ISSN: 2584-0495 Vol. 2, Issue 6, pp. 889-899

International Journal of Microsystems and IoT

ISSN: (Online) Journal homepage: https://www.ijmit.org

IoT-based Smart Vehicle Security and Safety System

Kotla Venkata Siva Reddy, Dande Harshitha, Desai Pavani, Singaiah Sai Yashaswini, Bhargavi Bangaru

Cite as: Reddy, K. V. S., Dande, H., Desai, P., Yashaswini, S. S., & Bangaru, B. (2024). IoT-based Smart Vehicle Security and Safety System. International Journal of Microsystems and IoT, 2(6), 889-899. https://doi.org/10.5281/zenodo.13148500

Published online: 24 June 2024

DOI: https://doi.org/10.5281/zenodo.13148500

International Journal of Microsystems and IoT
Vol. 2, Issue 6, pp. 889-899; DOI: https://doi.org/10.5281/zenodo.13148500

IoT-based Smart Vehicle Security and Safety System

Kotla Venkata Siva Reddy, Dande Harshitha, Desai Pavani, Singaiah Sai Yashaswini, Bhargavi Bangaru

Department of Electronics and Communication Engineering, Ravindra College of Engineering for Women, Kurnool, Andhra Pradesh, India.

ABSTRACT
The Internet of Things (IoT) simplifies human lives in many aspects. The applications it provides are beyond imagination. The Internet of Things (IoT) links objects, tools, and gadgets over the internet, allowing for communication. IoT applications include intelligent automobiles for safety, security, navigation, and fuel efficiency. This study describes an intelligent vehicle system constructed using IoT technologies. The system utilizes a variety of sensors to monitor the vehicle and its surroundings. An ESP32 microcontroller processes sensor data and controls the system's actuators. The concept aims to improve vehicle safety and convenience. It detects drunk driving, accidents, and driver weariness. It also offers real-time car monitoring and anti-theft notifications. Real-world evaluations corroborate the system's efficacy. It effectively recognized cases of drunk driving, accidents, and driver weariness. It continually provides real-time car tracking and anti-theft alarms. This intelligent vehicle technology has the potential to significantly increase vehicle safety and convenience. It's well-designed, inventive, and addresses major safety issues. It is also inexpensive and user-friendly, making it a wonderful tool for everyone.

KEYWORDS
Accident Alert, Alcohol Detection, Realtime Vehicle Tracking, Driver Fatigue Detection, Seat-Belt Alert, IoT Technology, Post-crash Assistance, Vehicle Safety Monitoring, Safety Innovation

1. INTRODUCTION

Before the development of the wheel, early people lived apart from other groups. They could only travel within walking distance. The discovery of the wheel transformed early human existence. His social limits grew with time. Over time, primitive humans evolved into sophisticated beings who perfected the design of the wheel. Transportation is becoming a vital part of our everyday lives because to technological advancements.

While technology provides numerous benefits, it also poses a significant risk to human lives The Delhi Statistical Handbook data shows that registered motor vehicles increased from 534,000 to 877,000 in 2014-2016, leading to more accidents and causalities. According to data from the National Crime Bureau and Ministry of Road Transport and Highway, over 100,000 individuals died in 2013 due to road rage incidents. In 2015, vehicle accidents caused 83% of all traffic-related deaths, despite awareness programs, road signs, and traffic laws, according to India Spend data.

The World Wellbeing Organization (WHO) claims that India is especially inclined to street mishaps, the larger part of which include four-wheelers. In this manner, we developed a rider security degree utilizing Hub MCU to give riders security and security. a contraption that confirms if seatbelts are being utilized legitimately and other security measures.

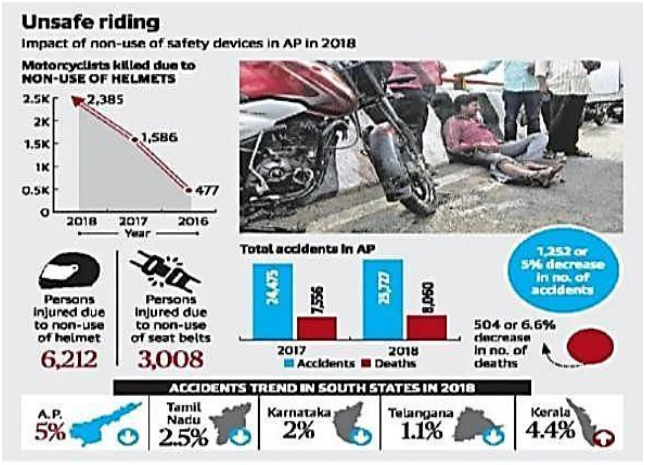

Fig. 1. The Hindu Article depicting survey of road accidents

Agreeing to the Transportation Investigate & Damage Prevention Program's report, "Street Security in India Status Report 2020," the number of motorized four-wheeler (M.F.W.) proprietors is rising every day, which causes tall activity and mischances on the streets. There were 3,54,796 activity mishaps in India in 2020, with 1,33,201 fatalities. Of these, 29.82% of fatalities were caused by people not wearing seatbelts.

The Intelligent System for Vehicles (ISV) revolutionizes vehicle technology by enhancing road safety, monitoring, and communication capabilities. This innovative effort focuses on enhancing road safety and driver well-being via exceptional communication capabilities. This innovative effort focuses on

enhancing road safety and driver well-being via exceptional technological expertise. ISV uses cutting-edge features and current technology to create a smart and networked automotive environment. ISV's capabilities include complex MQ-3 sensors for alcohol detection, vibration sensors for accident detection, Twilio for internet-based messaging, GSM modules for non-internet-based messaging, GPS modules for real-time tracking, and the Blynk app for interactive real-time monitoring. ISV prioritizes passenger safety and includes a Seat Belt Alert system.

This design integrates disparate pieces into a cohesive and intelligent system, surpassing normal automotive safety standards. ISV aims to improve safety and communication, reduce alcohol-related risks, and encourage responsible driving. This invention provides safer roadways, encourages responsible driving, and enhances vehicle monitoring. This inquiry explores ISV's fundamentals, capabilities, and potential impact on the automotive sector. ISV has the potential to revolutionize automotive communication and safety in today's interconnected world.

A. Motivation

The Internet of Things (IoT) simplifies human lives in many aspects. The applications it provides are beyond imagination. The Internet of Things (IoT) links objects, tools, and gadgets over the Internet, allowing for communication. It uses information technology, network technology, and embedded technology. Sensors and tracking devices work together to simplify daily tasks. IoT applications include intelligent automobiles, which improve safety, security, navigation, and fuel efficiency. This project proposes a way to prevent traffic collisions and save lives. Our suggested technology prevents accidents and takes appropriate action by tracking vehicle location.

B. Aim of the work

This research tries to address the root causes of fatal collisions and implement safety measures. Transportation is essential for accessing remote areas and reducing journey time. However, the growing number of automobiles on the road poses significant challenges that cannot be disregarded. The initiative attempts to eliminate some of the leading causes of automobile accidents and implement post-crash procedures. This initiative focuses on the factors that contribute to car accidents, including

- ✓ Driving without seat belt.
- ✓ Alcohol-impaired driving.
- ✓ Driving when drowsy.
- ✓ The project's post-accident measure is informing loved ones about the incident with exact location.

2. PROPOSED SYSTEM

The ISV offers a comprehensive solution for boosting automobile safety and monitoring. This innovative technology includes crucial elements that enhance road safety and driver well-being. The main components of the proposed system are:

1. **Alcohol Detection:** The system uses alcohol detection technologies to prevent drunk driving and encourage responsible driving. Advanced sensors monitor alcohol levels in the car interior and send notifications if found [30].
2. **Accident Alerting:** The suggested system provides fast accident detection capabilities. It uses sensors and collision detection algorithms to quickly identify accidents and send out fast notifications. Sending SMS notifications to registered cell phone numbers can speed up reaction time and perhaps save lives [12].
3. **Real-time vehicle tracking system:** Real-time GPS-based vehicle tracking improves security and simplifies fleet administration. This technology remotely monitors automobiles, deterring theft and serving as a useful tool for businesses [12].
4. **Seat Belt Alert:** Using seat belts is essential for occupant safety. The device has a seat belt warning feature to remind drivers and passengers to buckle their seatbelts. This simple effective reminder improves seat belt compliance and safety [19].
5. **Driver Sleep Alert**: Fatigue is a major cause of accidents, especially during lengthy rides. The device uses blink detection to monitor driver weariness and mitigate this danger. The system detects sleepiness and provides timely notifications to keep drivers alert and focused on the road, minimizing the risk of fatigue-related accidents [14].

The ISV uses integrated elements to provide a holistic solution for vehicle safety. The goal is to improve road safety, decrease accidents, and save lives by addressing primary accident causes and promoting responsible driving behaviours. This technology is user-friendly and cost-effective, making it useful for both individual car owners and corporations with fleets.

The suggested solution focuses on integrating an embedded system that uses Internet of Things (IoT) technology with Global System for Mobile Communication (GSM) capabilities. A fundamental aspect of this technology is the use of a pressure sensor to continually monitor the state of the seat belt, reducing the danger of an accident. As a safety measure, if the driver fails to secure their seat belt, the system will turn off the engine automatically. In addition, the device has an alcohol sensor to detect the presence of alcohol consumption. If alcohol is found, the engine is immediately disabled, significantly improving safety precautions.

In addition to these basic functions, the system includes other sensors such as eyeblink, vibration, and infrared. These sensors can identify driver weariness, possible crashes, and road impediments. In the case of a collision, the vibration sensor immediately sends a warning to a specified contact, allowing for

rapid action in emergency situations. Furthermore, the introduction of a buzzer alerts the driver to any detected obstructions, increasing situational awareness. Furthermore, the eye blink sensor serves as a tiredness monitoring device, immediately turning down the engine if symptoms of sleepiness are detected, lowering the risk of accidents caused by driver weariness. The suggested strategy intends to greatly improve road safety by seamlessly integrating these technologies. The suggested strategy attempts to improve road safety and reduce the number of accidents by seamlessly integrating these technologies.

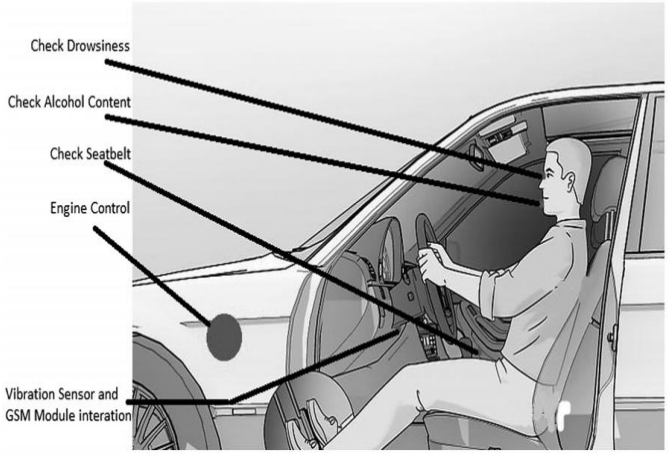

Fig. 2. System Design Implementation

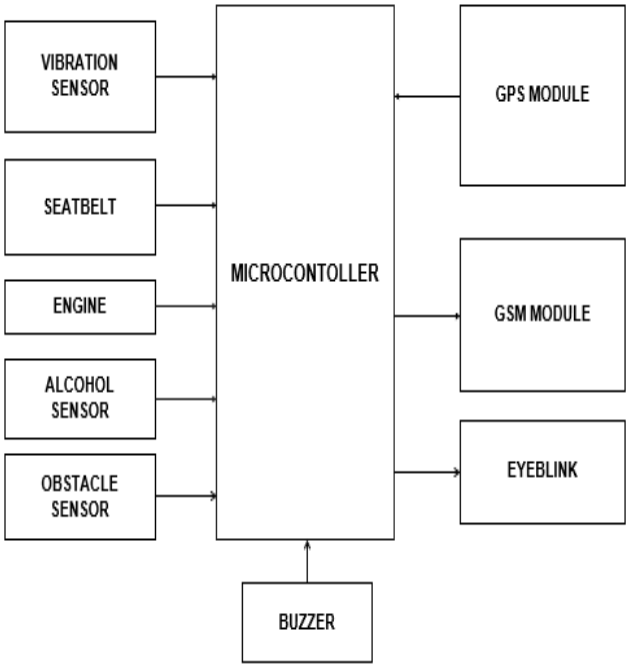

Fig. 3. Proposed Block Diagram

At the core of the system lies the Arduino Uno microcontroller, serving as the central processing unit that orchestrates the diverse functionalities of the numerous sensors and modules. This microcontroller acts as the brain of the system, receiving inputs from various sensors and processing them to trigger appropriate responses. The Seatbelt Detector and Alcohol Sensor play crucial roles in enforcing safety measures, ensuring that drivers adhere to seatbelt usage and are not under the influence of alcohol while operating the vehicle. These sensors provide real-time data to the Arduino Uno, allowing it to take proactive measures to prevent accidents related to these factors.

In addition to seatbelt enforcement and alcohol detection, the system incorporates advance features to enhance overall safety. The Eyeblink Sensor monitors driver alertness by detecting patterns of eye blinks, alerting the microcontroller if signs of drowsiness are detected. Moreover, the inclusion of an Obstacle Sensor and Vibration Sensor bolsters collision detection capabilities, enabling the system to react promptly to potential hazards on the road. Integration with GSM and GPS modules further enhances the system's functionality by facilitating real-time communication with external parties and enabling precise location tracking. Lastly, the incorporation of a Buzzer provides audible alerts to the driver, ensuring immediate feedback and promoting safer driving practices. Together, these components create a comprehensive safety system designed to mitigate risks and enhance overall driving safety.

Fig.3 shows the block diagram of the proposed system. The proposed IoT-based smart vehicle security and safety system is a promising solution for the problem of accidents occurring. This system can help people to save lives by sending alert messages to the driver as well as vehicle owner. In case of accidents the vehicle’s location is sent to the vehicle owner or their dearest ones and also to nearby police stations. Here, we will discuss in detail the working of the proposed system, the components used, and their functionalities.

The first component of the system is an embedded system based on the Internet of Things (IoT) and Global System for Mobile Communication (GSM) technology. This system serves as the backbone for integrating various sensors and functionalities into the vehicle. It enables real-time monitoring and communication capabilities essential for ensuring driver safety.

The second component is a pressure sensor designed to monitor the usage of seatbelts. Its primary function is to prevent accidents by ensuring that the driver wears the seatbelt while operating the vehicle. If the pressure sensor detects that the seat belt is not being worn, it triggers an action to shut off the engine, thereby encouraging compliance with safety regulations.

The third component is an alcohol sensor, crucial for mitigating the risks associated with drunk driving. This sensor detects the presence of alcohol in the driver's breath. If alcohol consumption is detected, the system initiates a response to turn off the engine, preventing the vehicle from being

operated under the influence and reducing the likelihood of accidents caused by impaired driving.

Moving on to the fourth component, the system incorporates with the eyeblink sensor is designed to detect patterns of eye blinks, providing insights into the driver's alertness level. By monitoring the frequency and duration of eye blinks, the sensor can identify signs of drowsiness or distraction, alerting the driver to the need for increased vigilance. If the sensor detects prolonged periods of closed eyes or irregular blinking patterns indicative of fatigue, it triggers actions to prevent accidents, such as activating audible alerts or initiating engine shutdown to prompt the driver to take necessary breaks or rest.

The fifth component, the vibration sensor serves as a vital component in collision detection systems. This sensor is sensitive to sudden changes in acceleration or deceleration, typically associated with collisions or impacts. By continuously monitoring vehicle movement, the vibration sensor can detect abrupt changes indicative of potential accidents, allowing the system to respond swiftly to mitigate their severity. Upon detecting a collision, the sensor triggers immediate notifications to designated contacts, enabling prompt emergency response measures and ensuring timely assistance to those involved.

The sixth component, the infrared sensor adds another layer of safety by detecting obstacles and hazards on the road. This sensor operates by emitting and detecting infrared radiation to identify objects in its vicinity. By analyzing the reflected infrared signals, the sensor can determine the presence of obstacles such as vehicles, pedestrians, or debris, alerting the driver to potential hazards. In combination with other sensors, such as the vibration sensor, the infrared sensor contributes to comprehensive collision avoidance systems, providing real-time feedback to the driver and facilitating proactive measures to prevent accidents.

The seventh component of the system, the buzzer, serves as a crucial auditory feedback mechanism designed to enhance driver awareness and promote timely responses to potential hazards on the road. Activated in response to the detection of obstacles by the infrared sensors, the buzzer provides immediate alerts to the driver about nearby hazards or obstructions, prompting them to take evasive action or adjust their driving behavior accordingly. This real-time feedback mechanism helps to mitigate the risk of accidents by ensuring that drivers are promptly alerted to potential dangers in their vicinity, allowing them to make informed decisions and avoid collisions.

In addition to obstacle detection, the eye blink sensor further contributes to safety by monitoring driver alertness and responsiveness. Upon detecting signs of drowsiness or fatigue, such as prolonged periods of closed eyes or irregular blinking patterns, the eye blink sensor triggers actions to prevent accidents caused by impaired alertness. One such action includes automatically shutting off the engine to prevent the vehicle from being operated when the driver's ability to maintain attention is compromised. By proactively addressing instances of driver drowsiness or distraction, the eye blink sensor helps to reduce the likelihood of accidents caused by impaired driving, thereby enhancing overall safety on the road.

The integrated approach utilizing GSM technology, and a combination of sensors offers comprehensive safety features aimed at preventing accidents, mitigating risks associated with alcohol consumption, and enhancing driver awareness on the road. Overall, the integration of these advanced sensors and communication technologies enhances the safety features of the vehicle, promoting responsible driving behavior and reducing the likelihood of accidents on the road.

3. HARDWARE COMPONENTS

ESP32 Microcontroller:

The ESP32, a flexible microcontroller designed by Express if Systems, serves as the system's central component. With dual-core CPUs, WIFI, Bluetooth, and GPIO connections, it's an excellent choice for IoT and embedded applications. Its price and open-source support have made it a popular choice among developers, encouraging creativity in many projects. The ESP32 provides the processing capacity and connection required to integrate and coordinate many hardware components, enabling the Intelligent System for Vehicles (ISV).

Fig. 4: ESP32Microcontroller

GSM Module:

The GSM module, a vital communication component in our system, adheres to the Global System for Mobile Communications standard. This tiny and efficient device operates seamlessly across numerous frequency bands, providing reliable voice, text, and data transfer. This module interacts smoothly with the Microcontroller and sends timely accident notifications via SMS. We created Arduino to communicate with the GSM module using AT instructions, resulting in a simple and responsive communication path. Our Intelligent System for Vehicles (ISV) relies on a small GSM module to generate timely alarms, improving safety and response time.

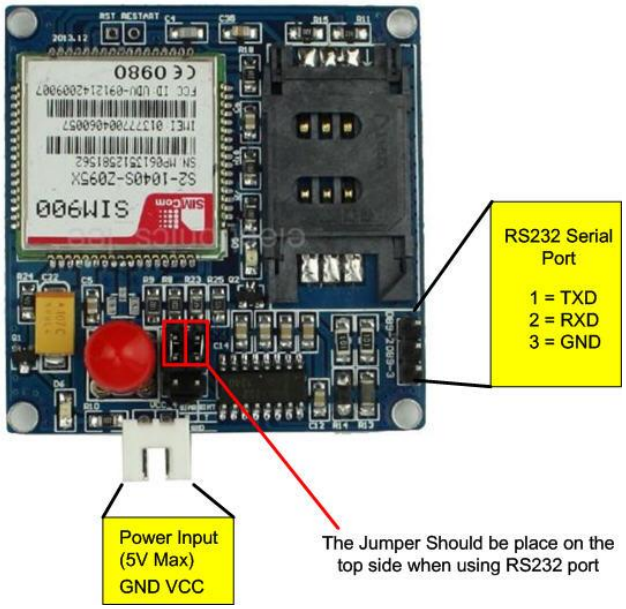

Fig. 5: GSM Module

GPS Module:

Our system's GPS module relies on the Global Positioning System to provide navigation. This little gadget accurately measures global position, speed, and time. Our system uses satellite signals to provide precise and real-time vehicle coordinates. The GPS module uses the NMEA phrase GPGGA to deliver accurate time and coordinates for our Intelligent System for Vehicles (ISV). This GPS module plays a crucial role in IoT-based automotive safety, providing high precision and dependability [20].

Fig. 6: GPS Module

Vibration Sensor:

The vibration sensor is our system's quiet guardian. This gadget measures acceleration and vibrations to detect fast changes in vehicle velocity. The Intelligent System for Vehicles (ISV) relies on this component to detect accidents and provide important data to the system. The vibration sensor plays a crucial role in IoT and automotive safety by accurately detecting vehicle movement.

Fig. 7: Vibration Sensor

EyeBlink Sensor:

Our system's eyeblink sensor accurately measures and evaluates a person's frequency and intensity of blinks. This inconspicuous sensor analyzes blinking patterns to assess the driver's cognitive and emotional state. As part of the Intelligent System for Vehicles (ISV), it assesses driver attentiveness to improve overall safety. This eyeblink sensor enhances IoT-based auto--mobile monitoring by focusing on the human element of driving [7].

Fig. 8: Eyeblink Sensor

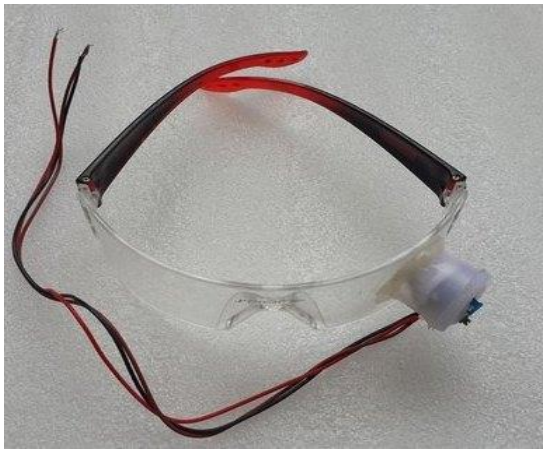

Fig. 9: EyeBlink Sensor System

Alcohol Sensor:

The alcohol sensor, properly known as a MQ3 sensor, detects ethanol in the air. When a drunk individual breath near an alcohol sensor, it detects the ethanol in his breath and returns an output based on the alcohol content. If the alcohol percentage is higher, more LEDs will light up [30].
This invention uses an alcohol sensor to detect alcohol concentration in the breath. The sensor sends its input to the Arduino Uno board, which uses it to generate a specified output [18].

Fig. 10: Alcohol Sensor

Buzzer:

When an external voltage is connected to the buzzer, it emits an audible sound. The output of such a buzzer circuit is a beeping or buzzing sound.

Fig. 11: Buzzer

4. SOFTWARE COMPONENTS

Arduino IDE:

Arduino IDE offers a user-friendly programming environment for Arduino microcontrollers. This creative environment facilitates code creation, compilation, and uploading for our Intelligent System for Vehicles (ISV).

Twilio Platform:
Twilio is a cloud platform that helps integrate phone, SMS, and communication services into our system. Twilio offers reliable communication solutions for our Intelligent System for Vehicles (ISV), ensuring timely and consistent notifications.
Blynk App

Blynk, our smartphone app, makes it simple to enable our Intelligent System for Vehicles (ISV). It simplifies IoT project management by providing an intuitive interface for interfacing with hardware components such as microcontrollers. Using Blynk improves our ISV's control and responsiveness, leading to increased user engagement. Blynk is a platform that allows developers to quickly create Internet of Things (IoT) apps for a variety of uses. It offers a

smartphone app that enables customers to operate gear remotely via the internet [25].

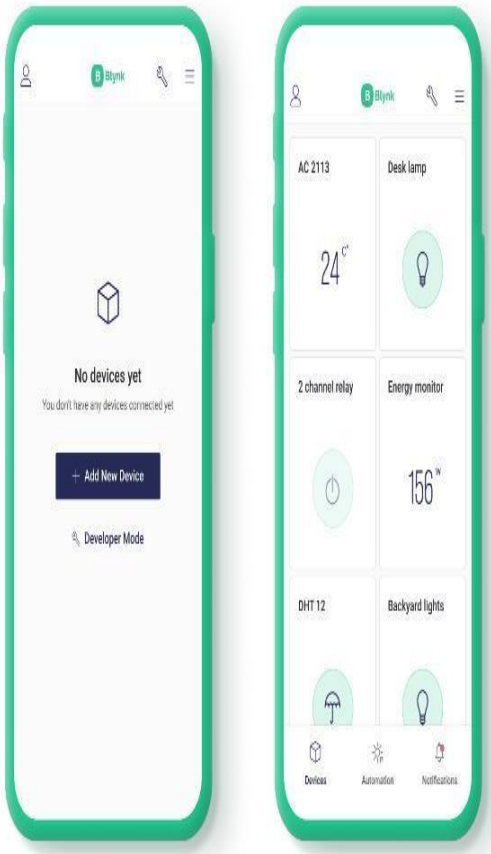

Fig. 12: Blynk App

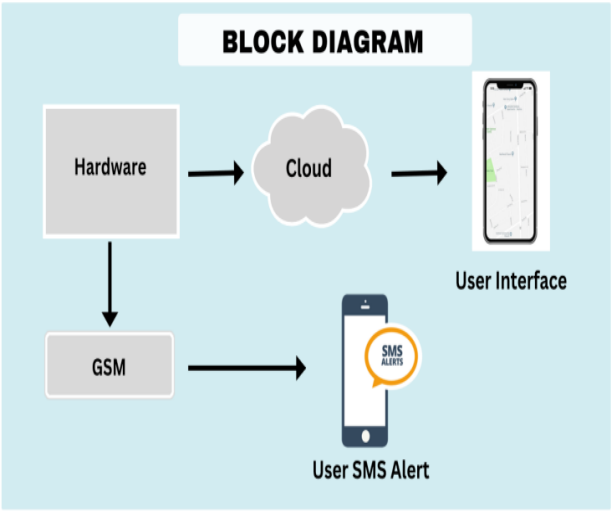

Fig. 13: Flow Diagram of ISV

5. WORKING ANALYSIS OF PROPOSED SYSTEM

This project is dedicated to tackling the root causes of accidents on the roads, striving to promote safety for all road users. It targets a range of factors contributing to accidents, recognizing the inherent unpredictability of road conditions. In every bend and stretch of the road, potential dangers lurk, emphasizing the critical need for proactive safety measures. With accidents often occurring unexpectedly, relying solely on the vigilance of other drivers and pedestrians is insufficient. Self-awareness of one's surroundings and the movements of surrounding vehicles is paramount to navigating safely. By addressing issues like lack of seatbelt use, alcohol impairment, driver fatigue, and collision detection, this project aims to mitigate risks and prevent accidents. It underscores the importance of technology-driven solutions in enhancing road safety and fostering a culture of responsible driving. Through its comprehensive approach, this project endeavors to instill a greater sense of awareness and accountability among drivers, ultimately reducing the occurrence of avoidable accidents and promoting safer roads for all.

The microcontroller board in the suggested model will begin operating in accordance with the software as soon as the driver starts the car's engine. The controller board then operates as follows:

- Upon starting the vehicle, the pressure sensor will detect whether or not the driver is fastened in a seatbelt. The vehicle will be turned off by a relay connected to a switching circuit if not.
- The device will then ascertain whether or not the motorist has had alcohol. The relay will turn off the engine if the alcohol sensor determines that the driver is inebriated. This will be the second procedure.
- Should the driver's identity be verified, the vehicle will be prepared for use.
- The eye blink sensor on the eyeglasses will inform the driver if it detects that their eyes are closed.
- To alert the driver, the buzzer will sound an alarm after eight seconds.
- The car will have an infrared sensor installed so that in the case of a collision, it can send information to the controller. The vehicle's position will then be shared in order to alert stored contacts and nearby hospitals for emergency assistance. The inbuilt GPS and GSM chips on the controller board will manage this function.
- The IR sensor will notify the controller of any barriers it detects as the vehicle gets closer to them. In the worst situation, the controller will cause the car to slow down or perhaps stop.

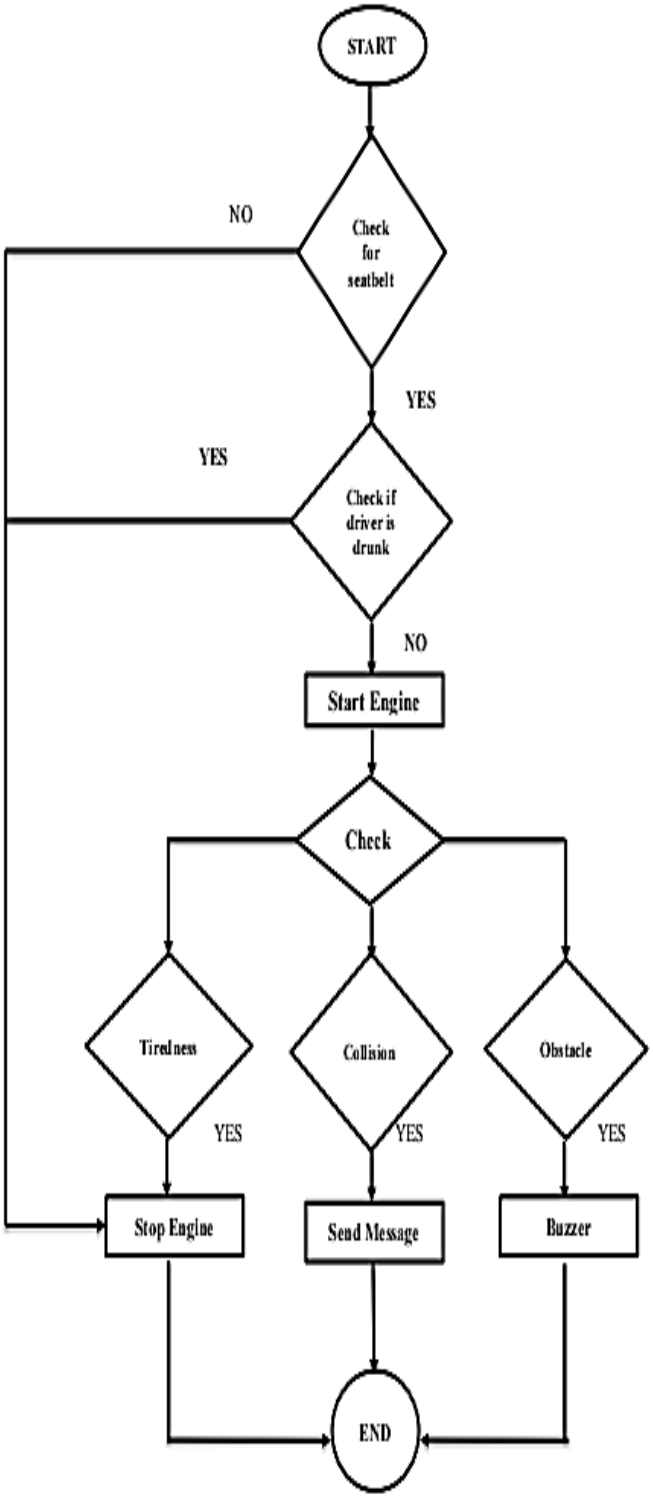

Fig 14: Working Analysis of proposed system Diagram

6. EXPECTED OUTCOME

When an accident occurs, our Intelligent System for Vehicles (ISV) triggers a series of steps. The GPS module identifies the precise location and sends an alarm to emergency services via the embedded GSM module. An alert message is delivered to the registered cell phone number, with essential information for immediate assistance.

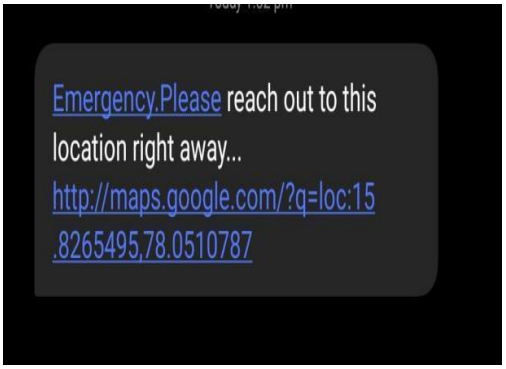

Fig. 15: Alert System

The MQ-3 sensor detects alcohol and acts as a warning system for drunk driving. The gadget alerts users immediately if alcohol levels surpass specified limits. The system prevents the engine from starting and sends an alarm to the registered cell phone number to prevent accidents due to impaired driving.

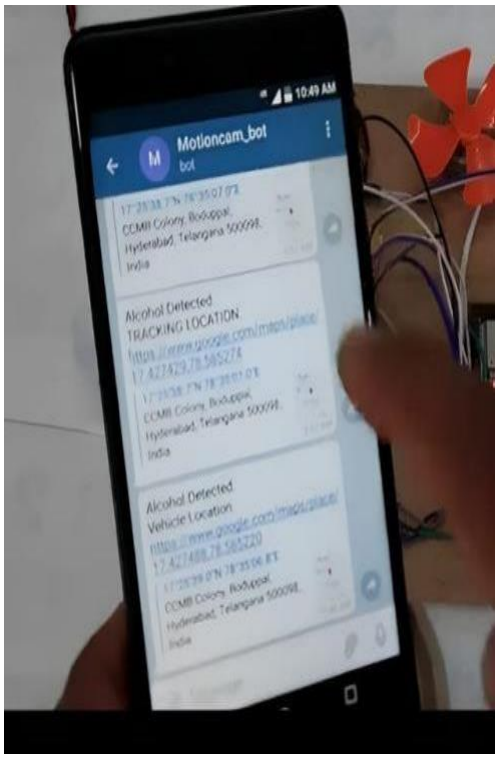

Fig. 16: Alert Message of Alcohol Detection

Integrating a cloud platform like Blynk App enables real-time vehicle monitoring. This function allows automobile owners to remotely track and monitor their cars in real-time, providing valuable insights for improved management and security.

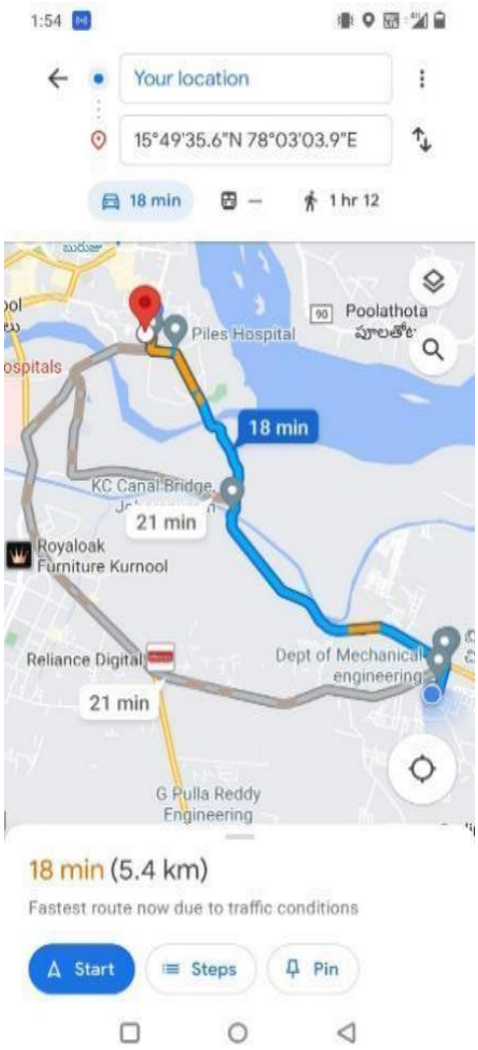

Fig. 17: Sending location

Our ISV's seat belt warning promotes vehicle safety by ensuring all passengers buckle up. This feature promotes the usage of seat belts, which are essential for general safety. Our technology monitors the driver's weariness using the Blink sensor. The technology alerts drivers to weariness and helps them stay focused on the road. Our ISV identifies accidents, drunk driving, and weariness, and takes aggressive action. Our all-in-one solution improves vehicle safety, making our ISV a dependable road buddy for everybody.

7. CONCLUSION

The ISV addresses safety problems by combining cutting-edge technology including Alcohol Detection, Accident Alerting, Real-time Vehicle Tracking, Driver Sleep Alert, and Seat Belt Alert. Real-world evaluations demonstrate its usefulness in identifying and responding to risks quickly. The initiative aims to prevent accidents, encourage safe driving, and identify potential hazards. The ISV is a cost-effective and user-friendly solution for fleet management and individual car owners, including cutting-edge technology. For ISVs aiming to capitalize on the burgeoning IoT industry, collaborating with platforms like Blynk may help them expedite the development process, cut expenses, and provide creative IoT solutions to their clients more effectively.

The integration of IoT technology into smart vehicles offers unparalleled advancements in safety and security. Through real-time monitoring of vehicle performance, environmental conditions, and driver behavior, IoT systems can proactively identify and mitigate potential risks, reducing the likelihood of accidents and enhancing overall road safety.

8. FUTURE SCOPE

Since technology is always advancing and expanding the devices' possible uses, the future of Internet of Things-based vehicle safety devices seems bright. These are a few potential future applications for Internet of Things-based car safety devices:

1. **Autonomous driving:** IoT-based safety devices can be crucial in guaranteeing the safety of self-driving automobiles as they become more common. These gadgets can assist in keeping an eye on the surroundings and spotting possible threats like other cars or pedestrians.

2. **Predictive maintenance**: Internet of Things-based safety equipment can assist in determining when a car might require upkeep or repairs, enabling fleet managers and individual drivers to take care of concerns before they worsen. This can lengthen the life of vehicles and assist decrease downtime.

3. **The integration of Internet of Things (IoT)**-based safety devices with smart city infrastructure, such traffic signals and lamps, can optimize traffic flow and minimize congestion. By offering real-time information on road conditions, this can also aid in lowering the danger of collisions.

4. **Insurance discounts**: By giving insurers access to useful data on driver behavior, Internet of Things-based safety gadgets can help them give safe drivers individualized insurance policies and savings. This can promote the use of these gadgets and reward safe driving practices.

5. **Improved cybersecurity**: The risk of cyberattacks rises as cars grow increasingly networked and dependent on IoT devices. IoT-based safety devices that offer real-time threat detection and prevention can improve cybersecurity measures. With new uses and technological breakthroughs opening the door to safer and more effective transportation, the future of smart car safety devices is bright.

REFERENCES

1. Parveen, N. Ali, A. and Ali, A. (2020). IOT Based Automatic Vehicle Accident Alert System. 2020 IEEE 5th International Conference on Computing Communication and Automation (ICCCA), Galgotias University, Greater Noida, UP, India. doi: https://doi.org/10.1109/ICCCA49541.2020.9250904.
2. Liu, X., Liu, X., Chen, X., Mai, E., Noh, H. Y., Zhang, P. and Zhang, L. (2017). Individualized Calibration of Industrial-Grade Gas Sensors in Air Quality Sensing System. ser. SenSys '17, New York, NY, USA: Association for Computing Machinery. doi: https://doi.org/10.1145/3131672.3136998.
3. Duchowski, A. T., Jörg, S., Allen, T. N., Giannopoulos, I., and Krejtz, K. (2016). Eye Movement Synthesis. Proceedings of the Ninth Biennial ACM Symposium on Eye Tracking Research & Applications, ser. ETRA '16, New York, NY, USA: Association for Computing Machinery. 2016, 147-154. doi: https://doi.org/10.1145/2857491.2857528
4. Liu, R., Yin, Z., Jiang, W., and He, T.(2021). WiBeacon: Expanding Location-Based Services via WiFi. Proceedings of the 27th Annual International Conference on Mobile Computing and Networking, ser. MobiCom '21, New York, NY, USA: Association for Computing Machinery, 2021, 83-96. https://doi.org/10.1145/3447993.3448637.
5. Danisman, T., Bilasco, I. M., Djeraba, C., and Ihaddadene, N.(2010). Drowsy Driver Detection System Using Eye Blink Patterns. 2010 IEEE International Conference on Machine and Web Intelligence (ICMWI), 230-233. doi: 10.1109/ICMWI.2010.5648121.
6. (2022). Smart Home Using Blynk App Based on IOT. International Journal of Creative Research Thoughts, 10(5), d341-d345. https://www.ijcrt.org/papers/IJCRT2205081.pdf.
7. Preetham, D. A., Rohit, M. S., Ghontale, A. G., and Priyadarsini, M. J. P. (2017). Safety Helmet with Alcohol Detection and Theft Control for Bikers. 2017 International Conference on Intelligent Sustainable Systems (ICISS), 668-673. doi: https://doi.org/10.1109/ISS1.2017.8389255.
8. Wakure, A. R., Patkar, A. R. (2014). Vehicle Accident Detection and Reporting System Using GPS and GSM. International Journal of Engineering Research & General Science, 2(2). https://www.ijergs.org/vehicle-accident-detection-and-reporting-system-using-gps-and-gsm.
9. Javale, P., Gadgil, S., Bhargave, C., Kharwandikar, Y., and Nandedkar, V.(2014). Accident Detection and Surveillance System Using Wireless Technologies. IOSR Journal of Computer Engineering (IOSR-JCE), 16(2), 38-43.
10. Prasanthi, R., Nitish Babu, M. U., Jaswanth, B., and Sumith Chandra, G.(2023). Accident Detection and Alert System Using Arduino. International Research Journal of Modernization in Engineering Technology and Science, 5(4).
11. Nanda, S., Joshi, H., and Khairnar, S.(2018). An IOT Based Smart System for Accident Prevention and Detection. 2018 Fourth International Conference on Computing Communication Control and Automation (ICCUBEA).
12. Kumar, V. N., Reddy, V. S., and Sree, L. P. (2023). Design and Development of Accelerometer-Based System for Driver Safety. International Journal of Science, Engineering and Technology Research (IJSETR).
13. Varma, R., Bharti, C., and Arote, S. V.(2020). Using Eye Blinking and Head Movement for Accident Prevention. International Journal of Computer Applications.
14. Kumar, M., and Senthil, R. (2021). Effective Control of Accidents Using Routing and Tracking System with Integrated Network of Sensors. International Journal of Science, 2(4).
15. Kumar, M., and Senthil, R. (2021). Effective Control of Accidents Using Routing and Tracking System with Integrated Network of Sensors International Journal of Science, 2(4).
16. Donko, D. and Alispahic, A. (2015). Implementation of Tracking Mobile Application and Analysis of Spatial Data. IEEE International Conference on Intelligence (ICMWI-2015), 230-233. doi: https://doi.org/10.1109/ICMWI.2010.5648121.
17. Almishari, S., Ababtein, N., Dash, P., and Naik, K. (2017). An Energy Efficient Real-Time Vehicle Tracking System. IEEE Pacific Rim Conference on Communications, Computers and Signal Processing (PACRIM-2017).
18. Lee, S., Tewolde, G., and Kwon, J. (2020). Design and Implementation of Auto Tracking System Using GPS/GSM/GPRS Technology and Mobile Phone Application.
19. Nair, H. V. (2015). Shocking Report Shows 70 Percent of Delhi's Deadly Road Accidents are Caused by Drunk Driving. Daily Mail UK. http://www.dailymail.co.uk/indiahome/indianews/article-3029373/Shocking-report-shows-70-CENT-Delhi-s-deadly-road-accidents-caused-drunk-driving.html.
20. (2015). Law Offices of Edgar Snyder & Associates. Seat Belt Statistics: https://www.edgarsnyder.com/car-accident/defective-products/seat-belts/seat-belts-statistics.html.
21. Wang, S., Min, J., and Yi, B. K. (2008).Location-Based Services for Mobiles: Technologies and Standards. IEEE International Conference on Communication (ICC), Beijing, China.
22. Mitsubayashi, K. (2004). Biochemical Gas-Sensor (Biosniffer) for Breath Analysis After Drinking," SICE 2004 Annual Conference.
23. Triawan, M. A., et al.(2016). Applied Internet of Things (IoT): Car Monitoring System Using IBM Blue Mix. International Seminar on Intelligent Technology and Its Applications (ISITIA), 6.
24. Hajrizi, E. et al. (2016). Use of IoT Technology to Drive the Automotive Industry from Connected to Full Autonomous Vehicles. IFAC-Papers Online, 49(29), 269-274.
25. Phadke, A., et al.,(2017). Internet of Things Based Vehicle Monitoring System. Fourteenth International Conference on Wireless and Optical Communications Networks (WOCN), 3.
26. Arbabzadeh, N. et al. (2018). A Data-Driven Approach for Driving Safety Risk Prediction Using Driver Behavior and Roadway Information Data. IEEE Transactions on Intelligent Transportation Systems, 19(2),446-460.
27. Pham, T. N., Tsai, M. F., Nguyen, D. B., Dow, C. R., and Deng, D. J. (2015). A Cloud-Based Smart-Parking System Based on Internet of Things Technologies. IEEE Access, 3, 1581-1591.
28. Renuka, R., and Dhanalakshmi, S. (2015). Android Based Smart Parking System Using Slot Allocation Reservations. ARPN Journal of Engineering and Applied Sciences.10(7).
29. Virant, M. and Ambro, M.(2016). Universal Safety Distance Alert Device for Road Vehicles. Electronics, 5(4).
30. Al-Yousif, S., Ali, M. A. M. and Mohammed, M. N. (2018). Alcohol Detection for Car Locking System. IEEE Symposium on Computer Applications & Industrial Electronics (ISCAIE), Penang, Malaysia, 2018, 230-233. doi: https://doi.org/10.1109/ISCAIE.2018.8405475.
31. Liang, Y., Reyes, M. L. and Lee, J. D. (2007). Real-Time Detection of Driver Cognitive Distraction Using Support Vector Machines. IEEE Transactions on Intelligent Transportation Systems, 8(2).
32. Reddy, K. V. S., Harshitha, D., and Yashaswini, S. S. (2024). "Intelligent Parking Monitoring and Autonomous Billing System. IEEE International Conference on Wireless Information Technology and Enterprise (ICWITE-2024), doi: https://doi.org/10.1109/ICWITE59797.2024.
33. Kumar, R. B., and Mohamed, M. H. K. K. (2023). Automatic Helmet Detector. International Research Journal of Engineering and Technology (IRJET), 10(1),123-129.
34. Dai, J. J. T., Bai, X. and Shen, Z. (2010). Mobile Phone-Based Drunk Driving Detection. 4th International IEEE Conference on Pervasive Computing Technologies for Healthcare, 1-4.
35. Pannu, S., Ansari, M. D., and Gupta, P. (2015). Design and Implementation of Autonomous Car Using Raspberry Pi. International Journal of Computer Applications, 113(9).
36. Almomani, I. M., Alkhalil, N. Y., Ahmad, E. M. and Jodeh, R. M. (2011). Ubiquitous GPS Vehicle Tracking and Management System. IEEE Jordan Conference on Applied Electrical Engineering and Computing Technologies (AEECT-2011).

AUTHORS:

K Venkata Siva Reddy received his BTech degree from JNTUH, Andhra Pradesh, India in 2008 and MTech degree in Embedded Systems from Rajeev Gandhi Memorial College of Engineering & Technology, Nandyala, India in 2012. He is currently pursuing PhD at the Department of Electronics and Communication Engineering, Mohan Babu University, Tirupati, Andhra Pradesh, India. Currently he is working as Assistant Professor in Ravindra college of Engineering for Women, Kurnool. His areas of interest are Embedded Systems, VLSI, IOT.

Email: kvenkatsivareddy@gmail.com

Harshitha Dande received her BTech degree in Electronics & Communication Engineering from JNTUA University at Ravindra College of Engineering for Women, Andhra Pradesh, India in 2024. Her areas of interest are VLSI, Internet of Things.

Email: dandeharshitha08@gmail.com

Pavani Desai received her BTech degree in Electronics & Communication Engineering from JNTUA University at Ravindra College of Engineering for Women, Andhra Pradesh, India in 2024. Her areas of interest are VLSI, Internet of Things.

Email: pavanireddy308@gmail.com

Singaiah Sai Yashaswini received her B Tech degree in Electronics & Communication Engineering from JNTUA University at Ravindra College of Engineering for Women, Andhra Pradesh, India in 2024. Her areas of interest are VLSI and, Internet of Things.

Email: yashaswinisingaiah@gmail.com

Bhargavi Bangaru received her B. Tech degree in Electronics & Communication Engineering from JNTUA University at Ravindra College of Engineering for Women, Andhra Pradesh, India in 2024. Her areas of interest are VLSI and, Internet of Things.

Email: reddybhargavi685@gmail.com