

# Development of an Automatic Vehicular Heatstroke Detection System

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**Abstract.** The cases of children being left in a car and died of heatstroke are on the rise every year. Car manufacturers have not implemented any sort of alert system that could prevent these unfortunate events from happening. There are many baby car seat alert systems available in the market, however, they are mostly inconsistent and unreliable. There is a need for more effective and efficient alert system to remind the users of their forgotten child. This paper aims to provide solutions to caretakers through application of multiple sensors for integration of a child detection system and also to discover the best placement of the sensors for a more effective system. The selection method is based on experimental setup with a test subject which is a human being. A prototype for the detection system is fabricated and results show a combination of ultrasonic and motion sensors produces the best results. The best position to place the ultrasonic and motion sensor is determined to be above the child seat and in the middle of the car respectively. The prototype of the detection and alert system is validated via a set of assessments to determine its accuracy, adaptability and reliability.

## 1. Introduction

Heatstroke is a condition where body overheats to a certain degree from a prolonged exposure in high temperature surroundings which might ultimately lead to permanent damage and even death. The hot weather in countries like Malaysia makes it even easier to get a heatstroke or also called hyperthermia. There have been many cases over the years where a baby or a child left in the car under the scorching weather has died of heatstroke. Based on a fact sheet by a non-profit organisation, there were 793 children that died in vehicles due to heatstroke since 1998 in the U.S. [1]. From a research done to a total of 171 fatalities in the U.S. of heat related deaths to young children in parked cars from 1995-2002, 73% (125) were children who were left unattended by adults [2]. One of the reasons that children are left unattended is because of the carelessness of parents who forget or unaware of the present of their child in the car. The parents fail to realise how hot a car would become if it is exposed to direct sunlight for a period of time. A normal human being body temperature is around 37 Celsius. Heatstroke would occur when the body temperature reaches around 40.5 Celsius. It could take as little as fifteen minutes being stuck in an overheated car for a child to suffer heatstroke [3]. There is no guarantee it can be prevented from just opening the car windows by a small gap. Children die of heatstroke in cars when parents get distracted from their daily routines and does not realise that they left their child unattended. The busy schedule of parents combined with the tendency to seat their sleeping child in the rear seat is one of the major reasons why these unwanted cases are happening. Moreover, tinting of car windows prevents the child to be noticed by passers-by.

