

Vehicular Child Trap Alert System

Kiran Rathi, Jigyasa Gupta

Department of Electronics & Communication Engineering, Swami Keshvanand Institute of Technology

Management & Gramathan, Jaipur, Rajasthan, India

Email – kiranrathi25@gmail.com, guptajigyasa2@gmail.com

Abstract— This paper presents a Vehicular Child Trap Alert System to help in preventing tragic child death caused by hyperthermia / heatstroke and suffocation using detection and control system inside a hatchback car. The number of victims of heatstroke is increasing each year due to increased temperature and suffocation in the locked car. The increase in the number of victims has raised the issues of safety of the child in the car. This safety feature addresses deadly situations of children getting locked in the car. An efficient system is presented here which can monitor the presence of a child whenever he is accidentally locked inside the car and can also communicate with the driver when the condition of the heatstroke arises. Initially, it sends a message to user's registered mobile number and if no one comes and opens the car, it alerts via a phone call to the registered users. It is expected that this module could help in reducing the vehicle heatstroke cases among children that keep on increasing lately.

Keywords— hyperthermia, suffocation, hatchback.

I. INTRODUCTION

Vehicular Child Trap Alert System is a module for people who unintentionally left their children unattended inside their car. The tragedy of children's heat stroke death in vehicles could happen to any family that own small children. The majority of parents think that they could never "forget" their child in a vehicle. Yet, in a world full with distractions, they sometimes do and the result can be serious injury or even death [1]. Occasionally they thought that they were away from the vehicle just for a few minutes, but they lost track of time while their children were suffering heatstroke in the vehicles. **On an average, 37 children die every year after being trapped inside vehicles.** More than half are under 2 years old.

Hyperthermia (heatstroke) is one of the most common dangers that can affect children lives. It is considered the third cause of children deaths inside cars around the world. It occurs when body is not able to cool itself quickly enough and body temperature rises to a dangerous level. Heatstroke can damage the brain as well as other organs, and can have long-term damages.

Ambient air has a CO₂ concentration of about 0.5%

and oxygen concentration of about 21%. Exhaled air has a CO₂ concentration of about 5% and an oxygen concentration of about 13% so what you'll do over time is you'll reduce the oxygen level. The problem is not so much the reduction of oxygen but the increase in carbon dioxide. By the time that the carbon dioxide levels in the air that you breathe reach 15% you'll effectively die.

According to a study, children left in a locked car even for a short period in moderate surrounding temperature are at risk of heatstroke. The atmosphere and the windows of a car are relatively transparent to the sun's shortwave radiation and are warmed little [2]. However this short wave energy heats the air by conduction and convection and also give off long wave radiation which is very efficient at warming the air trapped inside a vehicle. Thus, The internal temperature within closed cars ascends rapidly in first 15 minutes, may be with dispute of variations in the rate of increase depending on vehicle type, color and window tinting.

A child is at greater risk than an adult in hot air. Because a small body heats up 3 to 5 times faster than an adult's would in the same circumstances [2]. When cooling process doesn't take place quickly enough, a child's body temperature can rapidly rise to a dangerous level. In last few years death cases of kids being locked in a car have been increased to a large number [1]. It takes only few minutes for a locked vehicle to become a sweltering death trap for children. There is a need for such system that can alert parents or caregiver when someone has been left in the vehicle.

The proposed electronic module detects presence of a child inside the locked car with the help of temperature and gas sensors. The module notifies the registered user(s) when the condition of uprising of temperature and CO₂ concentration level occurs.

II. WORKING

When the driver gets out of the car and the car is locked, the module starts working. Sensors start working to monitor CO₂ and temperature values. The CO₂ and temperature value inside the car is then compared to a preset threshold (critical) value. The critical value is set over which child starts suffering from suffocation and heatstroke. If the measured value

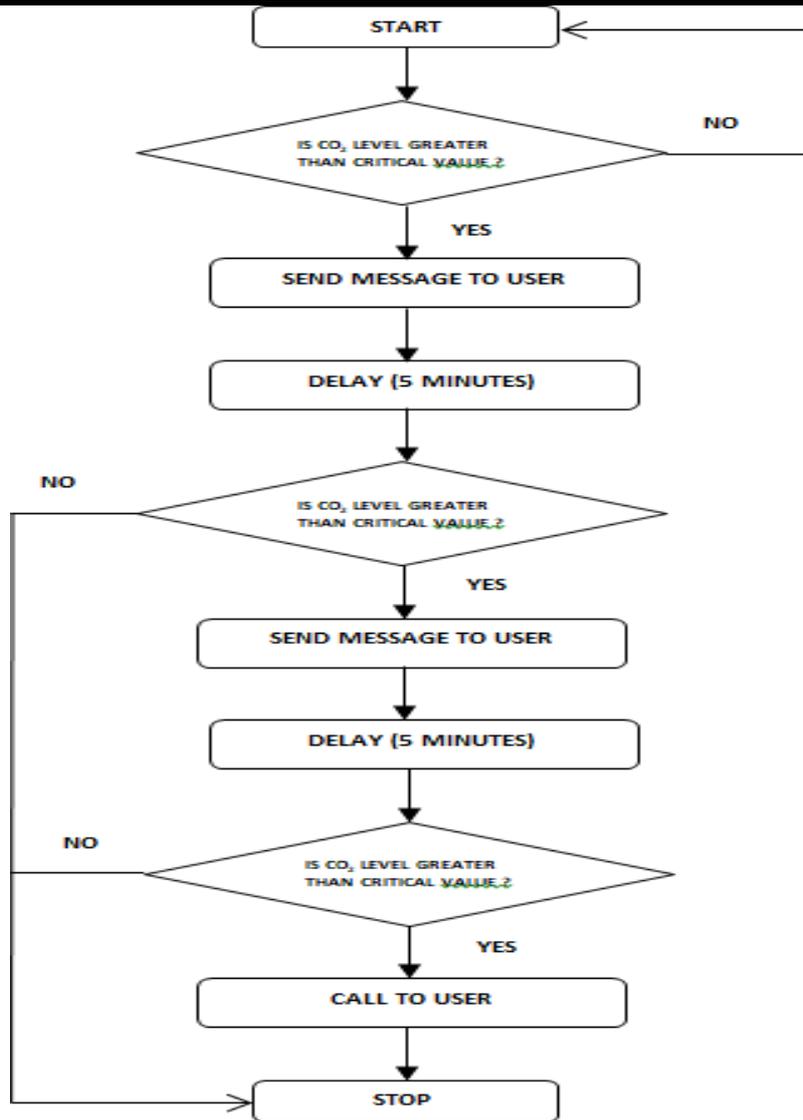


Fig.3 – Flow chart for designed module

III. RESULT & ANALYSIS

During testing, the analysis of designed module is carried out with various temperature value and CO₂ concentration.

If CO₂ concentration and temperature values cross the critical levels simultaneously, then the system is triggered and the message is sent to the registered user.

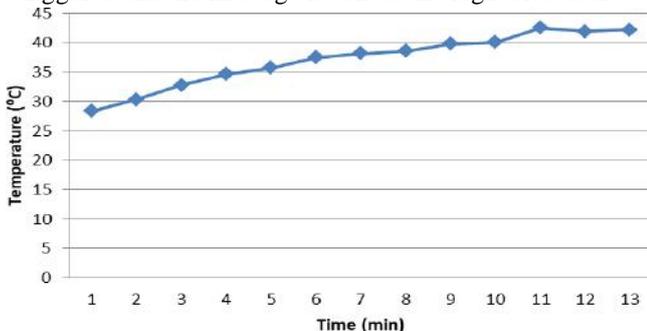


Fig.4 – Analysis of temperature over the time inside the locked car

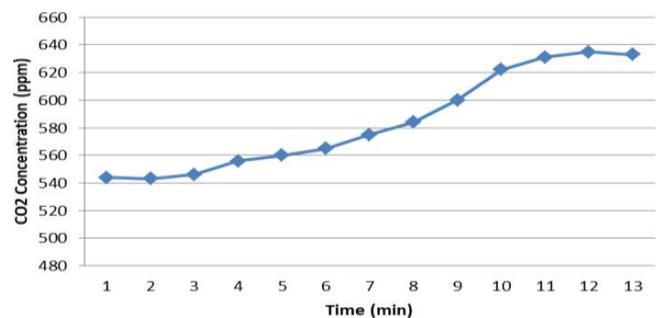


Fig.5– Analysis of CO₂ concentration over the time inside the locked car

From the above graphs it can be concluded that after 10- 15 minutes the temperature and CO₂ concentration values increases. If CO₂ concentration value crosses the critical value only then the designed module starts working.

IV. CONCLUSION

By the implementation of the Vehicular Child Trap

Alert System in the cars, deaths due to heatstroke & suffocation can be controlled. The designed algorithm and code is efficient in taking precise readings from gas and temperature sensor. This module can be scaled to industry standards and also provides a cost efficient safety feature to the car. This system will help the users to get a new helpful feature without spending too much money. The owner of the car can register the mobile number(s) and then the module in car, will alert to that number(s) when someone gets locked inside that car. Right now, this feature is not available in any car in India, so it can emerge as a new technology and a great feature towards the safety measures.

REFERENCES

- [1] N. M. Z. Hashim, H. H. Basri, A. Jaafar, M. Z. A. A. Aziz, A. Salleh and A. S. Jaafar, "Child In Car Alarm System Using Various Sensors", Asian Research Publishing Network, pp. 1653- 1658, 2014.
- [2] C Rajesh , K Kranthi , P Kishore, K Sireesha, "Intelligent Vehicle Security and SOS Messaging System with Embedded GSM Module", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, vol. 4, pp. 5435-5439, 2015.
- [3] By CSN Infographic. Heatstroke Deaths of Children in Vehicles. <http://www.childrensafetynetwork.org/infographics/heatstrokeinfographic>
- [4] Russell Manning and John Enning, "Temperature in Cars Survey", RACQ Vehicle Technologies Department, 2009.
- [5] Ryan Jaslow, "Study modules that alert parents when they left a child in car", CBS News, 2012.
- [6] C. McLaren, J. Null, and J. Quinn, "Heat stress from enclosed vehicles: moderate ambient temperatures cause significant temperature rise in enclosed vehicles," Paediatrics, vol. 116(1), pp. 109–112, 2005.
- [7] J. Booth, G. Davis, J. Waterbor, and G. McGwin, "Hyperthermia deaths among children in parked vehicles: an analysis of 231 fatalities in the United States, 1999 to 2007," Forensic Science, Medicine, and Pathology, vol. 6, pp. 99–105, 2010.
- [8] Bill Fleming, "Automotive electronics", IEEE vehicular technology magazine, pp. 49-52, 2006.