



# A Modern Approach for Bike Safety Globule System

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**Abstract.** Airbags are a common safety feature in cars around the world. Their purpose is to help the passengers in the car to reduce their speed in collision without being injured. The main objective of the airbag is to reduce the impact created on the chest area and also it encompasses the head area. The same motive is focused in this project i.e., it provides a safe journey to the bike riders. In this project, an attempt has been made to address this acute problem by designing a safety system which replaces helmet. The idea suggested here may certainly reach the people due to its simple installation thereby reducing fatal rates to low extent in our country.

## 1. Introduction

The frequency of traffic collision in India is amongst the highest in the world. More than 40 percent of these casualties are associated with bikes and trucks. On having a deep survey the reason for such events are found to be any one of the following, not maintaining proper lane, sudden crossing, distracted driving. According to the survey the fatal accident takes place on certain circumstances where negligence is shown by the rider on safety measures. Though government has taken several actions by imposing strict laws to protect people from such crises, people fails to follow the traffic rules and regulation. Since the usage of helmet is mandatory, people are neglecting to use them because of its size. Riders feel difficulty in carrying such things. This flaw is overcome by incorporating the module with the vehicle thereby the rider need not to carry anything.

## 2. Existing System

The previously prevailed technology contains crash sensor to detect the road crash by calculating the angle difference between the bike and the object that causes collision. On account of any crash, it is detected that the airbag systems are being installed on the four sides of the bike with elliptical cover to save the rider. The 'D' shaped airbags prevents the rider from being thrown away from the motor cycle. The airbag used in the existing technology are made up of leather material with grip technology in order to avoid slipping in wet or oily surface.

## 3. Demerits

The prevailing technology has drawbacks in several aspects. The D shaped designed airbags make a contact with road surface and locks the rider from being thrown away from the motorcycle. It restricts the usage in our countryside roads where the road conditions are poor. According to the recent survey, bike accidents are found to be takes place in large scale in local roads rather than in national highways. Apart from that, it restricts the usage in slippery roads and during rainy seasons. But such protective device should play major role in rainy seasons to protect the rider from skidding. Also, the contact between road and airbag causes wear and tear which limits its life time.

## 4. Proposed System

The proposed system consists of a protective suit with inflatable sections to the next level, by completely enveloping the rider in a two meter globular (sphere shaped object) ball like structure. The associated components with the suit detect any crash or skidding in the motor cycle and send electronic signals to the ECU in the suits. If any crash is detected, the suit inflates in five hundred of a second which would certainly protect the rider from injuries. On account of collision, the contact between motorcycle and the rider is cutoff eventually by installing ejector in the seat of motorcycle. At this stage, the proximity sensor detects the angle at the ejector is to be ejected. The cord connecting rider and motorcycle seat disconnects, the electric voltage plunges and processor inside the belt buckle imposes signal with the help of 9V battery to the electric ignitor at the back of suit. At once the solid propellant burns extremely to create a large volume of gas between two layers of inflated and forms globule around the rider. A second later the gas quickly dissipates through tiny holes in the bag. The harmless powdery substance is used here to keep the bags pliable and lubricated while they are in storage. The entire process would complete within the twenty fifth second of incident occurred. It consist of following components,

- Speed sensor
- Inflatable suit with processor
- Ignitor

- Crash sensor(Impact sensor)
- Proximity sensors

### 5. Advantages

- This system ensures the prevention of serious head trauma which found to be the major cause of fatality.
- The proposed system is especially suitable for any road conditions.
- Since there is a connection between motorcycle and the suit there is no chance of neglecting the suit unlike helmet.
- Since separate glove box is provided in the bike there is no difficulty in carrying the suit while leaving the bike.

### 6. System Architecture

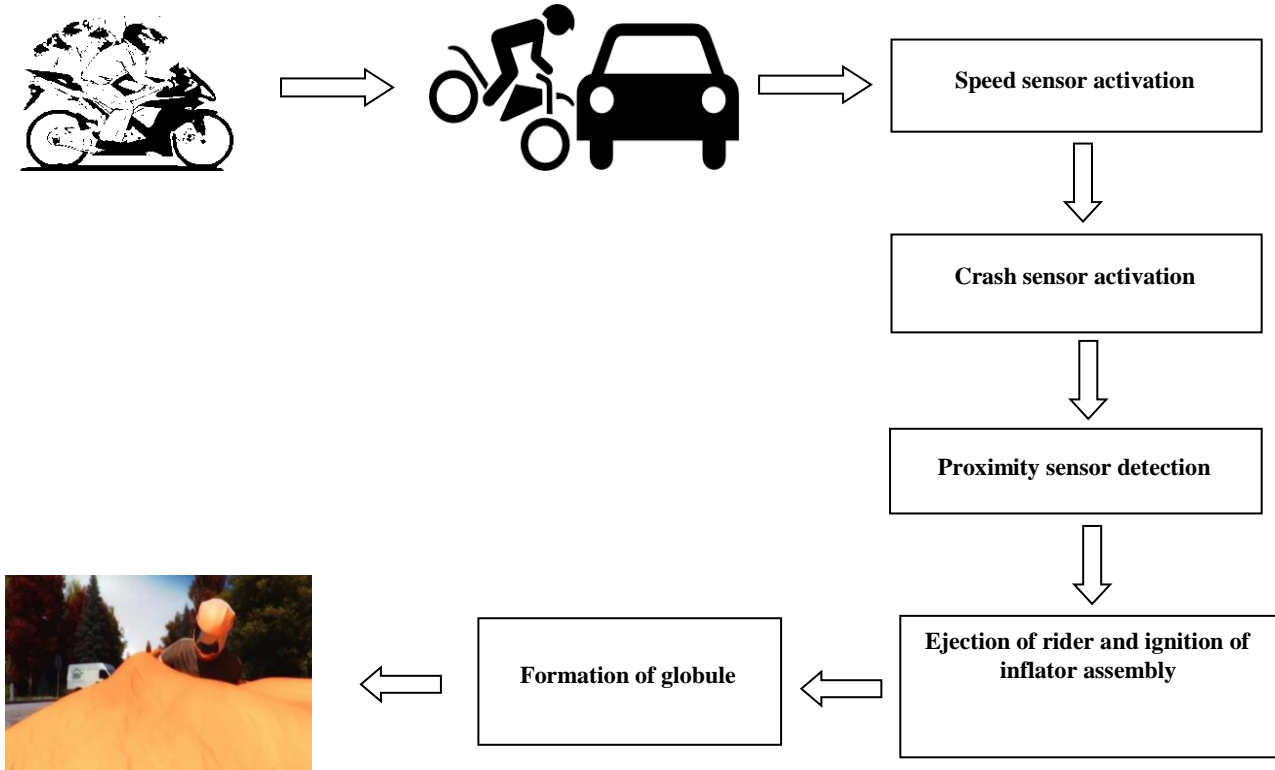


Figure 1. Bike Safety Globule System

### 7. System Modules

**Inflatable Suit:** It consists of two layers. The outer protective layer is made up of highly resistance parachute type material. The inner layer is made up of a thin moderately elastic synthetic material. This close fitting ECU hub works by a sophisticated algorithm that detects the initial phases of a crash and ignites canisters and inflates airbags in 45 millisecond (approx.). The padding provided to cover the full body protection. It is for spinal cord, head, chest, kidney, shoulders. **Crash Sensor:** Crash sensors play a vital role in deploying globular structure in this technology. It is placed behind the suit wore by the rider. The crash sensors are designed in such a way to prevent inflating when the bike moves over a bump or minor collision. The unit employed in this technology will function only when the collision equivalent to hitting a solid barrier at 14.5 (approx.) KM/hr. The crash sensor detects such impact and sends electrical signal activating initiators (ignitor). This causes the solid chemical propellant, sodium azide sealed inside inflator to undergo a rapid chemical reaction. This controlled reaction produces harmless nitrogen gas to fill the globule. **Speed Sensor:** Speed sensors are used in this technology to check whether the vehicle is in motion during the disconnection of suit with the vehicle. It has the deciding authority to inflate the globule during a crash. Thus it ensures the unwanted inflations that happen when the rider get down from the bike. The speed of 25 km/hr is fed for its operation. If the speed is below 25 km/hr, it decides that the collision is minor. **Proximity Sensors:** Proximity sensors are commonly used in mobiles which are employed here to measure the distance of nearby object around the motorcycle. It emits beam of electromagnetic radiation and looks for changes in field or return signal. It finds the direction where there is maximum distance so that the rider can be thrown safely. It decides in which angle the ejector has to be ejected. **Safety Globule:** The safety globule is made from two separate layers. It is of parachute-like material, and is hooked up to a battery that will set off a reservoir of nitrocellulose, which inflates the suit with explosive speed. **Inflator Assembly:** The inflator assembly consists of a canister, filter assembly and wire mesh. The inflator sub assembly is combined with the propellant and an initiator to form inflator assembly. When the control module activates, the inflator assembly an electric signal is sent to the detonator, it ignites the sodium azide pellets. When it burns, it releases nitrogen gas very quickly in large quantities.

## 8. Conclusion

According to National Highway Traffic Safety Administration (NHTSA), more than 30,000 lives have been saved by airbag system employed in cars. In the same perspective, it can be installed in motorcycle as a safety feature at the time of manufacturing which tends to reduce the fatal to a great extent. It paves an alternative way, instead of imposing laws. This technology also reduces the need for undergoing patrol checking. According to the perspective of this technology, it would reduce the fatal rates to nearly 60%. The ongoing up to experimental research would ensure the viability of the proposed system.

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