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DETECT DUI-IN CAR DRINK DRIVING DETECTION AND BACS

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ABSTRACT

As a significant contributor to road accidents and fatalities, the issue of drink driving warrants considerable research efforts. However, existing systems designed to detect or prevent drink driving often necessitate specialized hardware or significant user involvement, rendering them impractical for continuous monitoring in real-world driving scenarios. Addressing this challenge, we introduce DetectDUI, a non-invasive, contactless, and real-time system that offers a highly accurate approach to monitoring drink driving. Utilizing vital signs such as heart rate and respiration rate extracted from in-car WiFi signals, combined with the driver's psychomotor coordination inferred from steering wheel operations, DetectDUI presents a comprehensive framework.

The framework comprises a series of signal processing algorithms tailored to extract clean and informative vital signs and psychomotor coordination data. These data streams are then integrated using a self-attention convolutional neural network, known as C-Attention. In controlled laboratory experiments involving 15 participants, DetectDUI demonstrates remarkable efficacy, achieving a drink driving detection accuracy of 96.6% and accurately predicting blood alcohol concentration (BAC) levels with an average mean error ranging from 2 to 5mg/dl. These promising outcomes underscore the potential of DetectDUI as an effective tool for drink driving detection in real-world settings.

The successful performance of DetectDUI in laboratory experiments serves as a compelling validation of its capabilities and merits further exploration and refinement. Continued development efforts should focus on enhancing the system's robustness and scalability for deployment in diverse driving environments. Additionally, field trials involving a larger and more diverse participant pool will provide valuable insights into DetectDUI's performance under real-world conditions. Overall, the promising results obtained thus far position DetectDUI as a promising solution in the ongoing efforts to address the menace of drink driving and enhance road safety.

II.INTRODUCTION

Detecting and preventing drink driving remains a critical challenge in ensuring road safety, given its substantial contribution to accidents and fatalities. While existing systems have made strides in this area, many are limited by the need for specialized hardware or extensive user involvement, hindering their practical application in real-world driving scenarios. In response to this, we introduce DetectDUI, an innovative solution designed to address these limitations and offer a highly accurate, non-invasive approach to detecting drink driving in real-time within the confines of a vehicle.

DetectDUI operates as a contactless system, leveraging in-car WiFi signals to extract vital signs such as heart rate and respiration rate, alongside the driver's psychomotor coordination inferred from steering wheel operations. By combining these key indicators, DetectDUI forms a comprehensive framework for monitoring drink driving behavior seamlessly and effectively while minimizing user inconvenience.

The core of DetectDUI lies in its sophisticated signal processing algorithms, meticulously crafted to extract clean and informative data from the in-car environment. These algorithms are tailored to capture vital signs and psychomotor coordination accurately, laying the foundation for reliable detection of drink driving incidents. Additionally, DetectDUI incorporates a self-attention convolutional neural network, known as C-Attention, to integrate and analyze the extracted data streams efficiently.

In controlled laboratory experiments involving a diverse set of participants, DetectDUI has demonstrated remarkable efficacy, achieving high accuracy in drink driving detection and accurate prediction of blood alcohol concentration (BAC) levels. These promising results underscore the potential of DetectDUI as a viable solution for enhancing road safety and combating the dangers associated with drink driving. As such, further exploration and refinement of DetectDUI hold significant promise in the ongoing efforts to mitigate the risks posed by drink driving and safeguard the well-being of road users.

III.EXISTING SYSTEM:

The current methods for detecting drink driving often rely on specialized hardware or require active participation from the driver, making them impractical for continuous monitoring in real driving scenarios. These systems may include breathalyzer devices or manual sobriety tests conducted by law enforcement officers. However, they suffer from several disadvantages:

1.Specialized Hardware: Many existing systems require the installation of specialized equipment in vehicles, which can be costly and inconvenient for drivers.

2.Active Participation: Some systems rely on drivers to actively engage with the detection process, such as blowing into a breathalyzer or performing coordination tests, leading to potential user resistance or non-compliance.

3.Limited Coverage: Traditional methods of detection may only be employed during specific instances, such as traffic stops, limiting their effectiveness in continuous monitoring of drink driving behavior.

IV.PROPOSED SYSTEM

In contrast, DetectDUI offers a novel and non-invasive approach to drink driving detection with several distinct advantages:

1. Contactless Monitoring: DetectDUI operates as a contactless system, utilizing existing in-car WiFi signals to extract vital signs and psychomotor

coordination without requiring any additional hardware installation or user participation.

1.Real-time Detection: By leveraging real-time data processing algorithms, DetectDUI provides immediate feedback on the driver's condition, enabling timely intervention and prevention of potential drink driving incidents.

2.High Accuracy: Through the integration of vital signs and psychomotor coordination data using advanced signal processing techniques and machine learning algorithms, DetectDUI achieves high accuracy in detecting drink driving behavior, minimizing false positives and false negatives.

3.Seamless Integration: DetectDUI seamlessly integrates into the vehicle's existing infrastructure, ensuring minimal disruption to the driving experience while offering robust and reliable drink driving detection capabilities.

4.Cost-effectiveness: As DetectDUI utilizes readily available in-car WiFi signals for data collection, it eliminates the need for expensive hardware installations, making it a cost-effective solution for widespread adoption in vehicles.

V.CONCLUSION

DetectDUI represents a significant advancement in the field of drink driving detection, offering a non-invasive and contactless solution that harnesses existing in-car WiFi signals. By integrating vital signs and psychomotor coordination data using sophisticated signal processing algorithms and machine learning techniques, DetectDUI achieves high accuracy in identifying instances of drink driving, as demonstrated by laboratory experiments. With its ability to provide immediate feedback to drivers and enable timely intervention, DetectDUI has the potential to contribute substantially to the prevention of drink driving incidents and enhance overall road safety.

VI.FUTURE SCOPE

Moving forward, there are several avenues for further development and enhancement of DetectDUI. First, extensive field testing and real-world trials will be essential to validate the system's performance across diverse

driving conditions and scenarios. Second, exploring integration opportunities with vehicle systems could facilitate seamless operation and additional functionalities such as automatic alerts to law enforcement. Third, continuous improvement of machine learning algorithms will be necessary to enhance detection accuracy and robustness, informed by real-world data and user feedback. Fourth, designing an intuitive user interface with customizable features could enhance user engagement and compliance. Finally, pursuing regulatory approval and certification will be crucial for widespread adoption and deployment of DetectDUI in vehicles worldwide. Overall, ongoing development efforts hold great promise for addressing the persistent problem of drink driving and improving road safety globally.

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