e-ISSN:2582-7219

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH IN SCIENCE, ENGINEERING AND TECHNOLOGY

Volume 7, Issue 10, October 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.521

© 2024 IJMRSET | Volume 7, Issue 10, October 2024| DOI: 10.15680/IJMRSET.2024.0710064

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Smart Helmet with Collision Detection Sensors

K.Sasirekha *[1], Jeevan Sresanth S[2], Lokeswaran S[3], Monishkumar R.[4], Mohamed Muzammil M I.[5]

Assistant Professor, Department of Computer Science and Business Systems, R.M.D. Engineering College, Chennai, India[1]

Student of Department of Computer Science and Business System, R.M.D. Engineering, Chennai, India[2]

Student of Department of Computer Science and Business System, R.M.D. Engineering, Chennai, India[3]

Student of Department of Computer Science and Business System, R.M.D. Engineering, Chennai, India[4]

Student of Department of Computer Science and Business System, R.M.D. Engineering, Chennai, India[5]

ABSTRACT: The Smart Helmet with Collision Detection Sensor project aims to create a technology-based helmet designed to increase the safety of drivers, cyclists, construction workers and athletes. Modern helmets provide passive protection by reducing the impact of a collision, but do not provide immediate protection or the ability to intervene in an emergency. Smart helmets support traditional safety measures through a combination of sensors such as accelerometers, gyroscopes and proximity sensors that continuously monitor the user's surroundings and movement. In the event of an accident or crash, the user will be prompted to take action. In the event of an accident, it assesses the severity of the accident and automatically sends an alert with the user's location for communication or emergency services if necessary. With additional features such as wireless connectivity, the helmet can be paired with mobile devices for hands-free communication, GPS navigation and ride tracking. Head protection is important in contact sports. Combining technology with safety features, the project offers effective and smart solutions to prevent accidents, reduce emergency response times and ultimately save people's lives.

I. INTRODUCTION

The smart helmet project with impact sensors is a new way to increase personal safety in many high-risk areas such as traffic, construction sites and road contact sports. Since helmet technology has always focused on protection, this project, which aims to absorb the impact in the event of an accident, aims to expand helmet-related studies by using advanced technology that prevents accidents and reduces time in emergency situations. > As the number of incidents involving cyclists, cyclists and workers in dangerous areas continues to increase, additional safety solutions are needed. Smart hats fill this gap by integrating multiple sensors such as accelerometers, gyroscopes and proximity sensors to monitor the user's environment and movement. The system helps users protect themselves by providing instant alerts when an accident occurs. In addition, in the event of a real accident, the helmet is designed to receive emergency service alerts or communication, providing the user with timely life-saving assistance so that they may forget to call for service or not receive it. The helmet has wireless connectivity and can be paired with smartphones and mobile applications. This allows for greater connectivity and safety by enabling hands-free communication, GPS navigation, and tracking of driving or work data. It represents a major breakthrough in helmet technology, combining protection with protection and emergency response in the transportation sector, construction sector, sports sector, etc., ultimately aiming to reduce deaths and serious injuries due to head injuries. The project announced future solutions that use technology to provide intelligence, safety, and better head protection.

II. LITERATURE SURVEY

Otte et al. (2014) highlights that helmets can reduce the risk of head injury by 60% and the chance of death by 42% for motorcyclists and cyclists. However, they emphasize that traditional helmets do not prevent accidents, only mitigate injury during a crash. While essential for protection, these helmets lack active features that could detect or prevent impending accidents, suggesting a need for more advanced, intelligent design

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

Kamble and Meshram (2019), smart helmets with features such as Bluetooth communication, GPS tracking, and navigation have emerged, enhancing the functionality of conventional helmets. For instance, the Skully AR-1, a commercially available helmet, incorporates a rearview camera and a heads-up display (HUD) for navigation. However, this device still lacks collision detection and impact-sensing capabilities, leaving a gap in proactive accident prevention technologies

Kavya and Rajalakshmi (2018) proposes integrating accelerometers, gyroscopes, and ultrasonic sensors into helmets to detect crashes and alert emergency contacts in case of a severe impact. Their system used accelerometer data to measure sudden deceleration, which indicates a crash, and automatically sent GPS-based alerts to emergency services. This approach represents a shift from passive protection to active safety systems that monitor the environment in real time.

Aghazadeh and McCoy (2017) explored the development of smart helmets for industrial workers, equipped with sensors to monitor proximity to dangerous machinery or areas. Their research demonstrated the potential of using ultrasonic and proximity sensors to detect unsafe conditions and alert workers, thus preventing accidents before they occur. However, the need for integrating more comprehensive sensor arrays for real-time monitoring and accident detection remains.

Patel et al. (2020) point out issues such as battery life, sensor accuracy, and real-time data processing, which need to be addressed to create reliable and efficient smart helmets. Furthermore, cost remains a barrier to making these helmets affordable for the general population. Research is ongoing to improve sensor performance, minimize power consumption, and develop cost-effective solutions.

III. EXISTING SYSTEM

Current helmets mostly focus on passive protection; the primary function of a helmet is to reduce head injuries in a crash. Helmets, especially those used in motorcycles, bicycles, construction, and sports, are designed to absorb and dissipate impact energy, thus reducing the risk of serious head injuries. These helmets are usually made of materials such as polystyrene foam or plastic additives that protect the head in the event of impact, helping to protect against fractures and brain injuries. In order to comply with safety regulations, various levels of protection are provided depending on speed and type of use. However, these helmets are purely mechanical devices with no crash detection, crash prevention, or real-time safety advice. Occupants rely on other factors, such as awareness of the road and traffic environment, to avoid crashes, but the helmet does not directly assist in understanding or responding to light. They are protected from falling debris or crashes, but they are still passive devices. These helmets do not have any smart faces that would alert workers in case of danger or monitor the surroundings, such as approaching machines in danger. Helmets currently in use do not provide collision prevention features. Bad helmets provide real-time monitoring of the accident or the health of players. While some modern sports helmets are equipped with basic impact sensors, the sensors generally only collect data on impacts for evaluation after the game, not for immediate impact or emergency notification. They are also used to monitor long-term injury risk rather than to provide immediate advice for accident prevention.

IV. PROPOSED SYSTEM

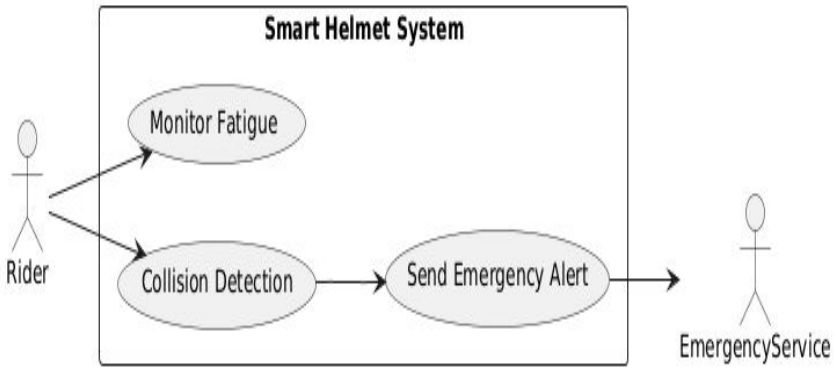
The concept of a smart helmet with crash sensors aims to replace traditional helmets by integrating advanced safety features to prevent collisions and provide emergency response capabilities. Unlike helmets that only provide protection in the event of an impact, this smart helmet includes modern sensors, wireless communication and advanced technology to increase the safety of users, especially cyclists, cyclists, construction workers and athletes. The main goal is to prevent problems before they occur and to provide immediate assistance in the event of an accident or disruption. Action and environment. These sensors help identify potential hazards such as vehicles or dangerous objects near the user. If an accident is detected, the helmet will sound an alarm, allowing the user to measure protection. These actions are important for cyclists and cyclists who often face unforeseen situations. The helmet uses accelerometers and gyroscopes to measure the severity of the collision and determine whether the user is seriously injured. If the impact exceeds the priority, the system will send emergency notifications to designated contacts or emergency services. The alerts include the user's exact GPS location, ensuring that help arrives quickly, even if the driver is unlicensed or unable to find help themselves. The helmet connects to a smartphone or mobile phone via Bluetooth or Wi-Fi, enabling hands-free communication and GPS

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

navigation. This integration not only makes driving easier, but also safer as users can communicate and navigate without taking their eyes off the road. The helmet also continuously collects and analyzes driving data such as speed, distance, and environment, providing users with information about driving habits and safety risks. Ability to identify fatigue and exhaustion. By analyzing head movement and behavior, the helmet can detect signs of fatigue that lead to accidents during long drives or long-term work. When the system detects signs of fatigue, it issues a warning, encouraging users to take a break before continuing.



V. FUTURE ENHANCEMENTS

Future improvements to smart helmets with impact detection technology will include advances in sensor technology, connectivity, and safety improvements to make helmets smarter, more efficient, and more effective. Based on the technology, smart helmets may include new features that can improve user safety, driving, or overall performance. Radar system that increases collision visibility. These sensors can see objects at greater distances and in challenging conditions such as low light or bad weather, providing greater environmental awareness. Artificial intelligence (AI) can also be integrated into the system, allowing the helmet to learn from the user's behavior and driving patterns. AI algorithms can predict potential crashes based on the driver's history and provide early warnings accordingly. Head-up display (HUD). AR can display directions, phone calls, and nearby alerts without distracting the driver. Increase comfort and safety by keeping important information in the passenger's field of vision, reducing the need to look at a smartphone or GPS. conditions such as heart rate, body temperature, and blood oxygen. These sensors can detect signs of an emergency, such as a heart attack or stroke, and send alerts to emergency services. These health-monitoring features, combined with fatigue detection, will make the helmet especially useful for long-distance riders, those working in high-impact environments, and athletes. Use voice commands to operate the helmet's features. Passengers can perform tasks such as answering calls, adjusting music, or asking for directions without taking their hands off the handlebars. This hands-free feature will make your job easier and safer while driving. V2X allows the helmet to communicate with other vehicles, construction and operations. This technology can warn passengers about traffic conditions, traffic hazards or vehicles that are not immediately visible. It can also reduce the risk of accidents in urban environments by associating the helmet with smart urban development, receiving warnings from traffic lights, crossings or construction sites.

VI. CONCLUSION

Smart helmets with impact protection technology represent a breakthrough in personal safety by addressing the limitations of traditional helmets. Integrating advanced sensors, real-time data monitoring, and automatic emergency response, smart helmets cannot protect users from natural disasters, but they still prevent collisions. This safety feature is especially important in high-risk areas such as motorcycle, cycling, construction, and contact sports, where head injuries can cause serious injuries. With collision detection features, automatic emergency alerts, and hands-free connectivity, smart helmets provide users with better protection and comfort. They are capable of detecting fatigue and monitoring the environment to further enhance their effectiveness and contribute to overall user safety. The planning process is a key factor in reducing accidents, injuries, and deaths by offering smart, connected solutions that go beyond passive protection. Augmented reality displays, health monitoring, and V2X communication can make smart hats smarter

ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| ESTD Year: 2018|

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)

and more efficient. By bringing these innovations together, smart helmets can play a key role in improving the future of personal safety, ultimately saving lives and providing peace of mind to users across the industry.

REFERENCES

[1] S. Khan, S. Ahmad, A. A. Al-Qurashi, "A Smart Helmet for Real-Time Monitoring of the Health Status of Workers," IEEE Access, vol. 8, pp. 100320-100330, 2020.
[2] D. Li, X. Wei, S. Wu, "Collision Detection Techniques: A Review," International Journal of Computer Applications, vol. 135, no. 7, pp. 10-14, 2016.
[3] MarketsandMarkets, "Smart Helmet Market - Global Industry Analysis and Forecast," Market Research Report, 2023.
[4] M. Margolis, B. Jepson, Arduino Cookbook, O'Reilly Media, 2017.
[5] E. Upton, G. Halfacree, Raspberry Pi User Guide, Wiley, 2016.
[6] ANSI, "American National Standards for Industrial Head Protection," ANSI Z89.1-2014, American National Standards Institute, 2014.
[7] ANSI, "Protective Headgear for Use in Bicycling," American National Standards Institute, 2018.
[8] P. P. T. Pham, D. C. K. Duong, "Design of a Smart Helmet for Construction Workers Using IoT Technology," International Journal of Engineering and Technology, vol. 7, no. 4, pp. 243-248, 2019.
[9] J. Zhang, Y. Wang, "Development of an Intelligent Safety Helmet Based on IoT Technology," Journal of Ambient Intelligence and Humanized Computing, vol. 11, no. 4, pp. 1531-1541, 2020.
[10] A. S. G. Thangavel, A. Kumar, "A Review on Smart Helmet Systems for Safety in Construction," Journal of Safety Research, vol. 67, pp. 59-67, 2018.
[11] S. N. F. Ali, M. A. Zubair, "Wearable IoT-Enabled Smart Helmet for Construction Safety Monitoring," IEEE Internet of Things Journal, vol. 7, no. 8, pp. 6881-6891, 2020.
[12] M. H. K. Mansour, "Impact Detection System for Helmet Using Accelerometer and Gyroscope Sensors," Journal of Electronics and Communication Engineering, vol. 10, no. 2, pp. 21-25, 2021.
[13] H. W. Lee, C. Y. Lin, "Smart Helmet for Work Safety with Real-Time Monitoring and Location Tracking," IEEE Transactions on Industrial Informatics, vol. 16, no. 3, pp. 1854-1861, 2020.
[14] R. R. R. Shah, S. B. D. Sharma, "Design and Development of a Smart Helmet with Collision Avoidance System," International Journal of Engineering Research and Technology, vol. 9, no. 4, pp. 567-573, 2020.

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

IN SCIENCE, ENGINEERING AND TECHNOLOGY

| Mobile No: +91-6381907438 | Whatsapp: +91-6381907438 | ijmrset@gmail.com |

www.ijmrset.com