Abstract

The Smart Motorcycle Helmet is a revolutionary safety device designed to enhance rider safety on the road. This cutting-edge helmet incorporates advanced technology such as alcohol detection, helmet detection, and crash detection to provide riders with a comprehensive safety system. The alcohol detection feature ensures that riders do not drive while under the influence of alcohol, while the helmet detection feature ensures that the helmet is worn before the rider starts the engine. Additionally, the crash detection feature uses sensors to detect and alert emergency services in the event of an accident.
This presentation will explore the features and benefits of the Smart Motorcycle Helmet, highlighting its potential to reduce accidents and improve rider safety on the road.

Aim and Objectives

- Aim: The aim of our project is to develop a smart motorcycle helmet that can detect crashes/falls and alert emergency services, detect alcohol consumption of the rider and prevent the bike from starting if the alcohol level is above the permissible limit, and ensure that the rider wears a helmet before starting the bike.

- Objectives:

1) To develop a crash/fall detection system that can sense the impact and send an alert to the emergency services and the rider's emergency contact.

2) To integrate an alcohol detection system that can detect the alcohol level in the rider's breath and prevent the bike from starting if the level is above the permissible limit.

3) To develop a helmet detection system that can sense whether the rider is wearing a helmet or not, and prevent the bike from starting if the rider is not wearing a helmet.

Innovativeness

- Inclined towards the objective of the Industry 4.0, of merging technologies like artificial intelligence, machine learning and IoT with humans' physical lives, we have designed a unique, IoT based Smart Motorcycle Helmet offering a higher level of safety and security.
- The Alcohol Detection system designed and developed by us, consisting of the MQ3 Gas Sensor, the RF Communication module and the Arduino UNO Board as its core components, detects whether the rider is drunk or not and precisely measures the amount of alcohol consumed if the driver is drunk. Our system is built and integrated with the vehicle in such a way that if the detected amount of alcohol consumed by the rider is above the permissible limit then the system will prohibit the vehicle's engine from igniting and thus save the rider's life by preventing any accidents. This unique system also serves as a 'wear-to-start' system as the engine won't ignite until and unless the rider wears the helmet and the amount of alcohol consumed is detected.
- Our Crash Detection System provides and extra layer of safety as it alerts and sends the live and precise location of the rider, using the integrated Neo 6 GPS and SIM800A GSM Modules, to the emergency services and the rider's emergency contact if he/she meets with an accident.

Design

- The helmet was designed after a thorough research and after finalizing all the required components that would meet the necessary standards and specifications.

- Below are the design blueprints of our helmet:

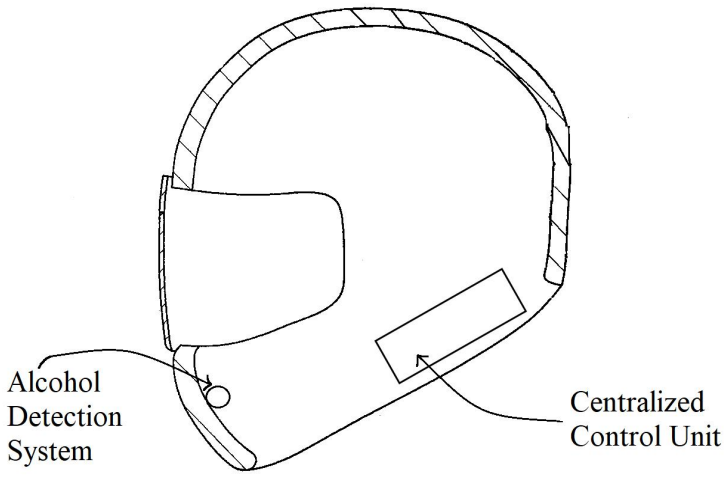

Fig. 1.1 Side view of helmet

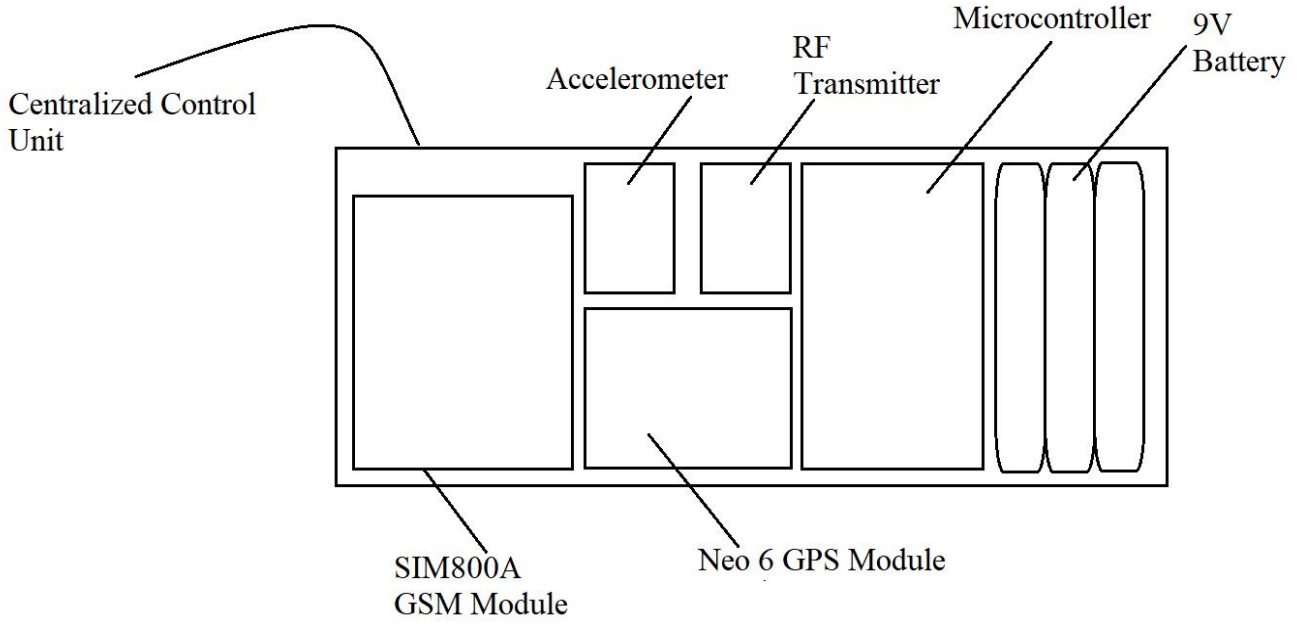

Fig. 1.2 Centralized control unit (CCU)

Design (continued)

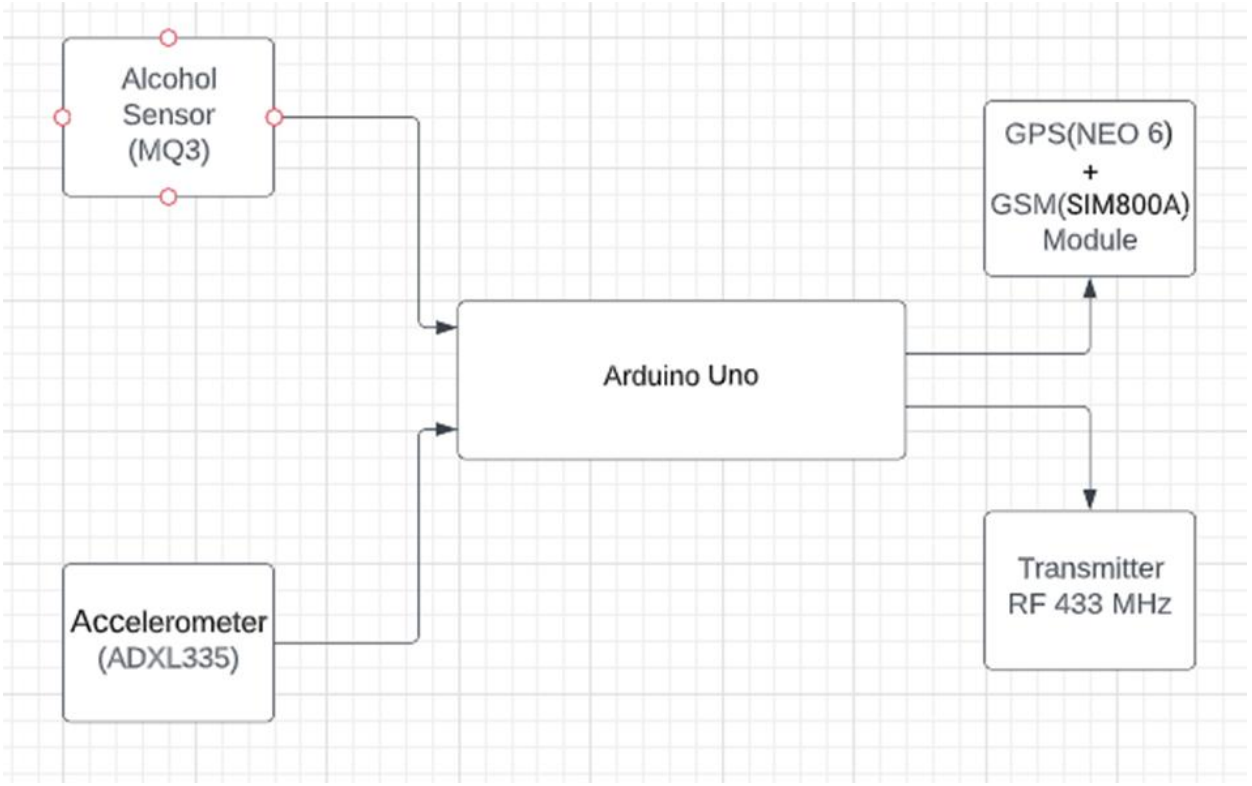

Fig. 1.3 Block diagram of helmet unit

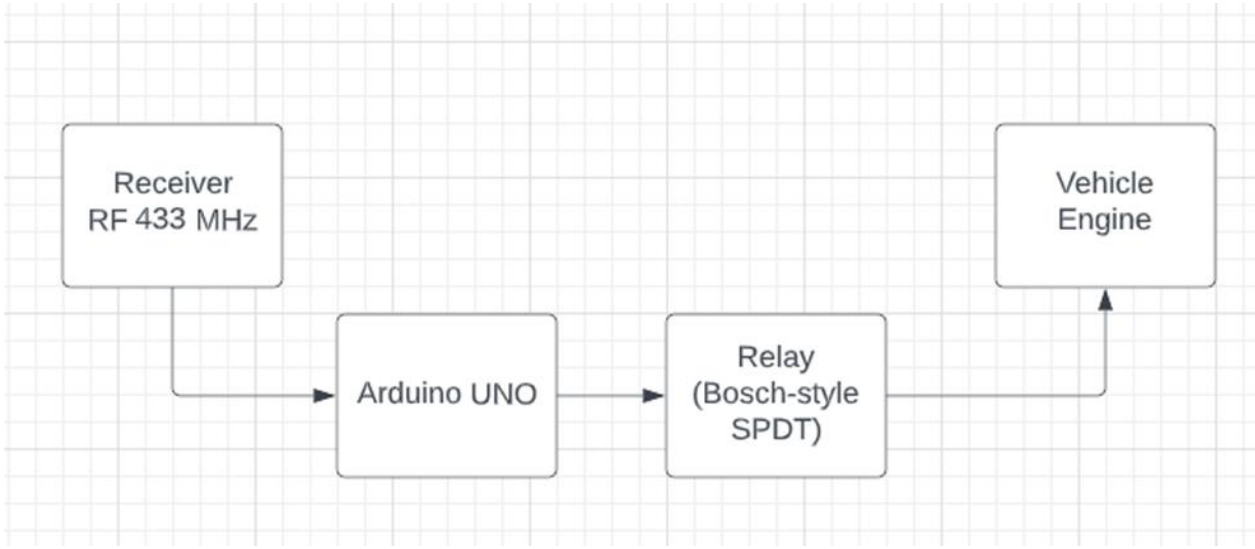

Fig. 1.4 Block diagram of vehicle unit

Development

- We decided to create a smart motorcycle helmet in alignment with the objectives of Industry 4.0. After conducting a thorough literature review, we identified the necessary features that should be integrated. We then created basic block and circuit diagrams and listed the required components within our budget. Once the circuit diagrams and blueprints were finalized, we purchased the necessary components.
- The next phase involved the actual creation and development of the helmet, starting with the alcohol detection system. Following this, we assembled all components of the crash detection system. After successful test runs, we integrated the two systems into the helmet and established the necessary connections between the vehicle unit and ignition system.
- As a result, we successfully completed the project.

Testing

- **Performance testing**: We evaluated the helmet's performance, such as its ability to detect alcohol, provide real-time alert to the emergency services .
- **User testing**: We done user testing to gather feedback and improve the helmet's design and functionality.
- **Safety**: We bought the helmet under the guidance of a traffic police officer to ensure that it meets safety standards and provides adequate protection for the rider.

Results and Discussion

1) Future improvements could include additional features such as real-time weather updates, and integration with a mobile app to provide more comprehensive safety information to riders.
2) Overall, the smart motorcycle helmet has the potential to significantly improve rider safety and reduce the risk of accidents on the road.

Conclusion

- The smart motorcycle helmet with crash detection, alcohol detection, and helmet detection is an innovative safety technology that has the potential to significantly reduce the risk of accidents and injuries on the road.
- The helmet's safety features have demonstrated excellent performance in terms of identifying and alerting the rider of potential collisions, detecting alcohol consumption, and ensuring compliance with safety regulations.
- The helmet's functionality and ease of use make it an attractive option for riders looking to prioritize safety on the road.
- Future improvements and developments in smart motorcycle helmet technology have the potential to further enhance rider safety and reduce the risk of accidents.
- Overall, the smart motorcycle helmet represents a significant step forward in motorcycle safety technology, and has the potential to save countless lives and prevent injuries on the road.

References

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