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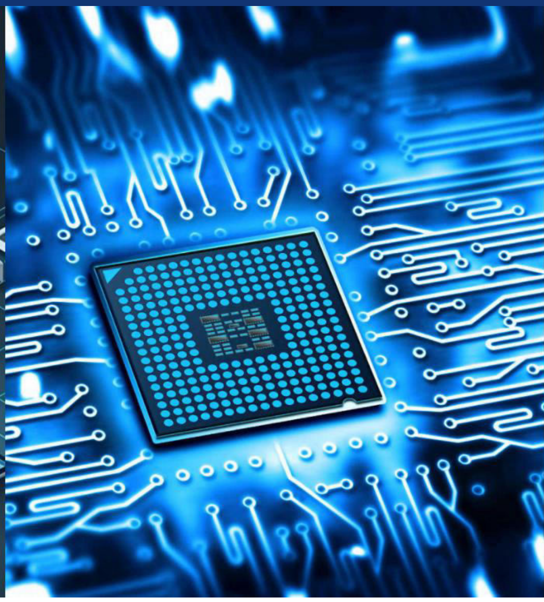

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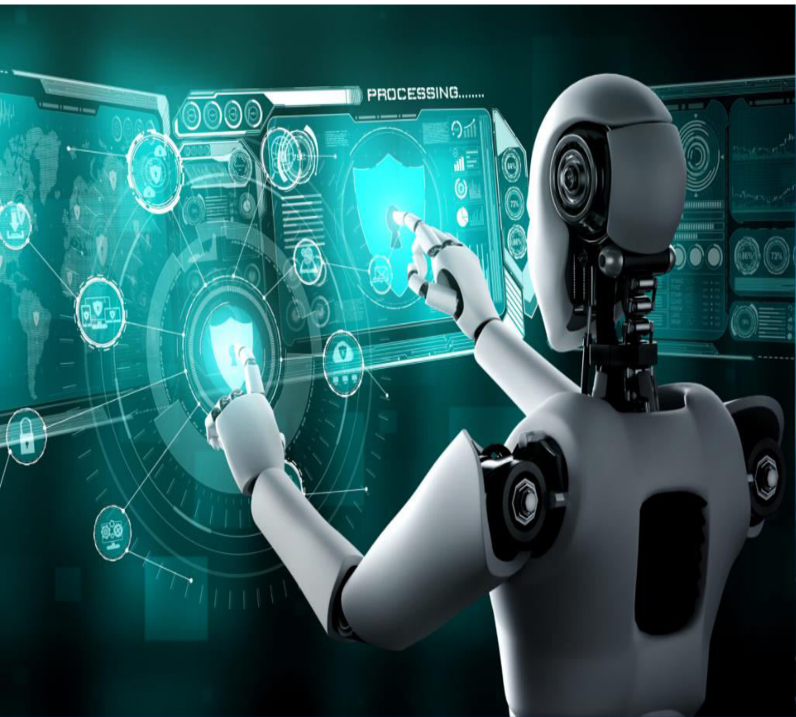

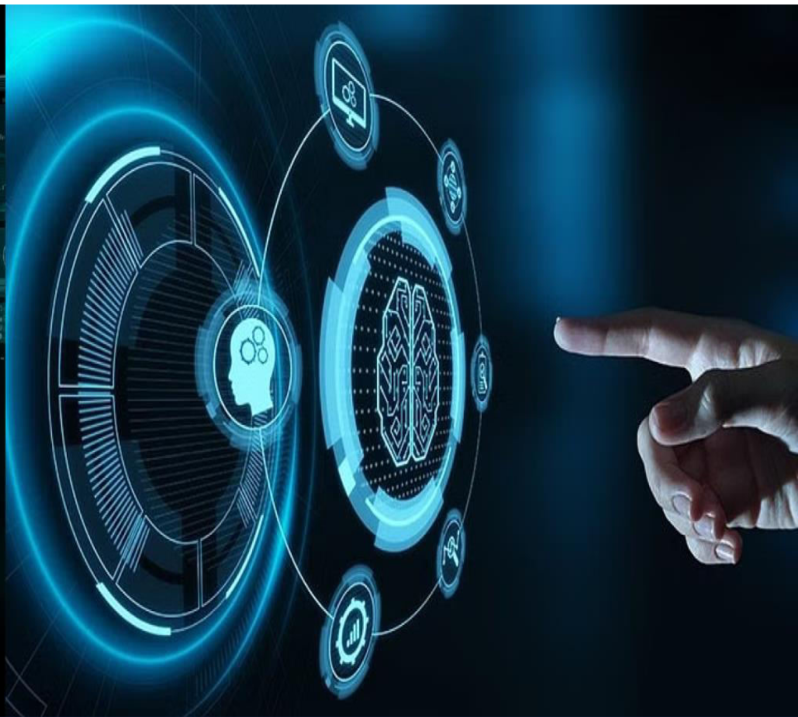

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A Review on Designing AI-Powered Driver Fatigue & Health Tracking for Accident Prevention with Emergency Alerts using IOT

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ABSTRACT: Driver fatigue and health issues contribute to a significant number of road accidents. Traditional monitoring systems lack real-time responsiveness and proactive alert mechanisms to prevent such incidents effectively. There is a critical need for a real-time, AI-driven system that detects driver fatigue and health anomalies using IOT to reduce road accidents and ensure prompt emergency intervention. Studies reveal that over 20% of accidents are fatigue-related. Existing solutions are reactive, with minimal integration of AI or IOT for real-time health and behavior monitoring. The system uses wearable lot sensors to monitor vital signs like heart rate, eye movement, and body posture. AI algorithms analyze this data to detect signs of fatigue or medical distress. A dashboard logs health metrics and triggers real-time alerts. If anomalies are detected, the system alerts the driver, nearby emergency contacts, and dispatches location data to emergency services. Cloud integration enables continuous learning and pattern recognition for improved predictive accuracy. Early detection of fatigue or health issues can prevent fatal accidents, protect lives, and enhance road safety. Integrating AI and IOT creates a smart preventive system rather than a reactive one. The proposed system significantly improves road safety by reducing fatigue-related accidents. Real-time monitoring and automated alerts ensure timely intervention. AI-driven analysis enhances accuracy. While it provides continuous data streams, making the solution scalable, Reliable, and impactful for public and commercial transportation sectors.

KEYWORDS –IOT, Machine Learning, Accident prevention, Real-Time Monitoring, Driver Fatigue Detection and Health Monitoring System.

I. INTRODUCTION

Driving While feeling drowsy is one of the major causes of road accidents. Current research shows that 1 out of 5 accidents is caused by the driver's lack of alertness, which accounts for about 20% of all traffic accidents and is gradually increasing each passing year. The study highlights the fact that the total number of deaths every year due to drowsiness or fatigue can be reduced drastically by using a basic combination of hardware and software. Driving has become a nightmare for many Peoples due to the inclement weather, bad road conditions, traffic congestion and speeding but some other reasons that also affect a driver even when it's not his fault are drowsiness, drunk driving and careless driving by other drivers who are on the road and this can be taken care of if all vehicles come pre-equipped Driver Drowsiness Detection System which can keep a check on the driver at all times and react to whatever conditions the driver is in. To provide the required safety measures, the vehicles are loaded with an automated safety system that alerts the driver through a beep or an alarm, and in some high end modern vehicles the vehicle automatically slows itself down and drives to the corner lane and stops if the user is irresponsive. The output of the IR receiver is low, if the eye is in an open position. This indicates that the eye is in the opening or closing position. The alarm is displayed, if the output is provided in a logical cycle. This project reduces the risk of comatose in the eye.

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Driving behavior is an important aspect of maintaining and sustaining safe transport on the roads. It also directly affects fuel consumption, traffic flow, public health, and air pollution along with psychology and personal mental health. For advanced driver assistance systems and autonomous vehicles, predicting driver behavior helps to facilitate interaction between ADAS and the human driver. Consequently, driver behavior prediction has emerged as an important research topic and has been investigated largely during the past few years. Driving behavior can be inferred using control actions, visual monitoring, and inertial measurement unit data. This study leverages the IMU data recorded using a Smartphone placed inside the vehicle. The dataset contains the accelerometer and gyroscope data recorded from the real traffic environment. Deep learning models tend to show poor performance than machine learning models where random forest and extreme gradient boosting machines show 100% accuracy for multiclass classification.

II. LITERATURE PREVIEW

The Joao Ruivo Paulo, Gabriel Pires, And Urbano J. Nunes, Cross-subject Zero calibration Driver's Drowsiness Detection: Exploring spatiotemporal image Encoding of EEG Neural Network Classification. This project explores drowsiness detection based on EEG signal's spatiotemporal image encoding representations in the form of either recurrence plots or gramian angular fields for deep convolutional neural network (CNN) classification. The Feng You , Xiaolong Li , Yunbo Gong , Haiwei Wang , And Hongyi Li . A Real-time Driving Drowsiness Detection Algorithm With Individual Differences Consideration. A real-time driving drowsiness detection Algorithm that Considers the individual differences of driver ROBERT CHEN-HAO CHANG , (Senior Member, IEEE), CHIA-TUWANG HSIN-HAN LI 1, AND CHENG-DI CHIU . Drunk Driving Detection using Two-stage Deep Neural Network . Drunk driving accidents have been rapidly increasing in recent times, Although the statistics show a decreasing trend in recent years, reports of drunk driving accidents are often seen in the news.

. III. HARDWARE REQUIRMENT

REFERENCE-1

COMPONENTS	SPECIFICATIONS
LPC2148 micro controller	Operating frequency: up to 60 MHz
Eye blink sensor	IR- Based reflection sensor
Alcohol sensor	Sn02 sensitive material
Tilt sensor	Orientation detection
LDR	Cadmium sulfide
LCD and buzzer	Embedded system

REFERENCE-2

COMPONENTS	SPECIFICATIONS
Eye blink	Infrared light
Mouth yawn	IR emitter and receiver
MEMS Accelerometer	Head movement
Gyroscope	Angular rotation

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REFERENCE-3

COMPONENTS	SPECIFICATIONS
CPU, Accuracy	ARM
Residual Energy	Energy consumptions
CNN,LSTM	Grid-like structure
Adam	AdaGrad
Machine learning	RNN

IV. RESULT

The figure shows the prototype which is a combination of all the hardware used for this system. Here we have designed a very basic system for eye blink to be continuously monitored by the eye blink sensor.

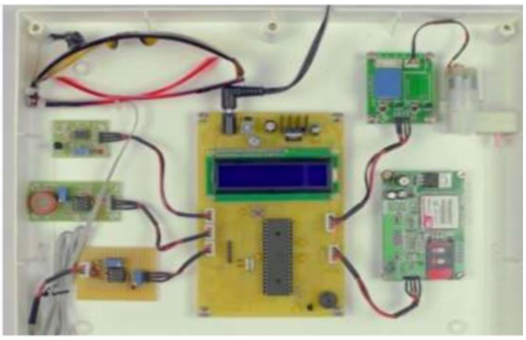

Fig: Driver drowsiness detection system

Fig: Alcohol detection

The Drowsiness detection system can be used for a variety of purposes. One of them is for heavy vehicles. For Example trucks, because truck drivers have drive more distance and for longer period of time. It can also be used with commercial vehicles. Many people use the public transportation system to get around. For their safety the system can be used on public vehicles. The system can also be used for cranes as they lift and carry heavy objects and then moved to other locations. Therefore for overloaded cranes and mobile cranes this system can be used to avoid the dangers associated with drowsiness.

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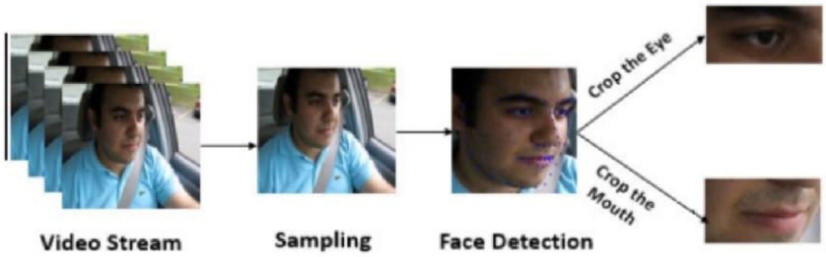
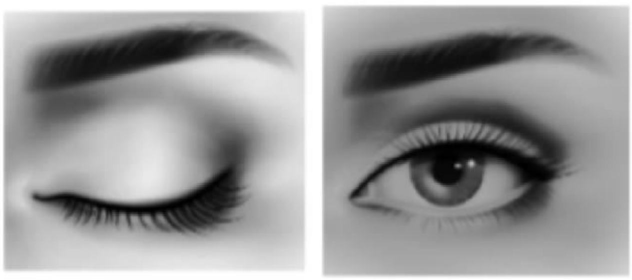


Fig: Input data samples for the Face-based Drowsiness Detection Model

The training dataset used to train the proposed face-based drowsiness detection model is extracted from 16 subjects on the NTHU dataset. The ,model is validated on a randomly selected 20% of the training set and tested on a testing subset of the NTHU dataset. The best detection results are achieved using 256 neutrons in the FC layer, with RMSprop and Adam optimizers using a learning rate of 0.0005 for the raw face and pre-processed face frames scenarios, respectively. Both models were trained using a batch size of 64 and 10 epochs.



(a) Closed Eye (b) Open Eye

Fig: Input Data Samples for the Eye ROI Classification Model

The Training set of the Kaggle eye dataset is randomly split into training and validation subsets to train and validate the model, which is then tested on Kaggle and NTHU datasets. The learning process is built from scratch, and processing the Videos require more time and high computing performances which may lead to more loss.

VI. FUTURE SCOPES

Future enhancements to the system can be integrated with ADAS for proactive control measures like automated braking. Lane correction, or speed reduction when driver fatigue or health issues are detected. This Technology can be implemented in buses, trucks, and fleet vehicles to monitor drivers, ensuring public safety and efficient fleet operation. Future versions can support integration with Smart watches or wearable ECG monitors for continuous health tracking, even outside the vehicle. Real-time health/fatigue alerts and location data can be automatically shared with hospitals, police, or nearby rescue units for quicker emergency response.

Accident and health tracking logs can be used as evidence in legal matters or insurance claims to determine fault or verify conditions before an incident. For broader adoption, adding support for local languages and customizable alert systems based on regional driving behaviors would be valuable.

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VII. CONCLUSION

The Driver Drowsiness System is analyzes the condition of the driver and in case it detects that the driver is not fit for driving at any point of time, the systems sends a warning to the driver through different methods. In this paper, the discussions on how to avoid accidents due to drowsiness is discussed and a basic prototype system was developed that can be used at high numbers to avert misshapenings. These can also be implemented in cheaper cars, commercial vehicles and public transports.

REFERENCES

1. Joao Ruivo Paulo, Gabriel Pires, And Urbano J. Nunes, Exploring spatiotemporal image Encoding of EEG signals for Convolutional Neural Network. Transaction On Neural systems and Rehabilitation Engineering, vol, 21, (2021), IEEE.

2. Feng You, Xiaolong Li , Yunbo Gong , Haiwei Wang , And Hongyi Li, A Real-time Driving Drowsiness Detections Algorithms with Individual Differences Consideration,(2021),IEEE.

3.Anirban Dasgupta, Member, IEEE, Daleef Rahman, And Aurobinda Routray, A Smartphone-based Drowsiness Detection And Warming System For Automative Drivers,(2020),IEEE.

4. ROBERT CHEN-HAO CHANG, CHIA-YUWANG HSIN-HAN LI 1, AND CHENG-DI CHIU,
Drunk Driving Detection Using Two-stage Deep Neural Network, (2021), IEEE.