



# **A Child-Left behind Warning System using GSM and ARM7**

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**ABSTRACT:** This paper presents a simple and efficient way of detecting the presence of a child left alone in a parked car. Now-a-days many of these incidents have been repeating world-wide. In this busy world, driver or Parents in some situations may leave the car without taking (forgetting) the child. When a car is turned-off and parked (window closed) the temperature inside it will increase rapidly and can be life threatening as the thermo regulatory system of a child is weak. The proposed system detects the child occupancy. If a child is detected inside a car, the window is opened slightly for air circulation and the notifications are sent to alert the driver/parents to save their child. This process is carried out through GSM module. Even if they don't respond and temperature is increasing rapidly, then A.C will be turned on automatically. As the proposed model is a prototype, it has vehicle ignition monitor to conform the presence of a driver inside a car.

**KEYWORDS:** Child-left behind alert, ARM7, Global System for Mobile communication, PIR Sensor, Temperature Sensor, IR Sensor.

## **I. INTRODUCTION**

This paper aims to develop a reliable system, targeting car owners to reduce the unnecessary deaths of the innocent children. The statistics show that the number of deaths have been increasing year after year. Babies and toddlers are most at risk for dying if they left alone in a hot car. Nearly 31% of 0-12 Months babies, who are helpless have died in recent years. In India above 700 children died due to hyperthermia, as the thermo regulatory system of a child is weak. As a dedicated it is our duty to solve such incidents. The report will firstly provide a detailed analysis system which uses various sensing technologies to establish a vital signs and environment of the subject, with an effective response system to notify car owners or the relevant authorities when child is in danger. As science and technology has advancing to be part of our lives, most of every day applications are now connected each other. Children are our future innovators so, make sure that they are safe. Studies have demonstrated that the temperature inside a halted vehicle can rapidly rise to hazardous level for infants, pets & even elders.

## **II. RELATED WORK**

In [1] newspaper articles & campaigns by safety advocates had brought some attention to the problem. Some companies have developed devices that signals parents about tragedy is going to happen. In [2] some devices in market in order to prevent these tragedies, but studies have suggested that they all are unreliable. William Edwards, a senior engineer at NASA's Langley Research Centre in Hampton, led an effort to develop a child-left-behind warning system after a child is left in car died of hyperthermia in the centre's parking lot. In [3] when a child is placed in the car seat, a sensor under the cushion, working through the module mounted on the side of the seat, establishes a communication with an alarm on the driver's key ring. If the driver walks away from the car while the child is still in the seat, the alarm sounds- and can be turned off only by removing the child. This is also an unreliable system.

In [4] children left in a motor vehicle, even for a short interval of time in moderate ambient temperature are risk of hyperthermia. The internal temperature within a closed motor vehicle ascends rapidly in first 15 minutes despite of

# International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: [www.ijirccce.com](http://www.ijirccce.com)

Vol. 7, Issue 2, February 2019

variations in the rate of increase due to vehicle type, color and window tinting. Temperature increases by 1.7-1.9°C per 5 minutes. In [10] within 30 minutes 80% of temperature is increased and in 60 minutes vehicle have reached peak temperature regardless whether window is closed or cracked or open.

### III. SYSTEM DESIGN

An easy well as low cost solution for child-left-behind difficulty in a car is presented. PIR and IR sensors help to detect the child present in an infant seat. Optical and thermal detectors are not well suited if the baby is wrapped in a blanket or cloths. Once a car is turned off and parked, if the child is present in the car, the sensors detects the child and immediately window will be opened slightly for air circulation. When a child is detected continuously a message alert will be sent automatically to driver/parents through GSM. When the temperature increases upon the limits AC is turned on automatically. Here we used ARM7 architecture board which results in accuracy and flexible outputs. The proposed system has a vehicle ignition monitor to confirm the presence of a driver inside a car. As it is a prototype we kept DC motor to indicate the movement of car. DC fan is used to indicate AC in the car. When oxygen content is insufficient inside the car due to other poisonous gases, notifications will sent to the parents. When the temperature crosses the threshold level AC is turned on automatically. So,that we can ensure that baby is safe in a parked car.

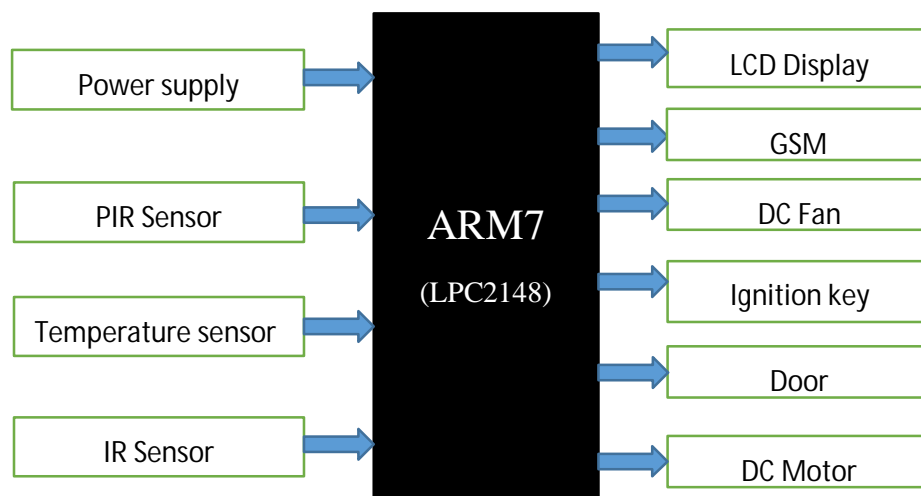


Figure 1: Block diagram of the proposed system

### IV. WORKING METHODOLOGY

The call of the design process is to produce a model or representation of the system. It is an embedded platform system which works according to the commands given to the microcontroller ARM7 (LPC2148). First we need to understand the most basic concept of interaction between microcontroller, sensors and GSM module. ARM7 is the heart of our project. Figure 2 shows the flow chart of the proposed system.

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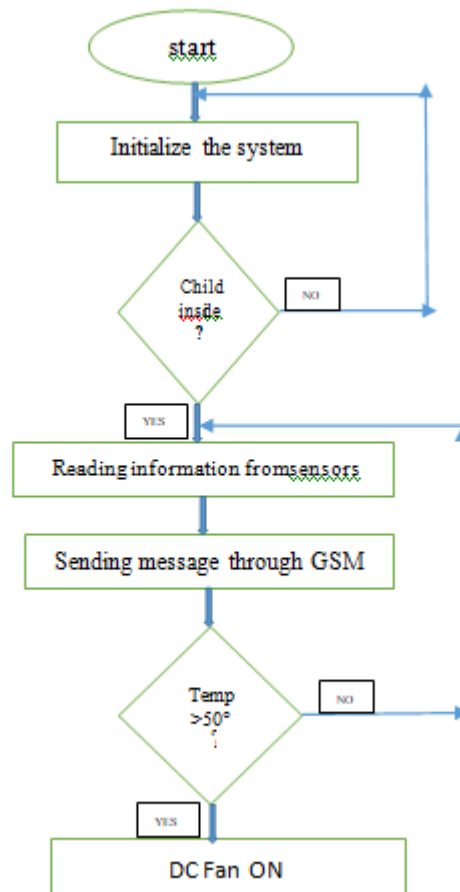


Figure 2. Flow chart of the system

## V. IMPEMENTATIONS

The following hardware components used in the system are

**ARM7 ARCHITECTURE BOARD:** ARM means Advanced RISC Machine, RISC stands for Reduced Instruction set computer. It is based on LPC 2148 microcontroller which is a widely used IC in ARM7 family. LPC2148 consists of 64 pins which are categorized by 2 ports (P0,P1) and each port has 32 pins. On-chip static RAM is 8KB-40KB and flash memory is 32KB-512KB, 60MHz of CPU clock cycle, 16-bit/32-bit architecture, SPI and SSP facilities, a power jack and reset button.

**GSM MODULE:** Global system for mobile communication was developed at Bell Laboratories in 1970. It is the widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900 MHz, 1800 MHz and 1900MHz frequency bands.

**PIR SENSOR:** Passive Infrared Sensor detects human being moving around within approximately 10m from the sensor. PIR are fundamentally made of a pyro electric sensor, which can detect the levels of infrared radiations.

**TEMPERATURE SENSOR:** This sensor continuously senses the temperature inside the halted vehicle and is transmitted to the microcontroller.

The software requirements of the system are Keil  $\mu$ vision 3, Embedded 'c', Flash magic to dump the program into ARM 7 kit.

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Vol. 7, Issue 2, February 2019



Figure3: Hardware setup

Figure 3 shows the total hardware setup of the proposed model.

## VI. RESULTS & OBSERVATIONS

Figure 4 shows the screenshot of detecting a child inside a car.



Figure 4. Child detected

Temperature sensor LM35 senses the surrounding temperature and displays continuously in the LCD display. The temperature increases rapidly so it is difficult for the children to survive. Figure 5 shows the temperature reading.

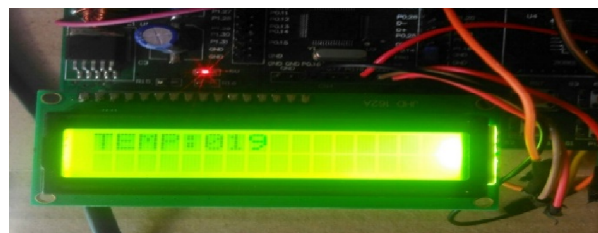


Figure 5. Temperature reading

If the child is detected continuously by IR and PIR sensors, then message alerts are sent to the parents/ driver to save the child using GSM module. Figure 6 shows the message sending alert.

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Figure 6. Message sending alert

Window is opened slightly as motor is fixed to the window. This allows some circulation of air into the car. When the temperature raises upon the limits, AC is turned on automatically i.e when temperature crosses 50°C.

## VII. CONCLUSION

The system is simple and cheap and is presented for detecting the child who left intentionally or inadvertently inside a car to prevent him/her from hyperthermia. This document has concluded designing, analyzing and building a model using ARM7 and sensors. The system that has generated is expected to continue to expand with concomitant change in time with the developed and equipped with great technology. With the creation of the system, hopefully parents are more responsible for ensuring their children safety is not compromised. However, the system is capable of being treated to better ensure of the resulting system will become more efficiently. Test results clearly show that the presence of a child in an infant seat can be accurately detected and appropriate warning signal can be generated to save the child using GSM.

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