

Implementation of ASAB (Angle Sensor Airbag) Without Airbag Module in 2 – Wheeler's

Chitta Sri Ysaswi Kasyap

Department of Mechanical Engineering

Sreyas Institute of Engineering and Technology, India

Abstract— Deployment of airbags to save the person's life has been pushed to a great achievement for the automobile industry. By this invention which has been commenced by John W. Hetrick, the founder of airbags in cars gave him an unforgettable appreciation for saving several lives. Hetrick couldn't predict the upheaval of two-wheeler design and by the time he prophesied it, he found to be cash in one's chip. Till now there is no prosecution of airbags in bikes and there is no contemplative of lives who are devilishly using two-wheelers. Highly educated professors, students of different universities are ushering forward their inventions through journals but there are no almanacs that they started perpetrating their inventions and enacting that to bikes. These journal comes out with a new invention of the airbag in bikes and pulls out the remedies to be safe from the injuries even though the accidents take place. This invention is done with its implementation and testing of the output and also the prototypes of the bike inflator, airbag design. This journal takes over the topics of how the persons on the bike will be safe from the injuries and how my invention pulls out to be special.

Keywords: Angle Sensor, Inflator (New Design), Airbag (New Design)

I. INTRODUCTION

Nowadays bike accidents have been increased enormously in that case by exploring the accident instances in social media people are a little bit aware of injuries. Taking that into consideration people are heading up themselves into taking lots of care before handling a bike. People might be safe and are not exposed to injuries after an accident occur but there are major cases like bone fracture, skin bleeding even though the rider is in complete protection side. Here we are ignoring an important topic whatever the new invention stands out in bikes it might be safe, the comfort of the rider but we are thinking only about the rider where will the second person or third person goes. Triple riding is not encouraged but during some important situations, the bike must bear the third person also. The airbag in bikes nowadays became a new invention to pull out for the safety of the rider but we have to also think about the second person behind. In that case, this ASAB pulls a step forward into the market and this plays a major role even though there are no safety precautions taken by the persons sitting on the bike.

A. Angle Sensor

This sensor is implemented in a bike by completing the circuit connection using the Arduino Uno board ADXL335, relay switch and a Vero board this complete connection is given to the battery [1]. This complete circuit is placed under the seat of the bike because there will be an easy connection to the battery. This sensor is made to be activated only after the bike speed crosses 10kmph. The

purpose of an angle sensor is to detect the threshold angle to which it has been dumped and send the signals to the inflator [3].

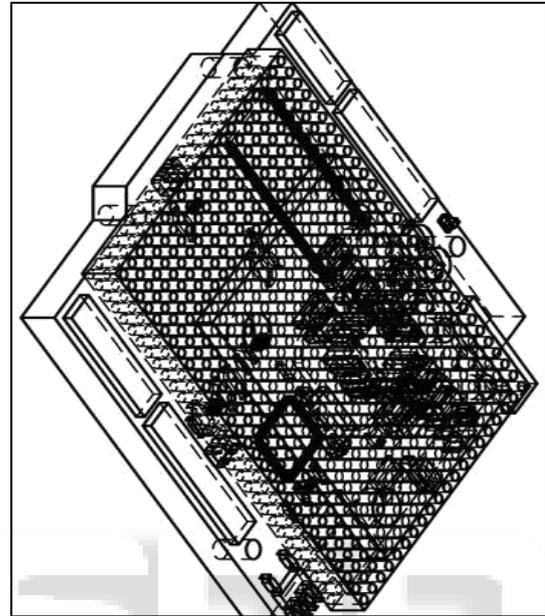


Fig.1

B. INFLATOR

The inner parts of this bike inflator like igniter, chemical ingredients, products used are as same as the car inflator only change is the design of the bike inflator and is completely different. This inflator is placed near the edge of the handle and also an indicator will be attached to the end of the inflator. This inflator is placed on both sides of the handle and it gets activated to which side the bike loses its control. The bike inflator design is made with the help of a metal sheet that withstands high temperatures. This inflator connection is not given to the airbag module it is directly given to the battery and this inflator takes its action as per the program dumped to the angle sensor. The connection of the wires will be given to the inflator form inside the handle chassis so that the connection will not appear from outside.

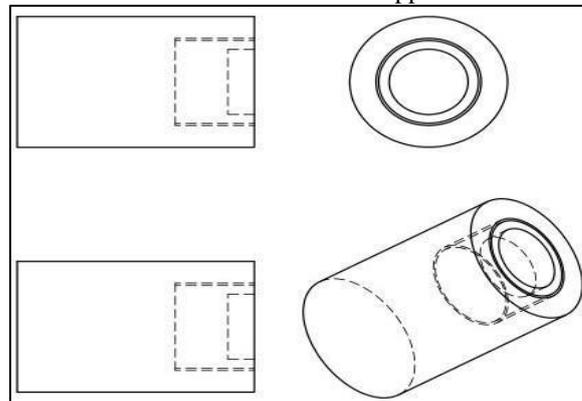


Fig. 2

C. AIRBAG

There are many designs of the airbags in cars and as well as airbags in bikes [8], the only Holy Grail to contrivance the airbags is bikes is to save the rider and reduce the injuries. In my case of thrifting the rider by not only diminishing the injuries [7]. This airbag saves the rider even though the accident takes place this airbag design is implemented in such a way that it rescues three major portions not only of the rider and also the second person behind, but also

- Knee bone
- Hand and elbow bone
- Head

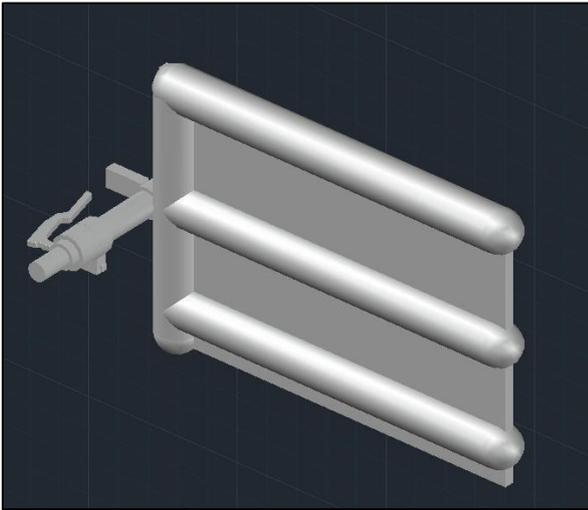


Fig. 3

When the inflator receives the signal from the sensor the bag bulges in such a way that three portions which I have mentioned will be safe even though the rider falls.

1) Calculations of PSI

$$PV = nRT$$

Linear motion

$$V_f^2 - V_i^2 = 2ad$$

Acceleration

$$a = ? (m/s^2)$$

Newton's second law

$$F = ma$$

$$F = ? (N)$$

$$P = F/A \Rightarrow P = ? (Pa)$$

ABS Pressure = Gage Pressure + atmospheric Pressure [4].

Based upon this calculation car gives out 60 PSI of N₂ Gas i.e. 413685 Pa and that gives 413.685KPa [5]. As my airbag requires the same amount of PSI to be released I used this calculation to my bike inflator design.

II. REASON FOR NOT USING AIRBAG MODULE

The main working of the airbag module is to check whether the impact is high and then make every part of the airbag active. But nowadays the major accidents are caused due to wheel skidding [7]. If the rider is about to crash a vehicle or any external source, he will be prepared to press the brake and then he will tend to put his legs down and tries to save himself. The bike which is in the market nowadays are with good BHP and when the rider presses the brake the bike slows down in seconds and the rider will be able to put his

legs down. But if the bike turns to an angle where the person can't bear the weight of the bike then it would be difficult for the rider to handle the bike. In this case, if there is a placement of the airbag module it will check the impact of angle and then activates the airbag parts and by this moment the rider may be on the ground. For that reason, I have implemented a direct connection to deploy the airbag without the help of the airbag module. It is not to discourage the airbag module if the rider reaches the angle where he can't bear the weight of the bike then what if there is a presence/absence of an airbag module.

III. REASON TO CHANGE INFLATOR AND AIRBAG DESIGN

Based upon the calculations of PSI release by the car inflator is found out to be 60 PSI (per square inch) [5]. Even though the car inflator is releasing an enormous amount of N₂ gas to deploy the airbag we can't place the same car inflator in a bike. If at all it is acceptable a separate design has to be made to make the car inflator fit into the bike even if we fit the car's inflator to the bike the outlook of the bike would be somewhat different. The main objective of the invention is to cover the body of two persons sitting on the bike taking that concept into deliberation I have placed the parts of the bike inflator as same as of the car inflator but the design is of the extension of the bike handle. Currently, the bikes which are clenched in the market are held with some extension in the handle taking that as an advantage I have made the design of the bike inflator hinged upon the dimensions of that extension. Because I need some amount of PSI [4] to be released I have not changed the parts inside the bike inflator. The reason behind this is that my bag design is made in such a way that it saves knee bone, elbow bone, and head not only of the rider but also the person sitting behind. The length of my airbag is 1500mm and the height is 1040 mm and the bag is declined as it will deploy over the main portions.

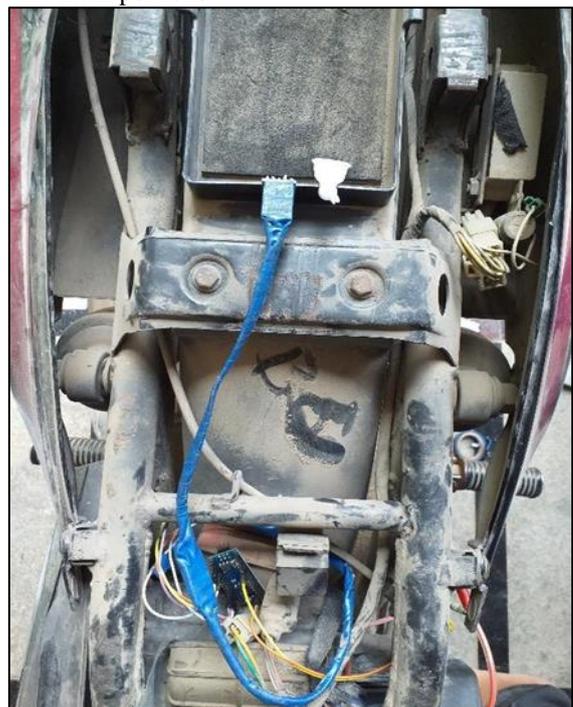


Fig. 4

To make this bag deploy in the same way as I have designed the PSI [4] should be more for that reason I have not changed the chemical ingredients, parts of the car inflator.

IV. HOW MY INVENTION OVERCOMES ACCIDENT PROBLEMS

As I have broached that even though the person acquired himself to take precautions before riding they are not finding a remedy to overcome the wheel skidding problem [7]. So despite taking care after the occurrence of the accident I put a step forward to implement this invention in bike. This study will be helpful at the angle where the person can't bear the weight of the bike and at a position where the rider is about to fall. In this scenario, my invention will be useful in avoiding injuries by deploying the airbag by covering the arms, legs, and head of the persons on the bike.

Taking my invention to deliberation I have placed a LED light and commenced my invention. The connection

which I have given to the LED is as same as the connection which will be given to the bike inflator as the pic below shows that at the threshold angle which is been dumped to the sensor the LED light gets activated and starts to glow, I intend to show that as LED light tends to glow at that angle the inflator will also get activated at that angle and starts deploying the airbag. The main reason to implement led over inflator is that I have got no exact material to create the airbag of my design if there is no source for N₂ gas to get in somewhere it will become a very dangerous aspect to think over for the surrounding people. For that reason, in my implementation of this invention, there is an absence of inflator and airbag but there is a prototype of this bike inflator and bag design. The only desire to take this step is to not harm the neighbourhood but I am very phlegmatic on my invention that this connection which I have given to the led will surely work on the bike inflator and the bag that deploys out will save the rider and the person behind.



Fig. 5

V. CONCLUSION

Airbags in bikes are a new type of invention that will reduce injury rates to the rider. There are enormous inventions on this concept but my placement would protect both the rider and the person behind. Today I am very excited to put a step forward and inform that I was successful in implementing the prototype of the bike inflator and bag design and I have successfully tested the working of the sensor on my bike. This would reduce the chances of the rider/the person behind exposing to more injuries.

REFERENCES

[1] Baranilingesam .I, Rajesh. R. "Tilt angle detector using a 3-axis accelerometer". International Journal of

scientific research in science and technology, online ISSN: 2395-602X. Research gate.

- [2] Zohar Aziz Ali Manjiyani, Renju Thomas Jacob, Keerthan Kumar R, Babu Varjhese. "Development of MEMS-based 3-Axis accelerometer for hand moment monitoring". International Journal of scientific research Publications. ISSN: 2250-3153.
- [3] "Simple angle meter using ADXL335 accelerometer (Arduino)". Electronicsblog.net.
- [4] Rachel Casidiy, Regina Frey. "Gas loss save lives: The chemistry behind Airbags". Washington University St. Louis, MO 63130
- [5] Madung. A." The Chemistry behind airbags: High tech in first-year chemistry". (1996) J. Chem. Ed. 73(4), P.347-348.

- [6] Crane. H. R.” The airbag: An Exercising Newton’s laws”, (1985) the physics teacher, 23, P.576-578.
- [7] Mr. Urvish A. Metha, Professor. Dr. D.M. Patel. “Design and Analysis of Airbag system in two-wheeler Vehicle system”. IJSRD. Volume. 6, Issue 02, 2018, ISSN: 2321-0613.
- [8] S. Mukherjee. A. Chawal, “Studies for Motorcycle Air Bag”. IRCOBi Conference. Prague (Crech republic).

