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Synopsis Report
On

"SMART HELMENT WITH INTEGRATED AIR BAG SYSTEM"

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Introduction:

- A smart helmet integrated with an airbag system is a revolutionary safety gear designed to protect motorcyclists in case of accidents.
- This helmet incorporates advanced technologies to detect and respond to sudden impacts that may occur during a collision, deploying an airbag to protect the rider's head and neck from injury.
- The helmet is equipped with sensors that detect any abrupt changes in motion, such as a fall or a collision, and trigger the airbag to inflate instantly to form a protective cushion around the rider's head and neck.
- This helps to reduce the impact of the accident on the rider's head, neck, and spine, significantly reducing the risk of severe injury or fatality.

Objectives:

- The objective of a smart helmet with an integrated airbag system is to significantly enhance the safety of motorcyclists by providing advanced protection during accidents or collisions.
- The primary goal is to reduce the severity of head and neck injuries, which are common in motorcycle accidents, by mitigating the impact forces exerted on these areas.
- By integrating an airbag system into the helmet, the objective is to create a protective cushion that inflates upon detecting sudden impacts or rotational forces.
- This inflation forms a barrier around the rider's head and neck, absorbing and dissipating the energy of the impact.
- The overall aim is to minimize the risk of traumatic brain injuries and neck fractures, potentially saving lives and improving the well-being of motorcyclists.

Methodology:

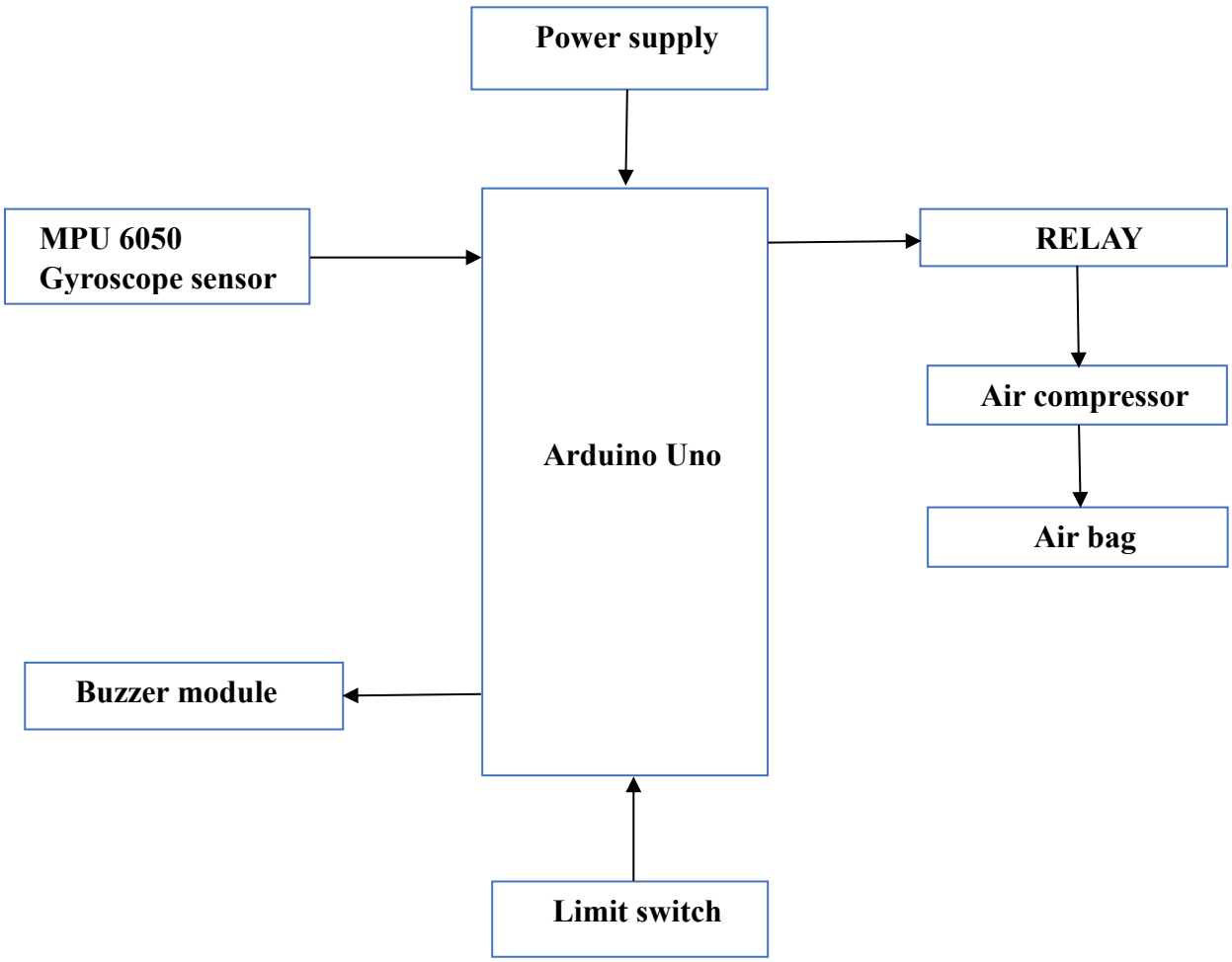
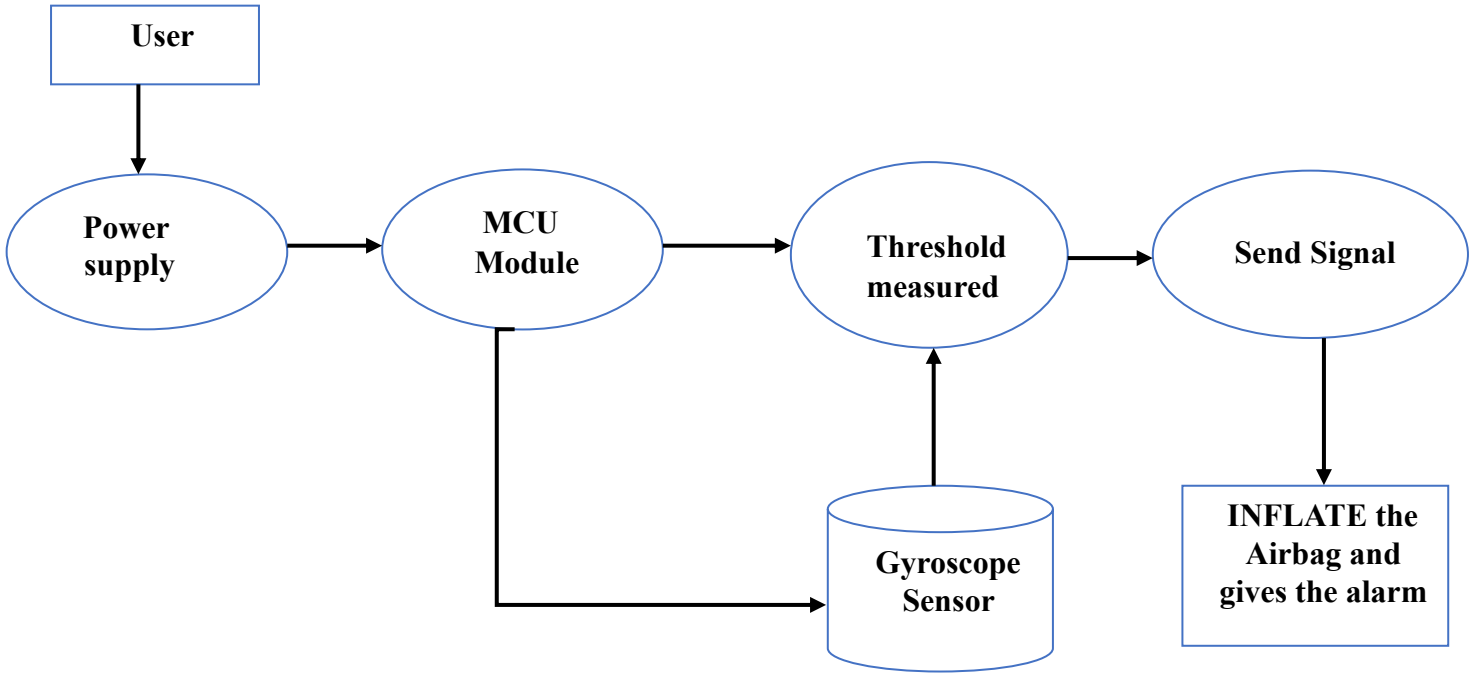


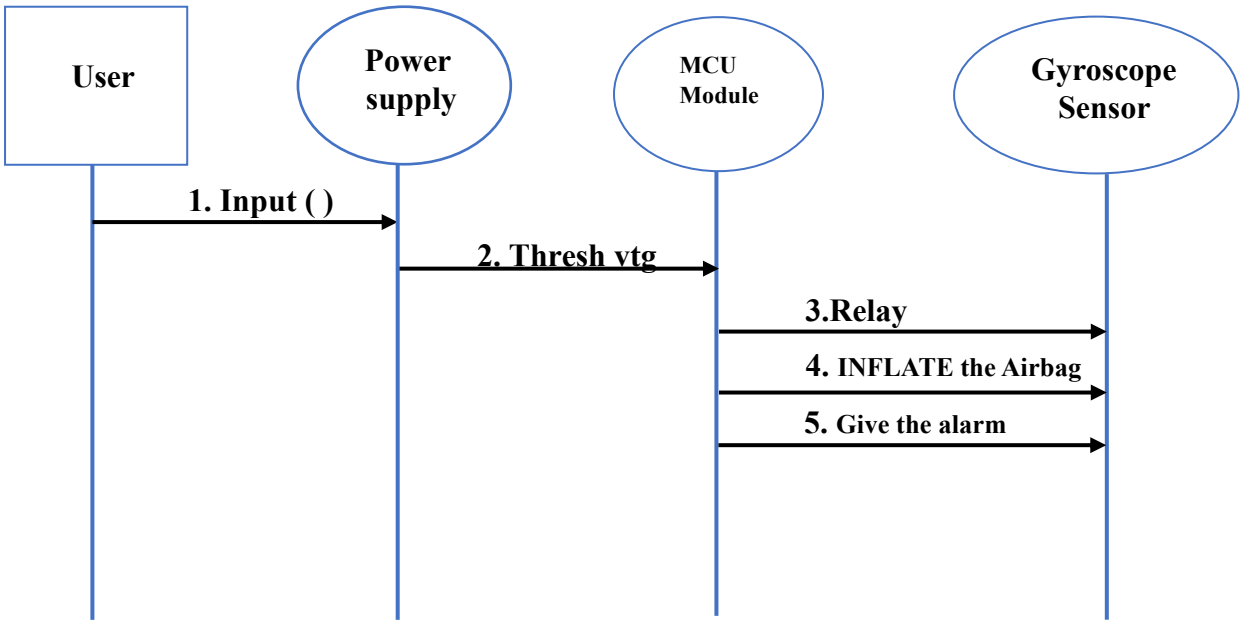
Fig: System Architecture

- The integrated helmet airbag system consists a sensors that is strategically placed in the helmet.
- The sensors is designed to detect the sudden deceleration or change in speed that typically occurs during a crash.
- When a crash is detected, the sensor trigger the deployment of the airbag system.
- The airbag system in the helmet works in the same way as the airbag in a car.
- It is designed to inflate rapidly upon impact, creating a cushion of air around the head and neck of the rider.
- This cushion of air helps to reduce the risk of serious injury by absorbing the impact of the crash.
- The system is powered by a Power supply. It provides the necessary power to deploy the airbag system and power the sensors.
- The Buzzer keeps deafening until the rider locks the limit switch.
- The Relay gets activated automatically at the event of a crash, providing an extra layer of protection for the rider.
- The relay gets activated as soon it receives the signals from Ardunio UNO.
- Air compressor gets activated and starts to inflate the airbag system.

ACTIVITY DIAGRAM



SEQUENCE DIAGRAM:



Results and conclusion:

- Studies have shown that airbag systems integrated into helmets can significantly reduce the risk of head injuries in the event of an impact or collision.
- The airbag system can also be easily reset and re-armed after deployment, making the helmet reusable and cost-effective.
- Providing total safety to the two-wheeler riders by incorporating the airbags in both sides of the two-wheeler as mentioned in this paper and this system also reduces the fatality rate by 20% to 30% by using this technology.
- This system not only aims at reducing the death rate but also gives the total protection to the rider as well as to the two-wheeler.
- The experimental research will illustrate that how this system is beneficial.

Scope for Future work:

1. **Connectivity and Communication:** Smart helmets may become interconnected with other devices and systems, such as smartphones, smartwatches, and vehicle-mounted sensors.

2. **Biometric Monitoring:** Future smart helmets may incorporate biometric sensors to monitor the rider's vital signs, including heart rate, body temperature, and blood oxygen levels.

3. **Integration with Smart Infrastructure:** Connecting smart helmets with intelligent infrastructure, such as traffic signals and road sensors, can provide additional information about road conditions, traffic flow, and potential hazards.

4. **Implementing cushion airbag system:** Removing the concept of wearing helmet by replacing it with cushion airbag system.