iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 **Issue:** X **Month of publication:** October 2024

DOI: https://doi.org/10.22214/ijraset.2024.64872

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue X Oct 2024- Available at www.ijraset.com

A Navigation Assisting Device

Rupali Deshpande[1], Raj Pagar[2], Rakshit Oswal[3], Onkar Jadhav[4], Shivkumar Padalwar[5], Suchita Padhye[6], Ajinkya Padole[7]
DESH, Vishwakarma Institute of Technology, Pune

Abstract: Due to the increase in the rate, road fatalities caused by factors like lack of helmets, and impaired driving this paper proposes The Smart Helmet system under the IoT infrastructure. This helmet contains a boxed Arduino Uno, HC-05 Bluetooth, an OLED, with a rider safety Android application added to the mix. With GPS and GSM integrated modules in the Smart Helmet, it identifies the accident zones and alert the family members before anything wrong happens. This research presents the development and possibilities of this Smart Helmet systems to minimize the number of two-wheeler riders' accident related injuries and fatalities.

Keywords: Smart helmet , Arduino Uno , Android Studio , HC 05 Bluetooth module , OLED display .

I. INTRODUCTION

Road accidents are a common occurrence throughout the world. Be it a developed country or an underdeveloped country, traffic accidents on roads seem inevitable. It has been observed that among the total roadside accidents in year 2016, the highest percentage of fatalities seen per hundred million vehicle miles travelled was for motorcycles. The data in this study were taken from the US department of transportation and they indicated that the fatality rate in motorcycle crashes is 25.85%, which is much higher than for light truck or passenger vehicles, which have fatality rates of 0.73% and 0.93%, respectively The motorcycle is a sophisticated machine that requires full presence of mind and a high level of skill for effective operation, and yet despite the skills required of the driver, it does not impress us in road safety. Any misuse, such as speeding, can be fatal. On road, motorcycles are under threat, not only from hurdles on the road, but also from other careless drivers. One careless move by the inattentive driver of an approaching vehicle can be fatal. The current means used to keep the approaching vehicle aware of the motorcycle moving in front of it are hampered by the lack of the complete transfer of information. Brake lights, for example, indicate that the biker has pressed the brake, but during gear braking or acceleration, no indication is relayed to the approaching vehicle. The bike's turning indicators are an effective information-relaying device, this is a situation we observe our day-to-day life, a thorough of finding some solution to resolve this problem come up with this idea of giving the information about navigation system in proper way.

The aim of our project is to give information to the rider in proper way and smart helmet and making comfort to the rider while driving and taking care of the person who is riding on road.

II. LITERATURE REVIEW

Jesudoos A et.al[1] proposed a mechanism, where sensors such as IR sensor, vibration sensor and gas sensor, mems are used. The gas sensor is used to detect the amount of liquor he had consumed by checking the breath of a person wearing the helmet. The bar control of the vehicle is handled by MEMS. Accident is detected by vibration sensor. Load of the vehicle is recognized by load checker. The Sensors are interfaced with the PIC microcontroller. The gas sensor will detect if a user consumed alcohol and display on the LED display. If an accident occurs the vibration sensor, sense the accident and send information through GPS to the hospital .If there is any rash driving is done by the rider the MEME sensor detect the amount of the person from his bank account. To check whether the rider is wearing the helmet or not IR sensor is used. In this system exactness and accuracy are high and ambulance is booked automatically based on ten location.

K.M. Mehata et.al[2] proposed a techniques which provide safety to the workers or to identify any fall of the workers in working area. The proposed system has two components. One is the wearable device built using sensors and electronic elements. Another component is the cell phone. The communication between the two components is provided by GSM module. These devices also monitor the health and safety of the worker is continuously. This system ensures good fall detection and alert the register person to give medical attention.

Divyasudha N et.al[3] proposed a system consists of micro controller, position sensor, Alcohol sensor, piezoelectric sensor, RF Transmitter, IOT Modem, GPS receiver, Power supply & Solar panel to avoid the accidents and check the alcohol consumption.

©IJRASET: All Rights are Reserved

In this system two condition is checked that is whether the rider is wearing the helmet or not and to check whether he had consumed alcohol or not if this is not followed by the rider the bike will not start and it is indicated by beep sound. If any accident Occur it is informed to predefined number and police station using IOT modem. This system is cost efficient compare to other kind of helmets.

Manish Uniyalet.al[4] proposed a system with two units that is helmet unit and two wheeler unit. RF receiver of the matching frequency gives the helmet position data to the two wheeler section. The microcontroller placed on the TW section will have information of the helmet position which is continuously checked. There are various other sensors such as accelerometer (tilt angle measurement), Hall-effect sensor (speed measurement), GPS module (location pointer) placed on the TW vehicle. The sensors collect the data and send the data to the microcontroller then if there is a internet connection then it is sent to the server. The speed of the vehicle can be accessed by the people at any instant by this method. In this system people can access the speed of the vehicle. Parents can see that is their child have worn helmet or not.

ShoebAhmed Shabbeer et.al [5] proposed the smart helmet method which detect and report the accidents. In this method they use microcontroller interfaced with accelerometer and GSM module. The notification and report of the accident is provided using cloud infrastructures. In this method if the level of the acceleration exceeds than the threshold or if any accident occurs the information is sent to the emergency authority server which then sends the message to the assigned emergency contact through GPS module. The result of this system was able to identify accidents is of 94.82% and sends the correct coordinates 96.72% of time.

P.Rojaet.al[6] has proposed a system consisting a 6 units as follow, that is remover sensor, IR sensor, Air quality sensor, Arduino uno microcontroller, GPRS, GSM. This helmet provides the alert about the harmful gases in the mining areas to the workers and also proved information to the server if helmet is removed. Here this data transmission is done using IOT technology .

C.J Bheret.al[7] has proposed a system of smart mining helmet that detects three types of hazards that is harmfull gases, remove of helmet and if any collision. Here they uses many sensors such as IR sensors, gas sensors, accelerometer.

Sreenithy Chandran et.al [8] has proposed a system of smart helmet named konnect. Here they use integrated network of sensors, WiFi enabled processors, cloudcomputing infrastructures to detect and prevent the accidents. This system also provide the information to the provided contact by text message if the speed is increased than the threshold level.

Mohammed Khaja Areebuddin Aatifet.al[9] proposed a technique consisting of arduinouno, Bluetooth module, push button and 9V battery. Here the smart helmet integrated with Bluetooth is connected to the cell phones and push button is used if any emergency occur.

Archana.Det.al[10] proposed a system to reduce accidents, here the system consist of a sensor which sense the human touch when he plug in the bike key. After he wear the helmet the sensor automatically lock the helmet and he can only remove is when bike is stopped.

Ahyoung Lee et.al [11] proposed a system based on three sensors acceleration sensor, ultrasonic sensor, and carbon monoxide sensor, and also based on an Arduino MCU (Micro Controller Unit) with a Bluetooth module to provide safety to the workers.

III. METHODOLOGY

The methodology of this research paper entails coming up with a step-by-step approach to fashioning the smart helmet with the navigation assistance. It starts off with a general concept of navigation assistance with focus on safety and ease in the overall flow. This is followed by a literature review where all the existing smart helmet technologies are assessed with a view of coming up with shortcomings and potential enhancements. The paper then goes on to describe the system perspective, this includes the Arduino Uno, the Bluetooth module HC-05, OLED display and the use of Android studio in the and APP development of the system's navigation application. The most complex stage is the third one, the hardware implementation phase; this is when all components are integrated into the helmet, as well as fine-tuned. At the same time, the software development aspect strengthens the software global interface and additional features such as mapping as well as real-time direction services. The hardware and software components of the Smart helmet have to work hand in hand, hence appropriate protocols between the helmet and the Android application. In the next step, testing and evaluation activities are performed to determine overall system's performance based on accuracy, reliability, and usability of the system. Special attention is paid to studying the results of the testing phase to define the work's strengths, weaknesses, and directions for further research; the compliance of the given document with the IEEE citation style is checked during the writing phase.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |

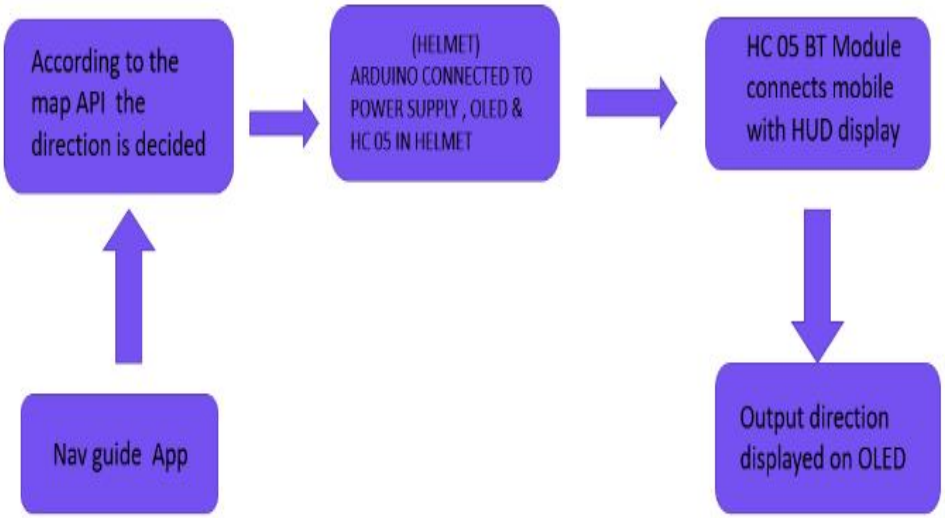


Fig.1 Project Flow

IV. RESULTS AND DISCUSSIONS

Arduino with OLED Display: The Arduino is the microcontroller that interprets the data that comes from the Bluetooth (BT) Module. The OLED display wired to the Arduino texts out the directions or any other information desired on the display. Because of their clarity and low power consumption OLED (Organic Light Emitting Diode) displays are the best option.
Bluetooth (BT) Module: This module allows wireless interface between the Arduino and the application. It handles end user data that comes from the application layer for instance navigation instructions and relays it to the Arduino for processing and display.
Custom Application: The work application would be to engage the user as well as the called hardware parts. It also interacts with the BT Module to send directions depending on the GPS information or the entry made by the user. The application also uses the Geoapify API to obtain mapping and routing services so that the application delivers the most current and accurate navigational data.
Geoapify API: This API helps mapping as well as routing feature for the application as well. It enables the application to pull map details, find out routes, and get directions other than pulling data depending on the user's location and/or the destination. Interaction with the Geoapify API means that the mapping data available to the application is updated and accurate. Hardware Setup Arm: An arm is developed to firmly install the hardware entities, including the Arduino, BT Module, and the Olympus Micro OLED display on the covering part of the helmet. This arm makes certain that the components are correctly orientated for efficiency and they are also very lightweight and comfortable to wear by the user. Magnifying Glass and Mirror: Some of these optical components includes; They are incorporated in the mounted arm as shown below to improve visibility and readability of the oled display. The magnifying glass zooms the content making it easier to read while the mirror project the content into the field of vision, HUD like display. This makes this a system that integrates both the hardware and software where it acts like a voice command system providing direction that the user can easily monitor as they drive, with directions being relayed on a screen situated in the user's line of sight. Arduino, BM, OLLED, CA, GA API, as well as the hardware design guarantee an efficient and visually appealing design.
The navigation system consists of several parts which are integrated into a single system and are used to give directions in real time without requiring hand use. An Arduino microcontroller along with an OLED display analyses and displays navigation instructions obtained through Bluetooth module. This module interacts with a specialized developed application, to function smoothly with the user and the hardware environment. Geocoding, mapping, and routing services are provided with the help of the Geoapify API integrated into the application; therefore, the user receives up-to-date and accurate information.
For ease of usage the various elements attach securely to the helmet by means of a specially designed hardware setup arm. This arm contains a magnifying glass and mirror to increase the size and further the legibility of the OLED screen; along with the instructions of the application, the forearm offers the user a sort of heads-up display. This is an elaborate hardware and software package which makes it easy for users to navigate and carry out different activities such as biking, hiking or driving.

Fig.2 Smart Helmet

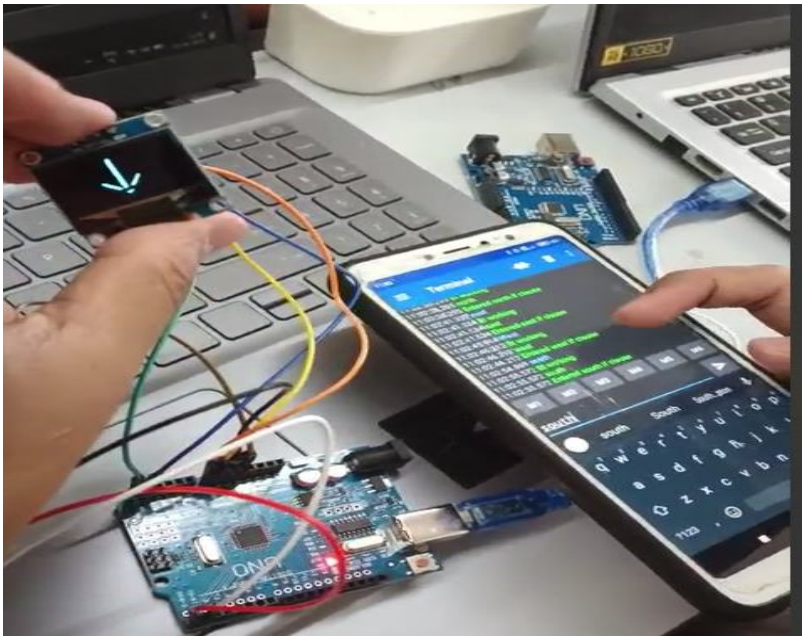


Fig.3 Working Circuit

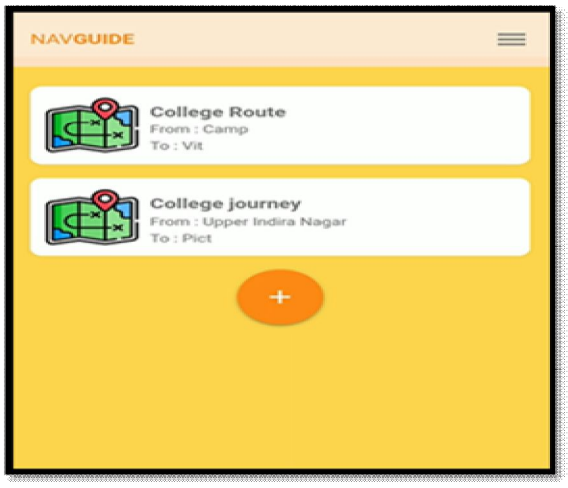


Fig.4 PWA(Progressive Web Application) of our device

V. FUTURE SCOPE

Over the course of this work, the possibility of expanding and refining the applications of navigation smart helmets equipped with Arduino Uno, HC-05 Bluetooth module, OLED, and develop applications in Android Studio is numerous in the future. Another avenue relates to progression in sensoring technology with subsequent constant model improvements expected to improve the accuracy and reliability of the models. Such developments may translate to improved navigation directions and contextual over imaging for the benefit of the riders offering better understanding and interpretation of what they are surrounded by. Furthermore, deployment of supplementary innovation like voice command, gesture control, emergency response systems, etc. offers one of the biggest opportunities to enhance the usability of cars and ensure enhanced safety in relation with traffic incidences. With the help of the new opportunities offered by the emerging technologies, the navigation smart helmets may turn into the full-scale safety devices which not only will help the riders find the way to the certain destination but will also constantly assess the potential danger and respond to the existing threats and emergencies. Additionally, the growth of compatibility with the third-party apps and platforms can create new prospects for advancement and synergy, which means that navigation smart helmets can become a part of the established large commutation of interconnected devices and services. It can be expected that as R&D in wearable technologies products proceed, navigation smart helmets will grow into more important roles of providing safer and more convenient navigation experiences for riders, thus promoting the development of smart transportation systems and the construction of smarter cities.

VI. CONCLUSIONS

The HUD will display such information as directions as a heads-up display, so that the rider's focus will remain on the road ahead while keeping him informed on the right directions to take. It's purposed to navigate without the need for riders to look down at a GPS device or smartphone thus helping avoid accidents and enhancing the perception of other $ things. Thus, this project appears as an effective synthesis of engineering, user interface design, and safety technology for the actual needs of motorcycle riders.

VII. ACKNOWLEDGMENT

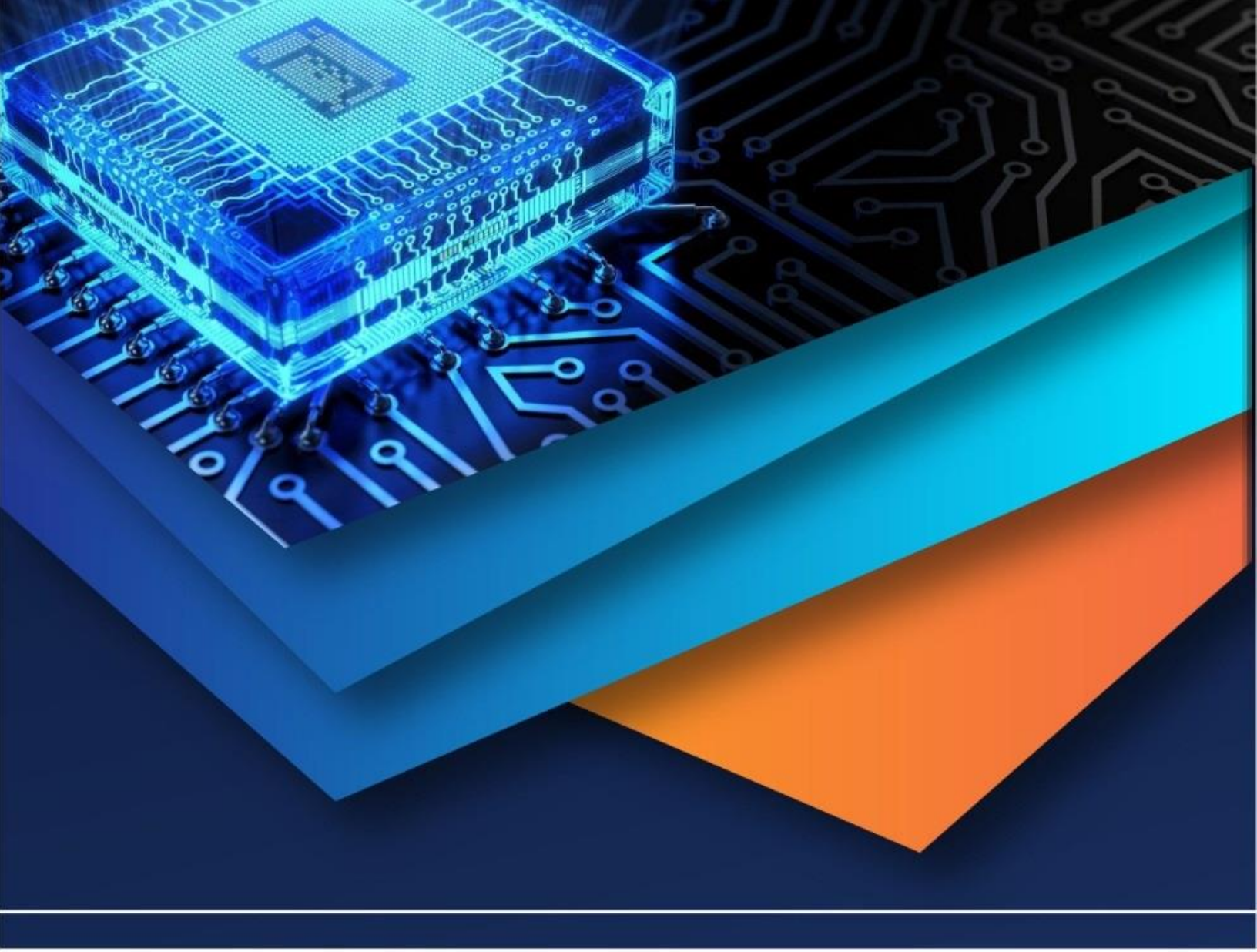
We would like to extend our profound thanks to all those who have contributed in the preparation of this research paper. To begin with, we extend our heartiest gratitude to our project guide [Prof. Rupali Deshpande] for their kind and unexcelled cooperation, constant encouragement and crucial suggestions critically during the course of this research work. Furthermore, we also would like to express our thanks to all the group members for their useful encouragement and patience during the difficult periods of this project. Finally, we are thankful to our college [Vishwakarma Institute of Technology, Pune] for their support and co-operation to accomplish this work. Their support has been very significant in the realization of this project.

REFERENCES

[1] Koohi, F.; Soori, H. Helmet Use and Its Efficacy on Preventing Motorcycle Injuries: A Systematic Review and Meta-analysis. J. Maz. Univ. Med. Sci. 2019,28, 198–216.
[2] Shaadan, N.; Suhaimi, M.A.; Hazmir, M.; Hamzah, E. Road accidents analytics with data visualization: A case study in Shah Alam Malaysia. J. Phys. Conf. Ser. 2021,1988, 012043. [CrossRef]
[3] Jesudoss, A.; Vybhavi, R.; Anusha, B. Design of smart helmet for accident avoidance. In Proceedings of the 2019 International Conference on Communication and Signal Processing (ICCSP), Chennai, India, 4–6 April 2019; p. 012043.
[4] Bhatti, F.; Shah, M.A.; Maple, C.; Islam, S.U. A novel internet of things-enabled accident detection and reporting system for smart city environments. Sensors 2019,19, 2071. [CrossRef] [PubMed]
[5] Davydov, V.; Bezzateev, S. Accident detection in internet of vehicles using blockchain technology. In Proceedings of the 2020 International Conference on Information Networking (ICOIN), Barcelona, Spain, 7–10 January 2020; pp. 766–771.
[6] Campero-Jurado, I.; Márquez-Sánchez, S.; Quintanar-Gómez, J.; Rodríguez, S.; Corchado, J.M. Smart Helmet 5.0 for industrial internet of things using artificial intelligence. Sensors 2020,20, 6241. [CrossRef] [PubMed]
[7] Usman, M.; Waseem, M.; Khan, D.; Manan, A.; Ullah, S.; Iqbal, M.M.; Faheem, Z.B. PD Based Cost Effective and Accurate Calorimeter Temperature Control and Measurement System. In Proceedings of the 2020 IEEE International Conference on Sustainable Engineering and Creative Computing (ICSECC), Indonesia, 16–17 December 2020; pp. 189–193.
[8] Aatif, M.K.A.; Manoj, A. Smart Helmet Based on I IoT Technology. Int. J. Res. Appl. Sci. Eng.Technol. (IJRASET) 2017,5, 409–415.
[9] Alvi, U.; Khattak, M.A.K.; Shabir, B.; Malik, A.W.; Muhammad, S.R. A comprehensive study on IoT based accident detection systems for smart vehicles. IEEE Access 2020,8, 122480–122497. [CrossRef]
[10] Goyal, S.; Bedi, P.; Kumar, J. Realtime Accident Detection and Alarm Generation System Over IoT. In Multimedia Technologies in the Internet of Things Environment; Springer: Berlin/Heidelberg, Germany, 2022; Volume 2, pp. 105–126.
[11] Tabary, M.; Ahmadi, S.; Amirzade-Iranaq, M.H.; Shojaei, M.; Asl, M.S.; Ghodsi, Z.; Azarhomayoun, A.; Ansari-Moghaddam, A.; Atlasi, R.; Araghi, F. The effectiveness of different types of motorcycle helmets–A scoping review. Accid. Anal. Prev.

[12] Karlin, B.; Victor, N.; Cuong, T. Personal Navi: Benefits of an Augmented Reality Navigational Aid Using a See Thru 3D Volumetric HUD. Proceedings of the 6th International Conference on Automotive User Interfaces and Interactive Vehicular Applications, Sept 2014.
[13] Krittiya, T.; Sakol, T. Effects of Guided Arrows on Head-Up Display Towards the Vehicle Windshield . 2012 Southeast Asian Network of Ergonomics Societies Conference (SEANES)
[14] Adam, B.; Gary, B.; David, R. An Investigation of Augmented Reality Presentations of Landmark-Based Navigation using a Head-Up Display. Proceedings of the 7th International Conference on Automotive User Interfaces and Interactive Vehicular Applications. Sept 2015.
[15] Annie, P. Head Up Display in automotive: a new reality for the driver. Springer. August 2015
[16] Aleš, M.; Tereza, K.; Martin, H. Production of Head-Up Display windshield and its relation with the image quality. Transactions on Transport Sciences a Peer-Reviewed Open Access Journal 2022 vol.2.
[17] Zong, Q.; Fang-Cheng Lin; Yi-Pai Huang; Han-Ping D. Shieh. Maximal Acceptable Ghost Images for Designing a Legible Windshield-Type Vehicle Head-Up Display. IEEE Photonics journal. October 2017.
[18] Bethan, T.; Sanna, P.; Gary, B.; Joseph, G. Evaluating Head-Up Displays across Windshield Locations. Proceedings of the 11th International Conference on Automotive User Interfaces and Interactive Vehicular Applications. September 2019.
[19] Choi, Y.; Kim, Y. Applications of Smart Helmet in Applied Sciences: A Systematic Review. Appl. Sci. 2021, 11, 5039.
[20] Sanjaya, K.; Anshuman, A.; Hemank, R.; Preetinder, S. New design and fabrication of smart helmet. 2nd International conference on Advances in Mechanical Engineering (ICAME 2018).
[21] Keesari, S.; Yamini, M.; Donuru, K.; Kothapu, H.; Ranjan, S. Smart Helmet for safe driving. E3S Web of Conferences. 2019.
[22] Soundarya, S.; Yamini, R.; Monisha, G.; Krishnakumar, R. Augmented Smart Helmet International Research Journal of Engineering and Technology (IRJET). May 2021.
[23] Rishi, D.; Purushottam, K.; Neeraj, G.; Arun, S. A Review on Smart Riding Helmet. International Journal of Creative Research Thoughts (IJCRT), Volume 6, Issue 2 April 2018.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)