Safety systems in Bikes

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Abstract: Considering the circumstances where a biker would lose his balance and meet with an accident, airbag safety system can be adapted. This presentation aims at a new idea to develop safety systems for two wheeler. It comprises of the automatic braking feature & inflation of airbags in order to ensure maximum safety during loss of balance after the action of automatic braking & during normal skidding of bikes as well. This airbag system will work in the same way as that of cars, but incase of 2 wheeler, this comes in contact with the ground while inflating it using a sensor. The distance limit & the speed limit within which the respective sensor has to activate the automatic braking & the airbag are to be considered. The strength of the airbag material and the various calculations to be performed using embedded systems programming are the challenges in this concept.

Keywords: Automatic braking, Balance, Sensor, Inflating, Airbag system.

I. INTRODUCTION

Consider a motorist driving @ a speed around 40kmph. Suddenly if he encounters an obstacle in his path, there is maximum chance of collision for him. He may or may not hit the obstacle, but he gets confused. This sometimes leads to falling down of the motorist and he may meet with an accident.

So implementing the automatic braking feature & the airbag safety system in two wheeler is our idea.

Considering the circumstances where a motorist would meet with collisions, the automatic braking feature can be implemented in bikes.

In order to safeguard the motorist from the sudden application of brakes (LOSS OF BALANCE), the airbag safety system can be implemented.

This airbag feature is not only to safeguard the motorist from the loss of balance due to automatic braking, but also to safeguard during the normal skidding of a bike.

II. MECHANISM:

An ultrasonic sensor will be kept on monitoring the distance between the obstacle & the motorist.

The ultrasonic sensor is provided with a CAN trans receiver which sends signals to the Micro controller unit through the CAN bus depending on its priority.

The ultrasonic sensor will sense for obstacles up to 180 degrees.

This ultrasonic sensor sends signals in the form of ultrasonic waves.

When the distance between the motorist and the obstacle is very less and the speed is above 30km/hr the brakes are applied automatically.

This is done by placing a pull type solenoid over the piston near the front brake lever. This pull type solenoid gets energized and automatically pulls the piston back and applies the brake. After the brakes are applied automatically, the driver is prevented from hitting the obstacle. If the brakes applied causes the driver to wobble and fall down, the Gyro meter which keeps monitoring the angle of slanting of the vehicle, will inflate the airbag longitudinally on the side depending on where the driver falls. Even now if the speed is still couldn't be controlled and the driver hits the obstacle, then after the clash, depending on the side where he falls down, the airbag inflates. The gyro meter is also provided with a CAN trans receiver. It also sends signals to Micro controller unit through CAN bus. It is given the priority next to the ultrasonic sensor. There is also a speed sensor which is helpful in detecting for obstacles in traffic signals where the obstacles will be closer but the vehicle will be static. In those conditions, the speed sensor is helpful. If the speed sensor detects 0 kmph speed,

then no further actions occur though how closer the obstacle may be. This wheel speed sensor is given the highest priority.

The above explained mechanism is shown in Flowchart as follows:

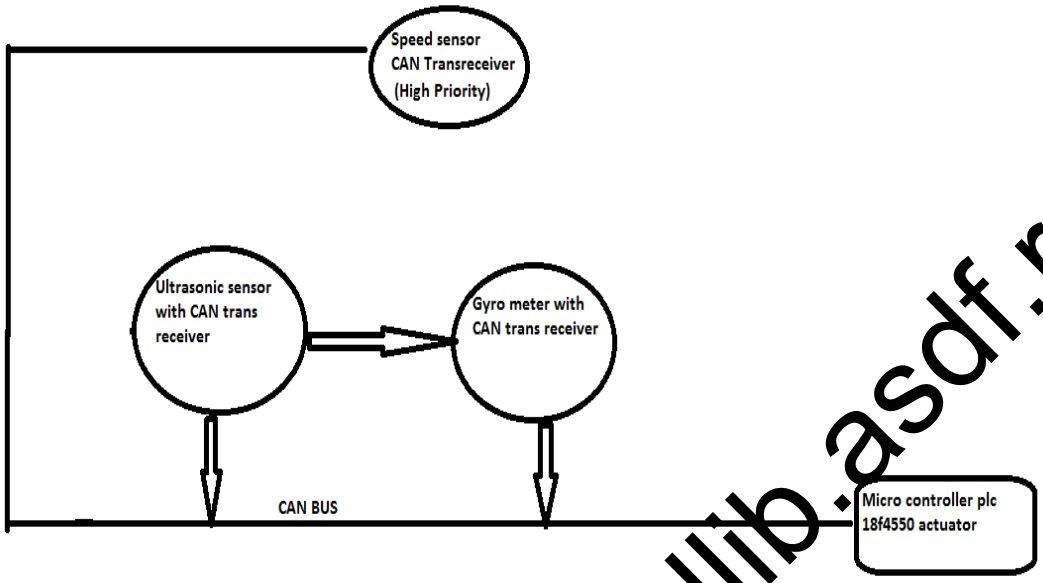

Figure 1 : Flowchart showing the mechanism

Figure 2 : ULTRASONIC SENSOR

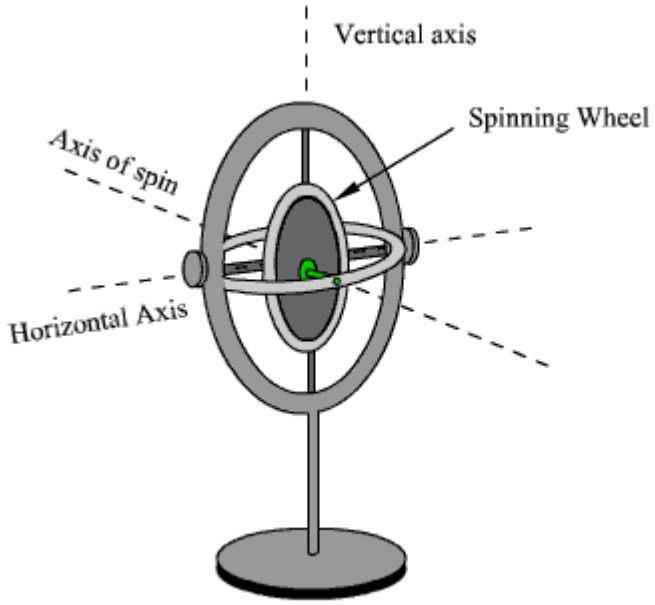

Figure 3 : A GYROMETER

After automatic braking?

AIRBAGS.

- Once the brakes are applied automatically, sometimes the motorist loses his balance and it leads to falling down.
- The Airbag inflates on any of the sides depending on the side, where the motorist falls.
- The Rollover sensor makes use of gyro meter to measure the angle of skid and inflate the airbag, when the programmed particular angle was exceeded.
- The airbag inflator unit differs from vehicle to vehicle, so the actuator mechanism also varies depending on the two wheeler in which the system is to be installed.

Figure 4 : ROLL OVER SENSOR

(SKID SENSOR here)

III. RESULTS AND DISCUSSION

After arriving at the ideas, we started discussing at the other parameters which play a major role in this concept.

Airbag material:

- A material which will not tear even after rubbing with the road surface is to be chosen for the airbag.
- Nylon 6-6, which has high mechanical strength, Great rigidity & good stability with heat, can be a good choice.
- It's stability with heat is a key to use this material, as this material would withstand the heat of the engine & silencer.

Positions:

- The Ultrasonic sensor is placed in between the front wheel & the head lamp, which is a reasonable height to sense for obstacles.
- The skid sensor will be placed at the bottom of the vehicle.
- The airbag will be inflating from the sides, near the gearbox at one side and near the exhaust (Silencer) on the other side.

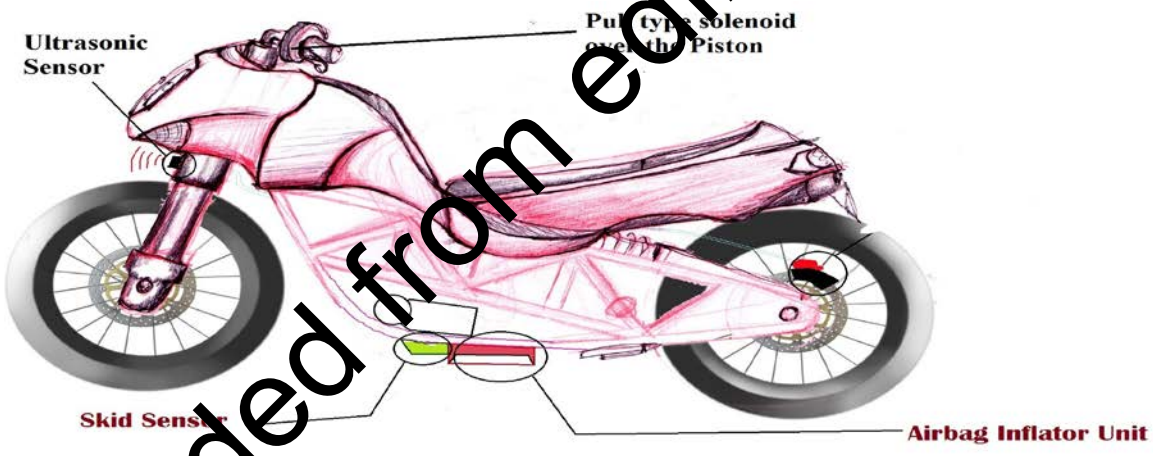

Figure 5 : Position of sensors

IV. CONCLUSIONS

Challenges:

For each & every automation planned in this idea, coding is to be performed using embedded systems.

Merits:

- This is automation. The obstacle is sensed by ultrasonic sensor. By its signals, the Microcontroller unit actuates the pull type solenoid to put the brake. The airbag inflates after the automatic braking to safeguard the motorist from loss of balance. Thus providing MAXIMUM SAFETY for the bikers.

- By automatic braking feature, the motorist is prevented from hitting the obstacle. Later, to overcome the skid due to sudden braking, the airbags are inflated. This airbag prevents the Head, Knee & Legs of the motorist from hitting the road/pedestrian path.
- The airbag is providing a float after collision, thus avoiding severe accidents.
- This airbag also works during normal skidding of bikes as well. Skidding of bikes due to muddy roads, wet roads etc

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REFERENCES:

Rollover sensors, which measures how much the car has turned and inflates the side airbags in cars.

Ultrasonic sensors used for monitoring distance around 180 degrees.

Emergency braking systems used in cars.

Automatic braking feature of Volvo's city safety system**.**

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