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Review on Smart Helmet for Accident Prevention Using IOT

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Abstract: ***Detecting and preventing drunk driving is of paramount importance as it has the potential to reduce accidents caused by alcohol impairment. Ongoing research is dedicated to developing techniques that can identify alcohol levels leading to unconsciousness, impairing a person's ability to function, walk, and make sound judgments. This research primarily leverages the capabilities of electronics and automotive componentsand concepts. Various devices are being explored, suchas different sensors from the MQ series and facial expression recognition systems. Among these, the MQ-3 Sensor has shown promise in the field of electronics for detecting alcohol concentration in individuals. Long- term environmental implications of these drink and drive detection technologies are being meticulouslyexamined. This study aims to enhance our understanding and explore the commercial viability of these detection techniques in the realm of safety precautions.***

Keywords: DC motor, Microcontroller, Alcoholic sensor, IOT module, Motor driver, Bluetooth.

I. INTRODUCTION

Motorcycle riding offers a cost-effective, flexible, and convenient means of commuting, especially in congested traffic. However, the surge in the number of people choosing two-wheelers for their daily commute has led to significant challenges. Motorcycle riding carries inherentrisks, particularly when riders neglect safety rules and fail totake necessary precautions, resulting in accidents that can, unfortunately, be fatal. Despite existing laws governing safe motorcycle operation, compliance with these rules is often lacking. Wearing a helmet in the right manner, as per informationfrom the World Health Organization (WHO), has the potential to decrease severe injuries by 70% and fatalities by40% in the context of road accidents. [1]. In the current system, accident victims often do not receive immediate first aid, and there is no mechanism to determine if the rider was under the influence of alcohol. Our motivation is driven by responsibility of social work. Shockingly, nearly 92% of bike-riders who died weren't putting on helmets, as revealed by statistics from the Online National Electronic Injury Surveillance System. We employ an alcohol sensor, MQ3, to detect alcohol in the breath driver. The Microcontroller Unit (MCU) considered to be the central unit controlling all system operations. The MCU reads data from the sensors and manipulates this data to control the entire system's operations. The alcohol sensor connects to the Microcontroller Unit (MCU) using circuit of interfacing, while the helmet switch is linked to the Microcontroller Unit (MCU) directly. The MCU processes sensors data and provides output to the encoder only when specific conditions are met.

II. PROBLEM STATEMENT

An accident is defined as any vehicle incident that occurs on road. Accidents encompass collisions involving vehicles and pedestrians, vehicles and animals, or vehicles & stationary objects. On the basis of reports, there are approximately 1600 road accidents daily in India, resulting in 550 fatalities each day. The primary causes of these accidents are driving under the influence and failure to wear helmets. Wearing a helmet is mandatory for bike-riders through Motor-Vehicle-Act, as outlined in Section-129 of the Motor Vehicle Act of 1988. The consumption of alcohol impairs the rider's concentration, leading to dizziness and diminished vision. Alcohol can also diminish a rider's fear and encourage them to take unnecessary risks. These factorscontribute to accidents while driving and often lead to severe consequences.

III. OBJECTIVES

The primary objectives of this project involve the use of IoTtechnology in a smart helmet to prevent accidents:

1) Verify whether the helmet has been worn by the rider.
2) Confirm that the rider is not consumed alcohol.
3) Ensuring motorcycle can start only when specificconditions are satisfied.
4) Send notification alert about an accident to a designatedrecipient using IoT.
5) Disable a vehicle when no helmet detected after startingthe bike.
6) Implement the presence of an alcohol sensor in thehelmet section (transmitter section).

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IV. LITERATURE SURVEY

Drunk driving remains a significant and concerning issue in our modern society, resulting in a distressing number of injuries and fatalities annually.

A smart helmet is a type of wearable technology outfittedwith an array of sensors and monitoring devices [1]. These helmets find applications in various fields, spanning sports, construction, and military contexts. However, one of the most promising applications of smart helmets is in enhancing transportation safety, particularly in identifying alcohol consumption among drivers [1][2].

The core concept behind the smart helmet systemrevolves around employing diverse sensors and monitoring devices for detecting alcohol in a breath of driver or bloodstream. The system then issues an alert to the driver, advising against operating a vehicle until they have sobered up. In cases where the driver disregards the warning and attempts to drive under the influence, the smart helmet system can also notify law enforcement officers [3].

One notable advantage of the smart helmet system lies in its non-invasiveness. Unlike other methods of alcohol detection, such as blood or urine tests, the smart helmet system doesn't necessitate the collection of bodily fluidsfrom the driver. Instead, it relies on sensors capable of non- invasively detecting alcohol in a driver's breath or blood. Several types of sensors can be incorporated into a smart helmet system to achieve this alcohol detection [4][5].

K. Sandeep et.al. 2020, Research presents an alcohol detection system that leverages the IoT (Internet of Things) technology using MQ3 sensors. The core functionality of the system involves a microcontroller that interfaces with the MQ3 alcohol sensor, collecting the pertinent data, and subsequently transmitting it to an IoT platform for comprehensive analysis. Attributes of this system is its real- time alcohol level detection capabilities. It continuously monitors alcohol levels and promptly dispatches alerts to a designated mobile phone number when elevated alcohol concentrations are detected. Our approach is bothstraightforward as well as cost-effective for deployment and rendering it suitable for deployment in public establishmentslike bars, clubs, and restaurants. This paper showcases the system's promising performance, underscoring its remarkable accuracy and reliability. It holds great potential as a valuable tool for mitigating the risks associated with drunk driving and related accidents.

Lukas Scott E et.al. 2021, The paper delves into the notion of Blood Alcohol Concentration (BAC) and its importance in assessing an individual's degree of alcohol intoxication. It elucidates the variables that influence BAC, encompassing the quantity and type of alcohol ingested,body mass, and metabolic rate. The paper also delineates diverse methodologies for BAC measurement, including breathalyzers, blood assays, and urine tests. Furthermore, it underscores the legal consequences associated with surpassing the permissible BAC threshold while driving or operating machinery. The paper concludes that a comprehensive grasp of BAC is fundamental for fostering responsible alcohol consumption and mitigating the hazards linked to alcohol-induced accidents.

A. Siri Pallavi et.al. 2021, The project introducesan Internet of Things (IoT) integrated ignition interlock device (IID) with the primary purpose of averting instances of drunk driving. This is achieved by deactivating an ignition system of vehicle when the BAC (blood alcohol concentration) of driver exceeds the legal limit. The core of this system involves alcohol sensor that assesses the driver's

BAC, relaying this data towards platform of IoT for thorough processing as well as analysis. Furthermore, the system is equipped to issue alerts to a specified mobilephone number should elevated BAC levels be detected or if any efforts are made to circumvent its operation. The adoption of IoT technology endows this system with exceptional reliability, scalability, and accessibility, rendering it a potent tool for the prevention of drunk driving and the associated accidents.

S Sahabis et.al. 2021, The project suggests utilizinga smartphone as a device to implement an alcohol detection system. This system incorporates an external alcohol sensor that connects to the smartphone via the headphone jack. The smartphone's built-in microphone is employed to capture the user's breath, subjecting it to alcohol content analysis. Real- time feedback regarding the user's alcohol level is provided, and if elevated levels are detected, an alert is dispatched to a predefined contact. Leveraging a smartphone as the primary device makes the system exceptionally portable and user- friendly, seamlessly integrating it into daily routines. The project highlights the smartphone's potential as a tool to encourage responsible alcohol consumption and prevent accidents arising from drunk driving.

Sandhya Ravindran et.al. 2020, Road accidents are on the rise, leading to severe long-term injuries, permanent damage, and even loss of life. Consequently, ensuring the safety of riders has become a paramount issue in today's society. This project aims to mitigate the occurrence of accidents involving motorbike riders by addressing key factors that contribute to accidents, notably alcohol consumption and drowsiness. Whenever the system detects either or both of these factors, the rider will be promptly alerted through an alarm. Additionally, if the motorcycle is stationary, the ignition will be automatically deactivated and locked as a precautionary measure.

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V. BLOCK DIAGRAM OF OUR SYSTEM

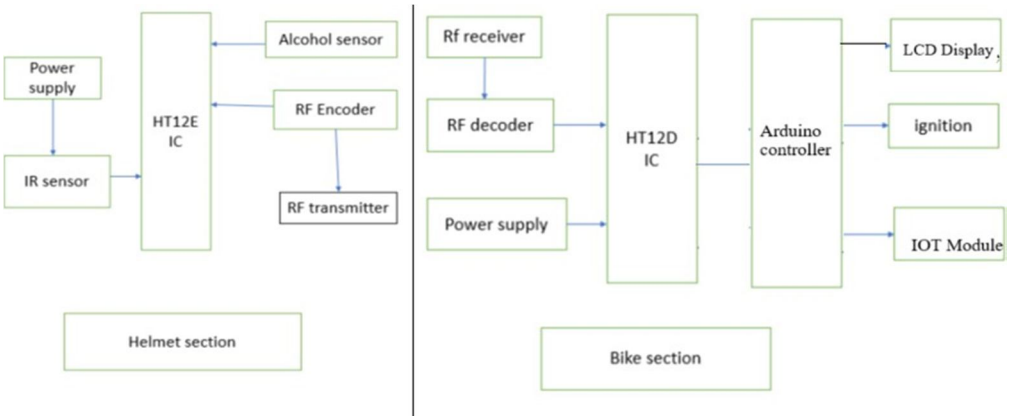

Figure 1. Block-Diagram

VI. WORKING

Transmitter section's block diagram includes a 9V battery,serving as the power source for this section.

1) An alcohol sensor is responsible for detecting the alcohol vapor and generating reading of analog voltage.
2) HT12E is an encoder integrated circuit designed for use in remote control systems, often paired with a series of decoders. It plays a crucial role in connecting infrared circuits &RF.
3) Within the circuit, "switch" , a binary device featuring both"on" and "off" positions.
4) A "button," on the other hand, is a binary device that briefly engages an "on" state before returning to its default "off" position.
5) The 7805 is an integrated circuit that functions as a voltageregulator, ensuring a stable output voltage despite fluctuations in the input voltage.
6) The alcohol sensor is capable of detecting alcohol vapor inthe air, producing output of analog voltage. Its operational range spans temperatures from -15 to 45°C, within the power of less than 150mA at 7V. The sensor's sensitivity ranges from 0.05 mg/L to 5 mg/L, making it suitable for analyzers of breath. Specifically, the MQ3 sensor has been utilized.

VII. ADVANTAGES

1) Minimize the incidence of accidents caused by driving under the influence of alcohol.
2) Enhancing safety for two-wheeler riders is feasible and could lead to a reduction in head injuries during accidents resulting from the absence of helmets.
3) Simultaneously transmitting information to rescue systems such as hospitals and fire stations along withthe alert message is feasible
4) A cost-effective solution that can be effortlessly replaced and equipped with a variety of sensors.
5) Detection of accidents in remote areas and the prompt dispatch of alert messages can be achieved seamlessly.

VIII. DIS-ADVANTAGES

1) System is complex.
2) Smart helmet is costly to build.
3) Need charging each time for smart helmet.

IX. APPLICATION

1) The safety system can be designed to consume less powerefficiently.
2) The technology of this safety system can be further improved for application in cars or other vehicles by substituting the helmet with a seat belt.
3) Its applicability extends to real-time safety systems.
4) Implementing the entire circuit into a compact VLSI chip,which can be seamlessly embedded into both the helmet andbike unit, is achievable.

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X. CONCLUSION

The government has taken a proactive step by mandating the use of helmets and enforcing a strict "No Drink and Drive" policy. However, statistics reveal that only a mere 10% of motorcycle riders adhere to these regulations. Violations of these rules are unfortunately common. The existing helmet system primarily focuses on helmet presence detection and neglects alcohol detection. To address this issue, our proposed solution introduces the concept of a "Smart Helmet" that not only checks for thepresence of a helmet but also examines the rider's alcohol consumption. This innovative system incorporates an Android application.

Our goal is to enhance rider safety by curbing instances of "Drink and Drive" and promoting adherence to traffic regulations. Ultimately, the proposed system serves as avaluable tool for safeguarding motorcycle riders.

In summary, the alcohol detection system integrated intoa smart helmet presents an efficient strategy for deterring drunk driving and encouraging responsible alcohol consumption. The system employs a non-invasive and dependable method to monitor alcohol levels among riders, capable of issuing alerts when alcohol content surpasses safelimits. Furthermore, the system is cost-effective, straightforward to implement, and can be seamlessly integrated with additional smart functionalities like GPS tracking and collision detection, making it an exceptionally appealing solution for motorcycle safety.

XI. FUTURE SCOPE

Looking ahead, there is room for enhancement in thesmart helmet alcohol detection system through the integration of advanced sensors and the utilization of machine learning algorithms. These refinements will contribute to increased accuracy and dependability in the results obtained. Moreover, the system's capabilities can be broadened by integrating it with additional smart features, including voice assistants and augmented reality displays, thereby elevating the overall riding experience.

Furthermore, the system's reach can be extended to encompass various modes of transportation, including cars, trucks, and buses. This expansion transforms it into a comprehensive solution for curbing drunk driving and fostering secure transportation practices. Through continued development and implementation, the alcohol detection system embedded in a smart helmet holds the promise of making a substantial impact on reducing the frequency of accidents resulting from drunk driving, ultimately saving numerous lives.

REFERENCES

[1] Sandeep, K., Ravikumar, P., & Ranjith, S. (2020). Innovative Approaches to Detecting and Preventing Drunk Driving Using the Internet of Things. International Journalof Control and Automation, 9(2).
[2] [Author(s) not provided]. (2020). Internet of Things- Based Drunk Driving Detection. In 2020 International Conference on Recent Trends in Electrical, Electronics, and Computing Technologies (ICRTEECT).
[3] Lukas Scott E, Zaouk Abdullatif, Ryan Elizabeth, McNeil Jane, Shepherd Justin, Willis Michael, Dalal Neeraj, Schwartz Kelly. (2021). Driver Alcohol Detection System for Safety (DADSS) - Preliminary Human Testing Results. In 25th International Technical Conference on the EnhancedSafety of Vehicles (ESV), Detroit, Michigan, United States.
[4] Siri Pallavi, A., Varun Kumar, K., Vamsi Krishna, T., Sandeep, S., & Jyothi Lakshmi, T. S. (2021). Drunk and Drive Detection using Raspberry Pi. International Journal of Trend in Scientific Research and Development (IJTSRD), 3(3).
[5] Sahabis was, S., & Sourav, S. (2021). Drunken Driving Detection and Prevention Using the Internet of Things. In 2021 IEEE 7th Annual Information Technology, Electronics, and Mobile Communication Conference(IEMCON).
[6] Sandhya Ravindran. (2020). IoT-Enabled Interlock Device. In 2020 3rd IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT).
[7] Bing Guo Liu, Yun Han, Bing Zhao. (2020). Drunk Driving Intelligent Test System Based on Micro C/OS-II. In IEEE 2020.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue II Feb 2024- Available at www.ijraset.com

[1] J. Y. Huang. (2020). Intelligent Identification and Control Systems for Vehicle Drunk Driving. In IEEE 2020 Symposium and Industrial Electronics (ISCAIE).

[2] A. Kumar. (2021). A Survey of Approaches for Drunk Driving Detection. In 2021 International Conference for Emerging Technology (INCET).doi:10.1109/incet49848.2021.9154093.

[3] Edward O. Ofoegbu. (2020). An Adaptive User Authentication Architecture to Prevent Drunk Driving. International Journal for Research in Applied Science and Engineering Technology, 8(5).

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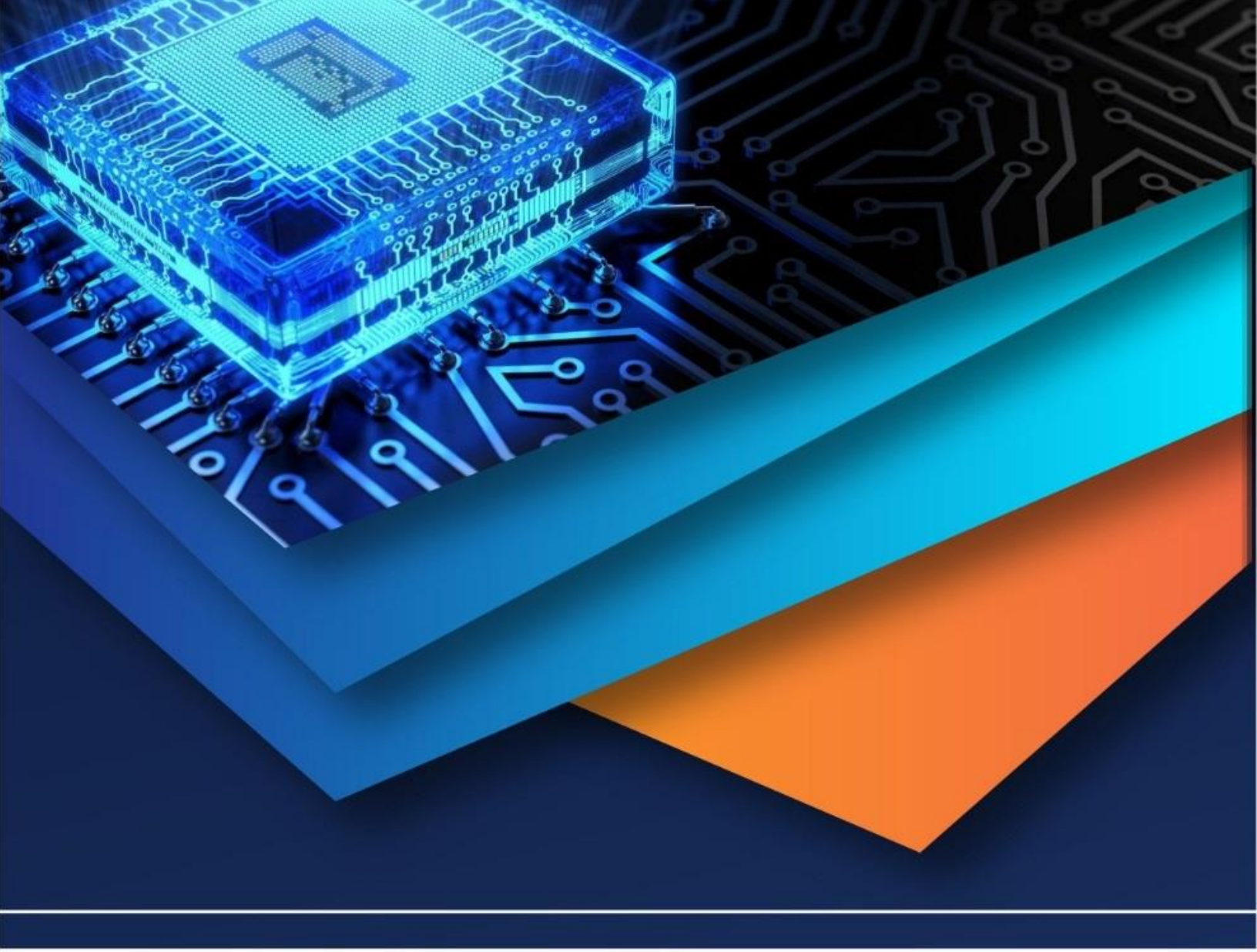

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