DEVELOPMENT OF CHILD SAFETY ALERT IN CAR

G.SOUMYA G.RISHITHA G.VENKATESH J.ADITHYA
Dept. of ECE Dept. of ECE Dept. of ECE Dept. of ECE
218R1A0421 218R1A0422 218R1A0423 218R1A0424
CMR Engineering College , Kandlakoya, Hyderabad – 50140

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Abstract This paper discusses the development of a car seat alert system through telegram application to design and develop a car seat alert system for babies that have been left in vehicles and get heatstroke deaths. This type of accident is called vehicular heatstroke and it is very dangerous to a baby because their body overheats 3-5 times faster than an adult body. Plus, the inside of a vehicle is heating up very quickly and it very concerns parents to bring their child to travel using car. Nowadays, heatstroke deaths of children in vehicles are quite encouraging and every year the number of cases is increasing. In an overwhelming majority of child vehicular heatstroke deaths, it was loving, responsible parents that unknowingly left the child. This project was created to inform and alert the parents out there when they might forget their child is left under any circumstances.

To make sure this project system is more practical, Node MCU Control all the input and output devices is used as a micro controller to in this system. As to alert parents when this carelessness is happening the alerts are provided in this system. Apart from that, LCD is used to display the presence of the child at the seat and temperature value inside. Temperature sensor module is used to sense the temperature of baby and alerts the parents if the temperature raises extremely. As to ensure the goals stated will be achieved, significant research has been made thoroughly that will act as references throughout these studies for this project.

INTRODUCTION

With advancement in technology it is is designed to prevent tragic incidents where children are accidentally left unattended in vehicles. This system utilizes advanced sensors and alert mechanisms to detect the presence of a child inside the car after the engine is turned off. By integrating technologies such as temperature sensors, motion detectors, and GSM modules, the system can notify parents or guardians through alarms and mobile alerts, ensuring timely intervention. With increasing cases of heatstroke-related fatalities among children left in hot cars, this safety measure serves as a crucial innovation to enhance child protection and prevent accidents.This system utilizes advanced sensors and alert mechanisms to detect the presence of a child inside the car after the engine is turned off. By integrating technologies such as temperature sensors, motion detectors, and GSM modules, the system can notify parents or guardians through alarms and mobile alerts, ensuring timely intervention.

PROBLEM STATEMENT

Despite growing awareness of child safety, incidents of children being accidentally left unattended in vehicles continue to occur, leading to serious injuries or fatalities due to heatstroke, suffocation, or other environmental hazards. These incidents often stem from caregiver distraction, miscommunication, or unawareness of a child's presence in the vehicle. There is a critical need for an intelligent system that can detect the presence of a child in a parked or idling car and immediately alert the driver or guardian, and if necessary, emergency services, to prevent life-threatening situations.This project aims to develop a

Child Safety Car Alert System that utilizes sensors and microcontrollers to monitor the rear seat for child presence, detect environmental conditions (such as temperature or CO_2 levels), and generate timely alerts through mobile notifications, car alarms, or GSM messages. The system is designed to operate automatically when the car is turned off or stationary for extended periods, ensuring no child is accidentally left behind in a dangerous environment.

LITERATURE SURVEY / REVIEW

The development of child safety alert systems in cars has become a crucial area of research and innovation, driven by the increasing need to prevent tragic accidents involving children accidentally left behind in vehicles. Historically, many children have died from heatstroke after being unintentionally left inside hot cars, leading to heightened awareness and calls for better safety measures. Researchers have focused on integrating advanced technologies such as sensor-based monitoring, communication systems, and IoT solutions to address this issue. Early solutions primarily relied on weight sensors and infrared sensors placed in car seats to detect a child's presence and trigger an alert when the vehicle is turned off. For instance, systems utilizing ultrasonic sensors can detect movement and body heat, while infrared sensors track temperature changes associated with the presence of a child. Another promising solution involves integrating mobile connectivity, where car systems send real- time alerts to a smartphone, notifying the owner if a child has been left behind in the vehicle. Such systems can leverage IoT technology to communicate with a mobile app or even notify emergency contacts via text messages, making the car owner aware of the potential risk. Additionally, integration with seat belt sensors and airbag systems has been explored, as these sensors can continuously monitor whether a child is properly seated and if any adjustments are required. However, despite these advancements, several challenges remain in perfecting child safety alert systems. These challenges include minimizing false positives and false negatives, which occur when sensors either incorrectly detect an object as a child or fail to recognize an actual child in the seat. Moreover, ensuring that these systems operate with low power consumption, especially when the vehicle is turned off, remains a key hurdle.

On top of that, the integration of such systems into existing cars, particularly older models, can be costly and technically challenging. Nevertheless, regulatory support is growing, with mandates such as the Children's Safety and Child Booster Seat Technology (SCS) Act of 2020 pushing manufacturers to adopt these systems as standard features. The future of child safety alert systems lies in the integration of artificial intelligence for enhanced detection accuracy, the development of wearable systems for children that directly interact with the vehicle's onboard systems, and the adaptation of these technologies in autonomous vehicles to ensure that child safety is never compromised, even in self-driving cars. With continued advancements in these areas, child safety alert systems are expected to become ubiquitous, saving lives and reducing the risks associated with leaving children unattended in vehicles.

The implementation of regulations is another driving force behind the development of these technologies. In the United States, the Children's Safety and Child Booster Seat Technology (SCS) Act of 2020 mandates that all vehicles incorporate technologies to prevent children from being left in cars, pushing manufacturers to adopt safety systems more rapidly. Similarly, the European Union is also exploring similar regulations to standardize child safety technologies in all vehicles, making them a norm rather than an exception. As a result, car manufacturers are under increasing pressure to incorporate these systems into their designs, and many have started offering them as standard features in newer vehicle models.

PROPOSED SYSTEM

This section discusses the process for the "The Development of Car Seat Alert System through Telegram Application". For more information on the idea of the project, a flowchart and block diagram are used. This consists of two main sections which will be presented in this chapter which are hardware and software implementation. The DHT 11 temperature sensor and limit switch are the input part in the process along with the door lock and engine status switch. The temperature sensor will sense the closed vehicle temperature and the limit switch would detect the attendance of the baby.

This input output voltage will send to Node MCU Esp8266 micro controller and with the code that has been implanted inside the micro controller this the output part will be converted to the LCD display that will show the baby's presence in the car seat while once the temperature is in danger level, the servo will roll the window down. Apart from that, LED willight up along with the buzzer which produces a continuous beep sound to alert the parents to the baby still inside the vehicle.

Flow Chart

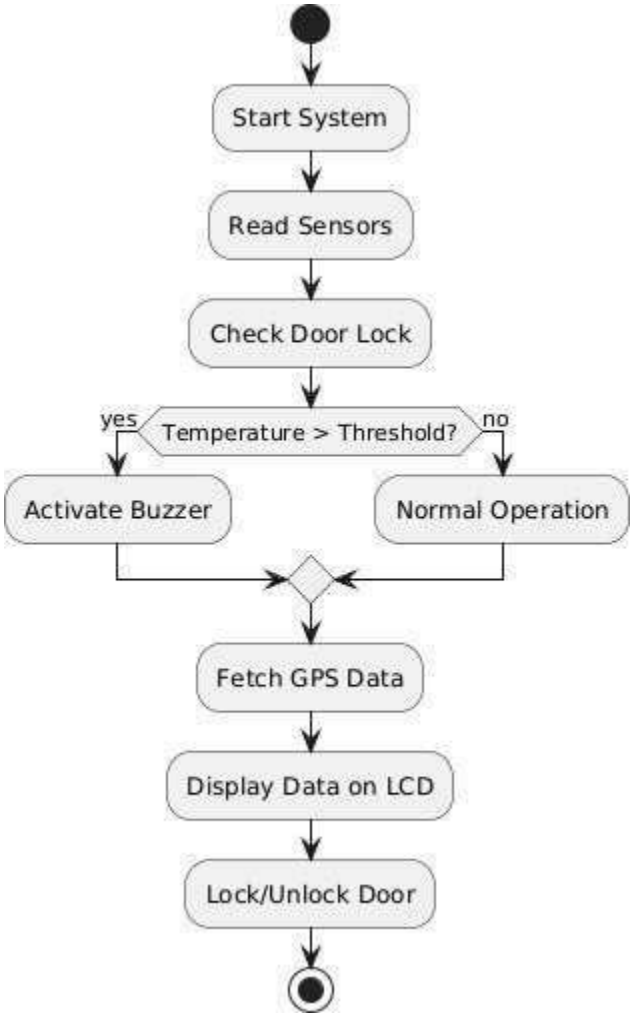

Fig. 1. Flow Chart Diagram for User.

CONCLUSION

In conclusion, the Child Safety Alert System successfully addresses the critical issue of child safety in vehicles, particularly preventing fatalities due to heatstroke. The system's design, which includes real-time temperature monitoring, automated cooling mechanisms, and immediate alerts sent via Telegram or GSM, ensures that caregivers are quickly notified if a child is left in a dangerous situation. This proactive approach minimizes the risk of heat-related harm, providing peace of mind to parents and caregivers. The system is cost-effective, easy to install, and accessible globally, making it suitable for various vehicles, from family cars to school buses and ride-sharing services. The inclusion of Wi-Fi and GSM communication ensures reliable operation even in remote locations. The project has met its goal of developing an efficient, scalable solution to enhance child safety, and with future enhancements like AI-based child detection and GPS tracking, this system has the potential to evolve into an even more comprehensive safety tool. Overall, this project serves as a valuable contribution to improving child safety in vehicles, offering an essential layer of protection in an increasingly busy and fast-paced world.

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