



## AI based Smart Wearable for Riding

**Priyanshu Pandey**  
*Internet of Things*  
 Thakur College of  
 Engineering & Technology  
 Mumbai, India

**Vikas Sharma**  
*Internet of Things*  
 Thakur College of  
 Engineering & Technology  
 Mumbai, India

**Aditya Tiwari**  
*Internet of Things*  
 Thakur College of  
 Engineering and  
 Technology  
 Mumbai, India

**Harshidh Patel**  
*Internet of Things*  
 Thakur College of  
 Engineering and  
 Technology  
 Mumbai, India

**Divya Kushwah**  
*Internet Of Things*  
 Thakur College Of  
 Engineering and  
 Technology  
 Mumbai, India

**Abstract**-Distraction related accidents account for over 60% of two wheeler accidents. Majority of those accidents occur while the rider is trying to use their cellphones or other types of media devices. There are many reasons why riders tend to use cellphones while riding, it may be for changing media track or for checking the navigation on their phones. When asked about it the replies were mostly "It is quicker to do this rather than stopping and checking the phone then start riding again". It would be easier if a solution was provided where this all could be done without stopping and without getting distracted. Every information needed will be available and accessible without taking the eyes off the road which leads to lesser distraction related accidents.

**Keywords**— Augmented Reality Display, Artificial Intelligence, Navigation, Voice control, Smart alert system, Safety, IOT

### I. INTRODUCTION

The project focuses on wearable devices that provide AR view to Rider using a Wearable. The new design consists of two parts, wireless voice recognition and a device for guiding passengers for navigation. This means that users can control the device with voice commands instead of traditional methods that put the device at risk. It is shown that the assistant in the equipment to be used will be used, especially when the user is riding a bike or vehicle and turning his face to darkness with appropriate security measures. Wearables can be configured for security and navigation functions. The wearable device connected to the phone will be responsible for security measures against unexpected problems. It will have a camera sensor to monitor its surroundings.

Wearable devices will be equipped with various sensors such as alert sensing devices, camera modules, etc. The helmet will be providing an Augmented reality view on the visor of the helmet. There would be some assistive features to voice control the helmet.

### II. LITERATURE SURVEY

During the research for literature survey, we came across various smart helmet research that had incorporated various approaches with different methodology.

[1] This article provides a thorough analysis of recent advancement in Smart helmet Systems. These Systems aim to improve motorcycle safety and quickly detect accidents, prioritizing the well-being of riders. The research offers valuable insights into the development of smart helmets, particularly regarding the integration of emerging technologies like IOT. Additionally, the Study explores an intelligent motorbike helmet system that alerts riders about approaching large vehicles from behind, helping to prevent collisions.

[2] Despite the mandatory helmet requirement, a significant number of people continue to ride motorcycles without wearing helmets. Pune City alone has approximately 3.5 million two-wheeler riders, leading to an alarming rate of 500-600 accidents each year, with 300-400 of them resulting in fatalities. Pune holds the top position among cities with a high number of two-wheeler riders. In recent years, there's been a concerning surge in frequency of road incidents. This research paper focuses on preventing accidents and developing helmet detection systems. The proposed solution involves an intelligent/safety helmet equipped with a module. This module will synchronize with a corresponding module installed on the motorcycle, ensuring that the rider is wearing a helmet. Additionally, an accident avoidance detection module will be incorporated into the motorcycle as an added feature.

[3] This paper aims to develop smart helmets by creating a mechanism for detecting, reporting accidents. To achieve this objective, the system incorporates sensors, a wireless-fidelity based processor and cloud infrastructure. System which detects the accident will function by relaying accelerometer data up to

the processor, which constantly monitors the readings for fluctuation. In the case of an accident, necessary information is transmitted to mentioned emergency numbers through a cloud-service and emergency information sharing with medical facilities. Additionally, the system utilizes GPS or Global Positioning System to determine the vehicle's current location. With its real-time transmission of accident-related data, the system, aptly named Konnect, ensures reliable and prompt information delivery.

[4] The paper discusses the design consideration where safety of the motorcyclists has been prioritized. The helmet is crafted in such a meticulous way that it ensures that the rider is wearing it while on the go, therefore ensuring a safe ride and promoting safe riding practice. The helmet incorporates a force sensing resistor and pulse sensor to verify that the rider is using the helmet appropriately.

[5] A motorcycle, also known as a motorbike or two-wheeler, is a widely used form of transportation due to its affordability. However, it is also considered the most dangerous type of vehicle. Accidents often occur as a result of speeding or driving under the influence. Ensuring safety and security while traveling in vehicles is a top priority for everyone. The rapid urbanization and expansion of two-wheeler transportation networks have made road safety and bike security crucial concerns. This has led to an increase in accidents and the loss of lives. In many cases, it is challenging to determine the precise location of an accident. Helmets provide protection for the head, safeguarding the brain from injuries. Smart helmets have the capability to not only detect accident locations but also save lives by enhancing the safety of two-wheeler riders. This research proposes the implementation of a smart helmet system to prevent accidents. The system consists of three components: the helmet circuit, the automobile circuit, and the mobile application. The helmet circuit incorporates infrared and alcohol detection sensors. The automobile circuit includes a 3-axis accelerometer, Bluetooth module, relay, and load sensor. If the helmet is worn and no alcohol is detected, the helmet circuit sends a signal to the automobile circuit to start. The automobile circuit verifies the load status before initiating. In the event of a crash or impact, the 3-axis accelerometer detects the accident. Once an accident is detected, the mobile application automatically sends the accident location to the police and emergency contact number stored in the database.

[6] The number of road accidents is on the rise due to the disregard for helmet usage and alcohol consumption among riders. This alarming trend has resulted in a significant loss of lives worldwide. To address this issue, the focus of this project is to develop a smart helmet that can prevent accidents and detect alcohol consumption. The helmet incorporates an IR sensor to check whether the rider is wearing it or not. Additionally, a Gas sensor is used to identify the presence of alcohol in the rider's breath. If the rider is not wearing the helmet or has consumed alcohol, the bike will not start. However, if the rider is wearing the helmet and no alcohol is detected, the bike will start. In the event of an accident, the sensor within the helmet will detect the condition of the motorcycle and promptly report the incident. Furthermore, the GPS integrated into the bike will transmit the accident location to the main server of nearby hospitals. This focuses on the importance of the smart helmet in preventing accidents and addressing the issues of helmet non-compliance and alcohol consumption among riders.

[7] Utilizing the Kano model as a framework, this study aimed to identify and analyze the personalized requirements of smart helmets. To understand the preferences of the user and their requirements for features of smart helmets we utilized

questionnaires and focus groups. The questionnaire was tailored based on the Kano Model principle and the gathered data was categorized and analyzed using the Kano Table. The study aimed to inform the design process by identifying the desired features which are also appealing to the users. Ultimately, the findings of this research contributed valuable insights for designing innovative smart helmet products and corresponding mobile applications, with the objective of enhancing user satisfaction.

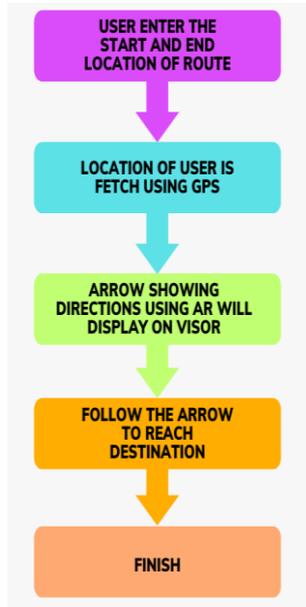
### III. METHODOLOGY

There will be a wearable consisting of several sensors which will be helping in riding the bike. The smart wearable will consist of cameras which will help in the detection of the road. The AR view of the wearable will work as a display unit for the rider such that all the field of view will be shown in the display, which will help to showcase the details for the riding assistant. The system is designed with a microcontroller to process data and make decisions based on the business of wearable devices. The wearable consists of many sensors to collect different parameters/information, so that the system can take proper action based on collected data. System will be integrated with a powerful microcontroller that processes the data which is received from various sensors. Microcontroller can provide real time feedback by analyzing the data collected from sensors and can make intelligent decisions.

The button is situated at the top of the wearable to detect, verify and ensure that the rider has the wearable on. When any accident occurs, tilt sensors that are part of the wearable are used to detect that the accident has occurred. When an accident occurs, we can record the location of the incident using GPS. Later, with the assistance of the Wi-Fi module, we can share information such as GPS location, bike, driver's health to the cloud. From there, we can use all this information to seek medical help in the event of an emergency or accident and reduce the risk of death for the passenger.

Navigation System integrated in the wearable which will offer riders a convenient and efficient way to reach their destination. It provides turn-by-turn directions, route optimization, and real-time traffic updates. By choosing the most suitable routes, riders can save time, reduce fuel consumption, which leads to a smoother and more enjoyable riding.

A realistic wearable view and directions, traffic, etc. to help the passenger understand the traffic situation. Passengers will also have voice recognition and services that provide real-time assistance to passengers. The wearable will consist of an alert system which will be using SMS technology to share the information about the accident to the emergency contacts and government bodies for proper actions to be taken.



3	AR View
4	Voice Control
5	Object Detection
6	GPS Navigation

Table 2: - Features for user

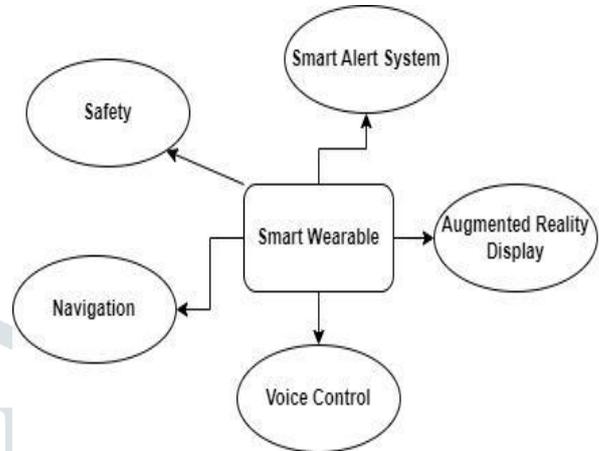


Figure: - Features of Smart Wearable



Fig1:- Tilt Sensor

Tilt sensors are used to measure the angle of inclination of an object with respect to earth's gravity.



Fig2:- Mic

Microphone is a device which is used for converting natural voices of various frequencies into various electrical signals which can be heard using electrical devices.



Fig3:- Camera Module

A Microcontroller can be described as a small computer which is developed on a single chip and can operate as a full system with ram and storage as in-built in it.

Python is a computer programming language used to develop various softwares such as AI, ML and Websites.

Sr.No	Features to Include
1	Voice Assistant
2	Crash Detection

IV. CONCLUSION

Here with the help of various research related to bike accidents and difficulties faced during riding a bike, we understood that the need of an end device is required to assist the rider while riding the bike. Also, to detect the accidents and help in directions for the route to end up the rider on proper location. This also enables accident detection through which can be safely recognized if any issues happen.

ACKNOWLEDGMENT

We express our sincere appreciation to the IOT Department for sharing their valuable insights and guidance throughout the research process. We are also thankful to our colleagues for providing constructive feedback on an earlier draft of the manuscript. Any errors or omissions in the final version is solely our responsibility.

REFERENCES

[1] D. N., A. P. AND R. E.R., "ANALYSIS OF SMART HELMETS AND DESIGNING AN IOT BASED SMART HELMET: A COST EFFECTIVE SOLUTION FOR RIDERS," 2019 1ST INTERNATIONAL CONFERENCE ON INNOVATIONS IN INFORMATION AND COMMUNICATION TECHNOLOGY (ICIICT), CHENNAI, INDIA, 2019, PP. 1-4, DOI: 10.1109/ICIICT1.2019.8741415.

[2] N. Nataraja, K. S. Mamatha, Keshavamurthy and Shivashankar, "SMART HELMET," 2018 3rd IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT), Bangalore, India, 2018, pp. 2338-2341, doi: 10.1109/RTEICT42901.2018.9012338.

[3] S. Chandran, S. Chandrasekar and N. E. Elizabeth, "Konnect: An Internet of Things(IoT) based smart helmet for accident detection and notification," 2016 IEEE Annual India Conference

(INDICON), Bangalore, India, 2016, pp. 1-4, doi: 10.1109/INDICON.2016.7839052.

[4] M. Lokeshwaran, S. P. Nikhit Mathew and A. Joshuva, "Raphael—The Smart Helmet," 2020 International Conference on Wireless Communications Signal Processing and Networking (WiSPNET), Chennai, India, 2020, pp. 48-51, doi: 10.1109/WiSPNET48689.2020.9198463.

[5] M. A. Rahman, S. M. Ahsanuzzaman, I. Rahman, T. Ahmed and A. Ahsan, "IoT Based Smart Helmet and Accident Identification System," 2020 IEEE Region 10 Symposium (TENSYP), Dhaka, Bangladesh, 2020, pp. 14-17, doi: 10.1109/TENSYP50017.2020.9230823.

[6] A. Jesudoss, R. Vybhavi and B. Anusha, "Design of Smart Helmet for Accident Avoidance," 2019 International Conference on Communication and Signal Processing (ICCSP), K and C. H, "Arduino based smart and intelligent helmet system for two-wheelers," 2020 IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER), Udupi, India, 2020, pp. 236-240, doi: 10.1109/DISCOVER50404.2020.9278032

Chennai, India, 2019, pp. 0774-0778, doi: 10.1109/ICCSP.2019.8698000.

[7] Luo, Jia & Zhu, Jiaying & Pan, Tianli & Ke, Ziang & Liao, Yaohui & Lin, Lu. (2023). Smart Helmet Design Based on KANO Model. 10.3233/FAIA220742.

[8] P. Korade, M. Gupta, A. Shaikh, S. Jare, Y. Thakur, and U. Students, "SMART HELMET- Review Paper," IJSDR. Accessed: Feb. 06, 2023. [Online]. Available: <https://www.ijedr.org/papers/IJSDR1811028.pdf>

[9] M. S. Gour, D. K. S, P. Kumara, M. S, S. K.

