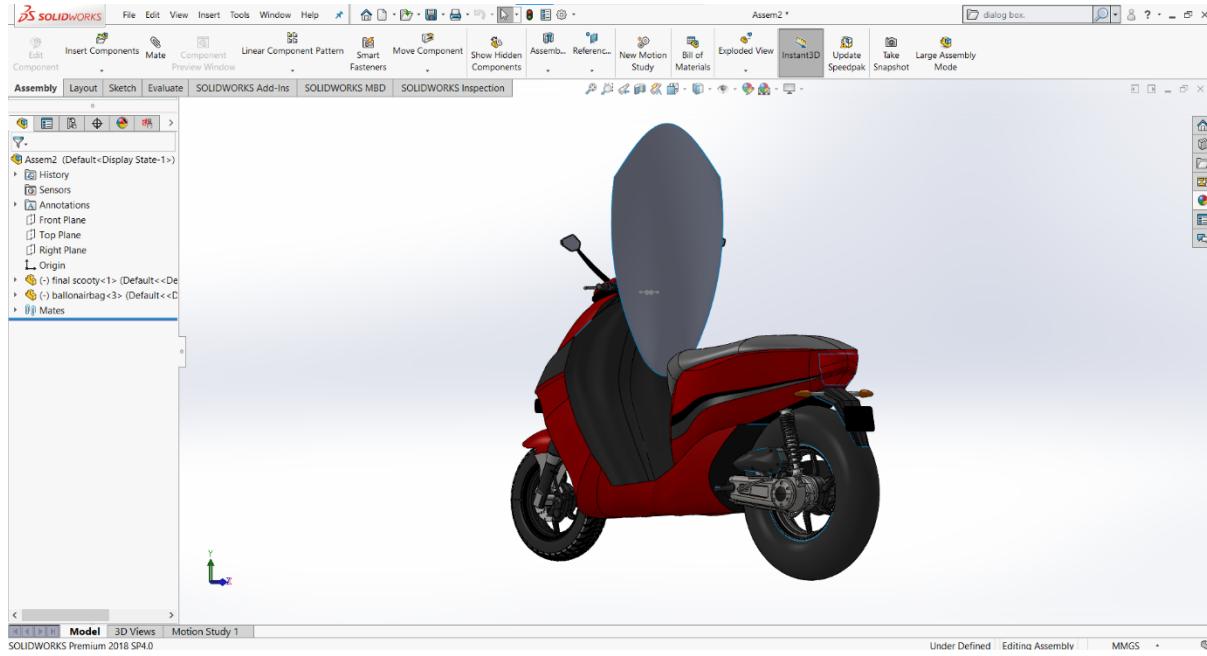
Right side air bag:

The right side air bag is different from the left side air bag because the mounting point of the air bags varies .In the below photo the right side photo contains two small squares boxes structure those are supports which are made with nylon but the thickness is very high when compared to the main part of the air bag.

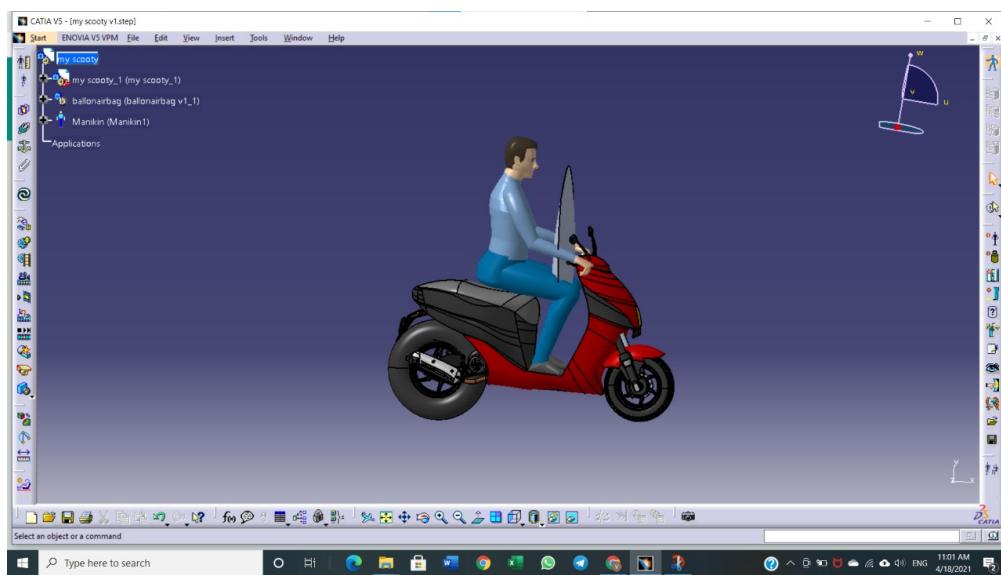


INSTALLATION:

This air bag will be open just below the dashboard of the scooter and there is separate cabin is arranged below the dashboard as shown above for the air bag system to be installed .The inflators crash sensors angle sensor are arranged near front tire and the inflators are installed back side of the air bag.



Assembly of front airbag and scooty at modification place



Assembly of front airbag, scooty and driver

ANALYTICAL PROCEDURE TO CALCULATE THE PRESSURE:

The procedure we took to calculate of the pressure inside the air bag is that conservation of word done by the driver and the whole system so multiplication of pressure and change in volume is equal to the kinetic energy of the whole system .

For the calculation of pressure there some assumptions need to be done some of them are

- mass of the body = 60kg
- velocity of the vehicle = economy speed (assumed as $45\text{kmph}=0.277\frac{\text{m}}{\text{s}}$)

some iterations are done for this calculation and divided into some cases as follows.

case 1 : driver hit the ground (deformation = 0.4m)

$$p \times (\Delta v) = \frac{1}{2}mv^2$$

$$p \times (0.55 \times 0.93 \times 0.4) = \frac{1}{2}60(0.277)^2$$

$$p = \frac{9164.22874}{0.4} \text{ kg/ms}^2$$

$$p = 22910 \text{ pascal}$$

$$p = 22.9 \text{ KPa (this is Gauge pressure)}$$

$$\text{absolute pressure} = \text{Gauge pressure} + \text{atmospheric pressure}$$

$$\text{atmospheric pressure} = 101,325 \text{ Pa}$$

$$\text{absolute pressure} = 101,325 \text{ Pa} + 22910 \text{ pa}$$

$$\text{absolute pressure} = 124.235 \text{ KPa}$$

case 2 : driver just above the ground(deformation = 0.3m)

$$p \times (\Delta v) = \frac{1}{2}mv^2$$

$$p \times (0.55 \times 0.93 \times 0.3) = \frac{1}{2}60(0.277)^2$$

$$p = \frac{9164.22874}{0.3} \text{ kg/ms}^2$$

$$p=30547 \text{ pascal}$$

$$p=30.5 \text{ KPa (This is Gauge pressure)}$$

$$\text{absolute pressure} = \text{Gauge pressure} + \text{atmospheric pressure}$$

atmospheric pressure = 101,325 Pa
 absolute pressure = 101,325 Pa + 30547 pa
 absolute pressure = 131KPa

case 3 : driver just above the ground(deformation = 0.25m)

$$\begin{aligned}
 p \times (\Delta v) &= \frac{1}{2}mv^2 \\
 p \times (0.55 \times 0.93 \times 0.25) &= \frac{1}{2}60(0.277)^2 \\
 p &= \frac{9164.22874}{0.25} kg/ms^2 \\
 p &= 36.6 KPa \text{ (This is Gauge pressure)} \\
 \text{absolute pressure} &= 137 KPa
 \end{aligned}$$

case 4 : driver just before the air bag to hit (deformation = 0.20m)

$$\begin{aligned}
 p \times (\Delta v) &= \frac{1}{2}mv^2 \\
 p \times (0.55 \times 0.93 \times 0.20) &= \frac{1}{2}60(0.277)^2 \\
 p &= \frac{9164.22874}{0.20} kg/ms^2 \\
 p &= 45.8 KPa \text{ (This is Gauge pressure)} \\
 \text{absolute pressure} &= 146.1 KPa
 \end{aligned}$$

case 5 : driver just before the air bag to hit (deformation = 0.10m)

$$\begin{aligned}
 p \times (\Delta v) &= \frac{1}{2}mv^2 \\
 p \times (0.55 \times 0.93 \times 0.10) &= \frac{1}{2}60(0.277)^2 \\
 p &= \frac{9164.22874}{0.10} kg/ms^2 \\
 p &= 91.6 KPa \text{ (This is Gauge pressure)} \\
 \text{absolute pressure} &= 192.9 KPa
 \end{aligned}$$

case 6 : driver hit to hard air bag(deformation = 0.01m)

$$p \times (\Delta v) = \frac{1}{2}mv^2$$

$$p \times (0.55 \times 0.93 \times 0.01) = \frac{1}{2}60(0.277)^2$$

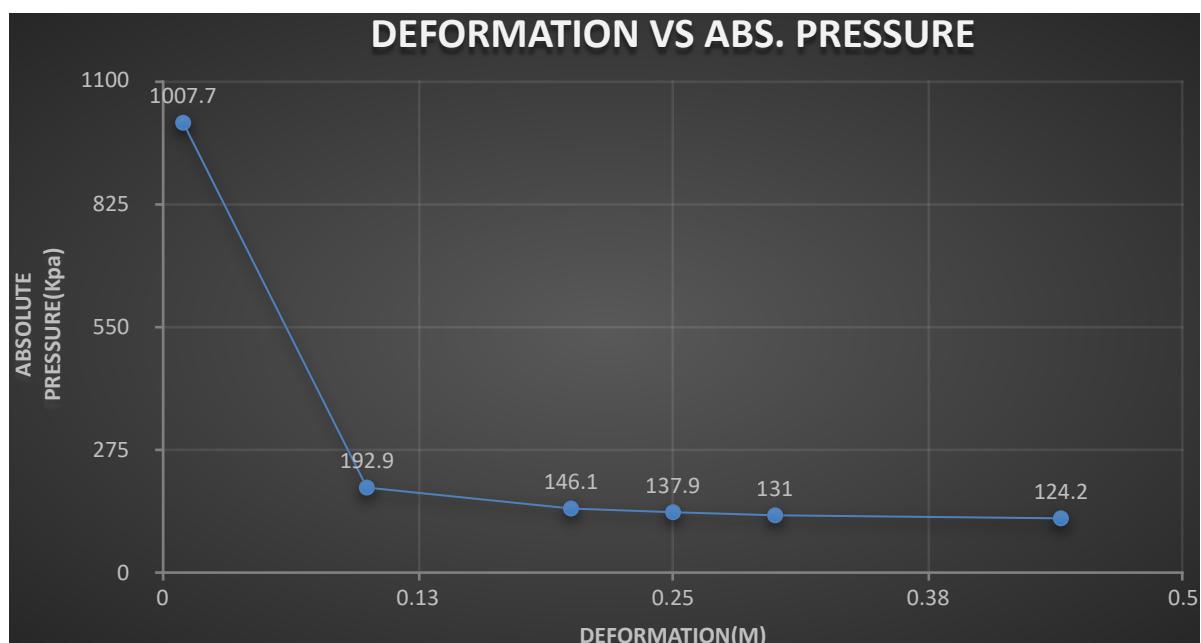
$$p = \frac{9164.22874}{0.01} kg/ms^2$$

p = 916.4 KPa (This is Gauge pressure)

absolute pressure = 1007.7 KPa

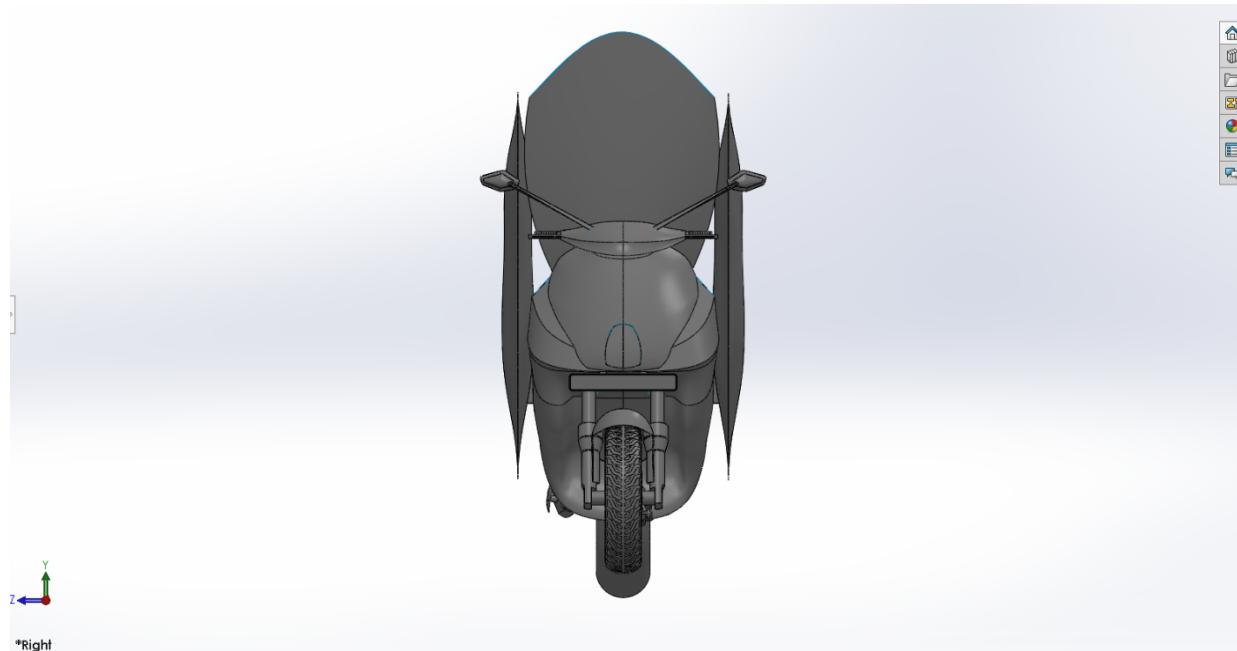
S.NO	DEFORMATION (meters)	PRESSURE(Kpa)
1	0.44	124.2
2	0.3	131
3	0.25	137.9
4	0.2	146.1
5	0.1	192.9
6	0.01	1007.7

Above graph shows deformation of air bag vs pressure inside the air bag



With this came know that the pressure inside the air bag must be less than 1007.7 KPa and greater than 124.2 KPa. The air bag module should be set to these values as end points and it should not be exceed more than this .If the more than this pressure is occurred in the air bag the computer should be set that the pressure should be leak from that , in this way code in the air bag control unit should be enter the code according to the reading comes from accelerometer and brake sensor such that the driver will be in safe position and away from any injuries .Also the air bag should open and pressure inside the air bag must be more than 124.2 KPa and not greater than 200 KPa such that the driver will not hit the ground and will be away from any brain injuries and major accidents and the air bag wont fail respectively.

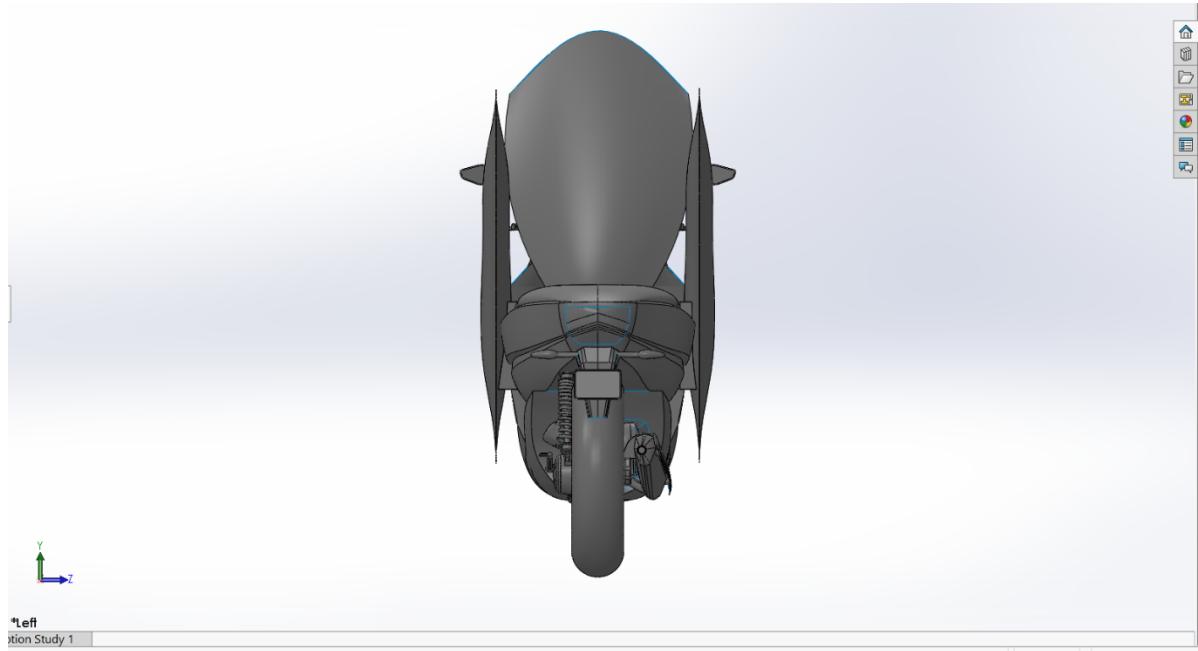
FINAL SIMULATION:



Front View



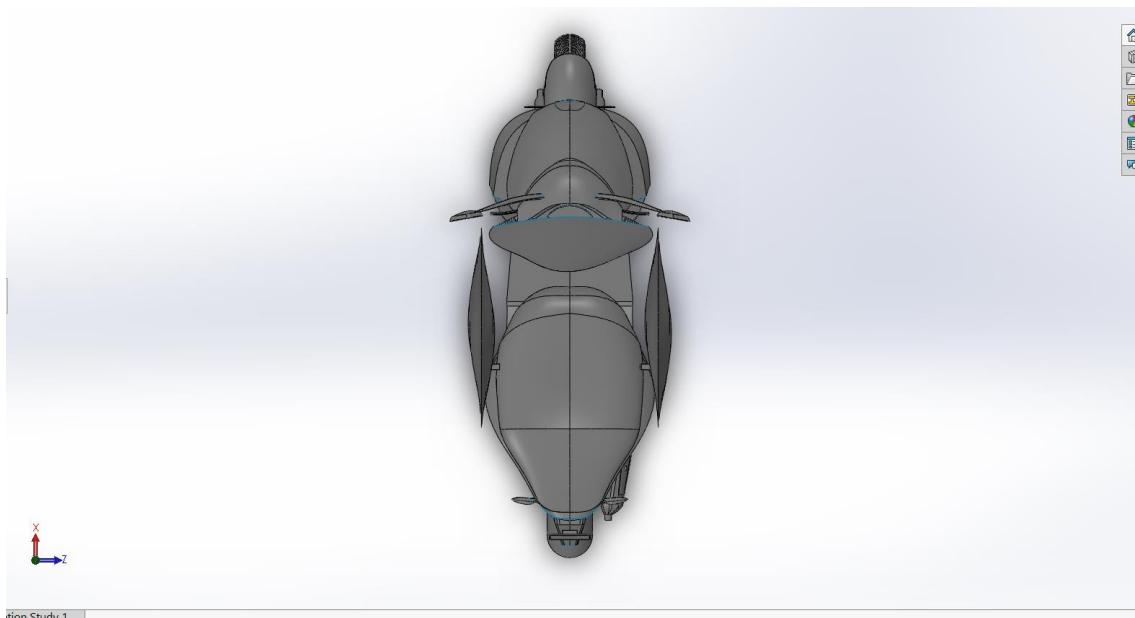
Side View



Rear View



Isometric View



Top View

CONCLUSIONS AND FUTURE SCOPE:

The angle sensor is the central position of the two wheeler system and it plays a major role to deploy air bag in road accidents .When the angle sensor didn't responded to the air bag control unit in case of front collision then the crash sensor which is placed near the front tire will comes into act and sends the signal to the air bag control unit then the computer sends the signal to air bag module which is inflators and the inflators do the rest work to open the air bag according to the reading of the accelerometer and brake sensor .

The air bag control unit is able to read out the each and every sensor elements like reading from the accelerometer, speed sensor, crash sensor, angle sensor continuously. When these values either are decreased or sudden fluctuate then the air bag module control unit sends the signal to the air bag module (inflators).

The main and foremost point for safety application is the reaction time of the sensor system. In our air bag system all the sensor are completely updated and in every sensor there is no mechanical switches will be present ,instead of those I decided to place razer light inside the sensor whenever sudden fluctuates it sends the signal by opening the shutter and razer light passes from one point to another point and sends the signal to the air bag control unit in 0.2 milliseconds .This new invention will help this system to open the air bag in less than actual time of air bag.

Air bag will open in every direction whenever the speed decreased from above economy speed to average low speed because it is difficult to send the signal to air bag control unit from angle sensor and to protect the rider from heavy injuries.

In India, six two-wheeler riders die every hour in road accidents, as two-wheelers become more popular in the absence of public transport, the number of road accidents involving these is also growing. More than a third (37%) of those killed in road accidents in

2019 were two-wheeler riders, noted a Ministry of Road Transport and Highways' report published in October this year.

Around 370-400 people die every day, equivalent to a jumbo jet crashing every day. In Utter Pradesh two to three people die every hour, that makes them State with maximum number of road crash deaths. In Tamil Nadu maximum number of road crash injuries happens. In this review paper we studied that vehicle accident is a major problem. So, I decided to implement the air bag system for two wheeler to reduce the accidents and save many families life .

Air bag are of greater importance in today's vehicles since safety of human life is of prior importance. So far safe riding and for saving the previous life the safety bags must be implemented. Lets hope every two wheeler manufacturer will implement my invention and government also will make this as mandatory.

FUTURE SCOPE

- This system may be applicable in all types of vehicles like in electronic vehicles, petrol vehicles and e scooters.
- It able to give some assurance to the life and decrease the death rate due to accidents in two wheeler.
- System able to increase the pre-crash safety.
- System able to provide more safety to the passengers like in development of the material of the air bag.
- To reduce the requirement of internal safety devices like sensors

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