DESIGN AND IMPLEMENTATION OF SUFFOCATING PREVENTION SYSTEM

Shenbagarajan.A[1], M.A.Kumaran[2], B.Ramachandramoorthy[3]
Department of Computer Science and Engineering
AAA College of Engineering and Technology, Sivakasi, Tamil Nadu, India.

Abstract: Accidents are caused due to getting locked inside the cars without sufficient air. There are many incidents in which children got locked inside the car and were dead due to suffocation. This can be prevented by implementing our project in automobiles. In our project we are going to sense the presence of human inside a locked car and alert the driver and the owner through SMS to open the car. If there is no response or the car is parked in a remote area, after a few waiting period the air vent present in the car is opened automatically, which prevents the suffocating child from death.
Key-words: Security, Suffocation Prevention, Automated System, SMS Alert, Human Detection

I. INTRODUCTION

Life casualty caused by suffocating inside a closed parked car has become a worldwide tragedy. Statistic has shown the occurrence of death inside a non-moving vehicle involving children is the largest, followed by handicapped and elderly person. Cases involving adults usually happens while the victims are taking a nap inside the car. This is due to dehydration, reduced amount of oxygen and heat exhaustion from the car's interior. When it became hard to breath, it is usually too late to react as the body already too weak to do anything. Cited from an article about child's injury and death caused by suffocation inside a closed parked car, 54% of these cases are due to parent's carelessness by leaving the child intentionally while doing some chores and 42% of the cases are the opposites as the parents forgets or did not realize that their child is inside the car when they parked it. Usually the biggest factor of this fatality is caused by hyperthermia as the temperature inside the car will drastically increase when the engine has been turned off. As a solution, sense the presence of human inside a locked car and alert the driver and the owner through SMS to open the car. If there is no response or the car is parked in a remote area, after a few waiting period the air vent present in the car is opened automatically. This system will prevent any parents from intentionally leaving their child inside the car while doing chores. Hence, this will reduce the number of life casualty especially the fatality among children inside the car.

II. PROPOSED SYSTEM

The presence of human inside a locked car is detected and alerts the driver and the owner through SMS to open the car. If there is no response or the car is parked in a remote area, after a few waiting period the air vent present in the car is opened automatically. This system will prevent any parents from intentionally leaving their child inside the car while

doing chores. Hence, this will reduce the number of life casualty especially the fatality among children inside the car.
2.1Block Diagram:-It consists of a processor (Arduino which is used here).
The connections are made according to the block diagram shown in fig 2.1.The timer used here is inbuilt timer. User mobile is the driver's and owner's mobile.
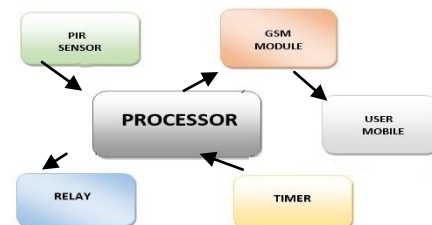

Fig 2.1:-BLOCK DIAGRAM

2.2Module Explanation:-A module is a software component or part of a program that contains one or more routines. One or more independently developed modules make up a program. An enterprise-level software application may contain several different modules, and each module serves unique and separate operations. Modules make a programmer's job easy by allowing the programmer to focus on only one area of the functionality of the software application. Modules are typically incorporated into the program (software) through interfaces. There are several modules and their explanations are given below.

2.2.1User Module:-The user module supports user roles, which can be set up with fine-grained permissions allowing each role to do only what the administrator permits. Each user is assigned one or more roles. Here the user module consists of the user mobile where the messages can be received.

2.2.2Processor (Arduino Board):-A processor is the logic circuitry that responds to and processes the basic instructionsthat drive a computer. The four primary functions of a processor are fetch, decode, execute and writeback. The processor used here is Arduino.Arduino is a prototype platform (open-source) based on an easy-to-use hardware and software. It consists of a circuit board, which can be programmed(referred as a microcontroller) and a ready-made software called Arduino IDE(Integrated Development Environment), which is used to write and upload the computer code to the physical board. Arduino

provides a standard form factor that breaks the functions of the micro-controller into a more accessible package.
Functionality:-
The following points shows the functionality of arduino board,

- Arduino boards are able to read analog or digital input signals from different sensors and turn it into an output such as activating a motor, turning LED on/off, connect to the cloud and many other actions.
- You can control your board functions by sending a set of instructions to the microcontroller on the board via Arduino IDE (referred to as uploading software).
- Unlike most previous programmable circuit boards, Arduino does not need an extra piece of hardware (called a programmer) in order to load a new code onto the board. You can simply use a USB cable.
- Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program.
- Finally, Arduino provides a standard form factor that breaks the functions of the micro-controller into a more accessible package.
- Fig 2.2 shows the arduino board or output screen for visualizing the output.
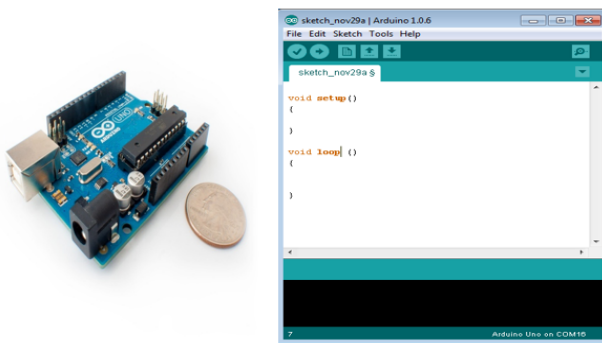

Fig2.2:- ARDUINO BOARD & OUTPUT SCREEN

2.2.3Sensors:-A sensor is a device, module, or subsystem whose purpose is to detect events or changes in its environment and send the information to other electronics, frequently a computer processor. A sensor is always used with other electronics, whether as simple as a light or as complex as a computer. The sensor used here is PIR Sensor.

2.2.3.1 PIR Sensor:-All objects with a temperature above zero emit heat energy in the form of radiation. Usually this radiation isn't visible to the human eye because it radiates at infrared wavelengths, but it can be detected by electronic devices designed for such a purpose. A PIR-based motion detector is used to sense movement of people, animals, or other objects. They are commonly used in burglar alarms and automatically activated lightning systems. They are commonly called simply "PIR", or sometimes "PID", for "passive infrared detector". This sensor is used for detecting humans or living being inside the locked car. The PIR Sensor is shown in fig2.3.

Fig2.3:- PIR SENSOR

2.2.4 GSM Module:-This is an ultra compact and reliable wireless module. The SIM900A is a complete Dual-band GSM/GPRS solution in a SMT module which can be embedded in the customer applications.Featuring an industry-standard interface, the SIM900A delivers GSM/GPRS 900/1800MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption.
GSM Sim 900A:-GSM/GPRS Modem-RS232 is built with Dual Band GSM/GPRS engine- SIM900A, works on frequencies 900/ 1800 MHz. The Modem is coming with RS232 interface, which allows you connect PC as well as microcontrollerwith RS232Chip(MAX232). The baud rate is configurable from 9600-115200 through AT command. The GSM/GPRS Modem is having internal TCP/IP stack to enable you to connect with internet via GPRS. It is suitable for SMS, Voice as well as DATA transfer application in M2M interface. The onboard Regulated Power supply allows you to connect wide range unregulated power supply. Using this modem, you can make audio calls, SMS, Read SMS, attend the incoming calls and internet ect through simple AT commands.

The features of GSM Module:
- Dual band GSM/GPRS 900/1800MHz.
- Configurable baud rate.
- SIM card holder.
- Built in network status LED.
- Inbuilt powerful TCP/IP protocol stack for internet data transfer over GPRS.

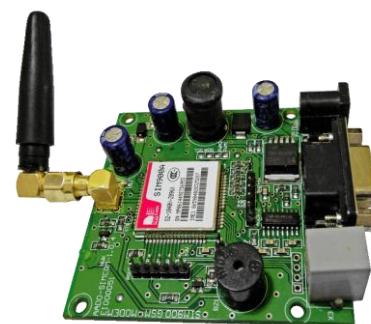The GSM Module and the working of PIR sensor is shown in the fig2.4 and fig2.5 respectively.
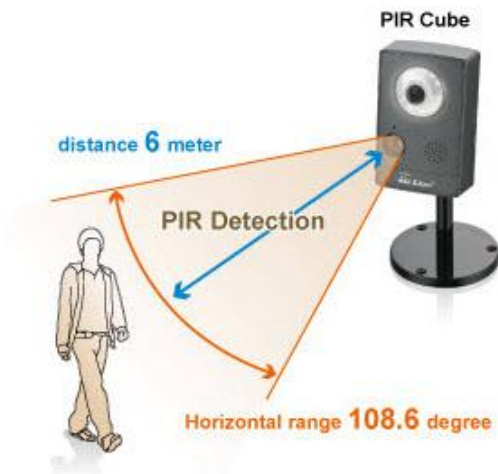

Fig 2.4:- GSM MODULE

Fig 2.5:- PIR SENSOR WORKING

2.2.5Timer:-A timer is a specialized type of clock for measuring time intervals. Timers can be categorized to two main types. A timer which counts upwards from zero for measuring elapsed time is often called a stopwatch; a device which counts down from a specified time interval is more usually called a timer. A simple example for this type is an hourglass. The timer used here is inbuilt timer.

2.2.6Relay:-A switch is an electrical component that can "make" or "break" an electrical circuit, that interrupt the current or diverting it from one conductor to another. The mechanism of a switch removes or restores the conducting path in a circuit when it is operated.The most familiar form of switch is a manually operated electromechanical device with one or more sets of electrical contacts, which are connected to external circuits. A switch that is operated by another electrical circuit is called a relay. Large switches may be remotely operated by a motor drive mechanism.

III. PROCESS OF PROPOSED SYSTEM

The following stepsshows the procedure of the proposed system.

- The first step is to check whether the car's engine is turned off or not.
- If engine is in off condition, the door is locked or not is checked.
- If the door is locked the system starts.
- Now system checks the movement inside the car using PIR sensor.
- If there is no movement detected ie)no one present inside the car, the control flows again to the initial condition of checking the engine is off or not and it continues.
- If movement is detected, a SMS is sent to the owner and the driver's mobile phone.
- A time interval of five minutes is waited or delayed by the system for opening the door.
- If the door is opened the control again flows to the initial position of checking whether the engine is turned off or not.

- If the door is still not opened, the air vent present in the car is opened and then the system shutdowns.
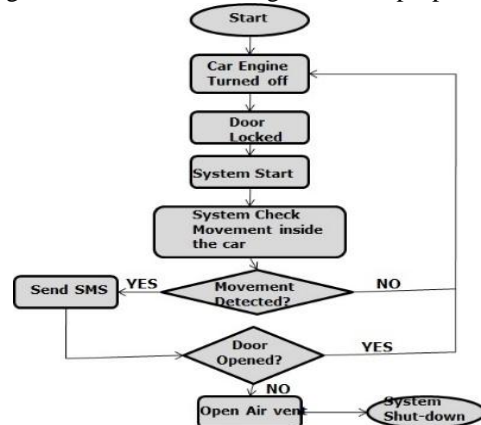
The fig 2.6 shows the flow diagram of the proposed system.

Fig2.6:- FLOW CHART

IV. CONCLUSION AND FUTURE WORK

The In-car Suffocating Prevention System has been successfully developed with the promising testing results as it can detects a human inside a parked car. Within a 30 minutes time span, human lives can be saved as this prevention system will alert the owner to check back any faulty reason due to his or her carelessness. The system uses a very simple automation technique where feature extraction of a human presence is analyzed in order to detect human. By doing this, the system can helped preventing child or pet fa1tality inside a car after being left alone for a certain amount of time for any reason. The next step of our project is to capture the image of the person who got locked inside the car using 360° camera and send the image as MMS to the registered mobile number.

REFERENCES

[1] Recommendation on the Prevention of Leaving Children Unattended in Motor Vehicles, French Consumer Safety Commission, Adopted in Session 10 December 2009. Available at:http://www.securiteconso.org/prevention-ofleaving-children-unattended-in-motor-vehicles/

[2] J. Schuette, S. Scholz and C. Crawford, "AnAutomatic Empty Vehicle Detection Systemfor Airport People Movers Applications," inVehicular Technology Conference (VTCSpring), 2012 IEEE 75th, Yokohama, 2012, pp.1-5.

[3] P. Faber, "Seat Occupation Detection Inside Vehicle," in Proc. 4th IEEE Southwest Symposium on Image Analysis andInterpretation, Austin, TX, 2000, pp. 187-191.

[4] M. Devy, A. Giralt and A. Marin-Hernandez," Detection and Classification of Passenger Seat Occupancy using Stereovision," in Proc. IVIEEE Intelligent vehicle symposium, Dearborn,MI, 2000, pp. 714-719.

[5] B. R. Wilson, "Endangered Child in Vehicle Alarm," U.S. Patent 7 710 277 B2, May 4,2010.

[6] C. Tsuchihashi and Y. Shinojima, "In-VehicleBody

Detection Method," European Patent 1420 270 B1, April 28, 2010.

[7] H. Takasuka, "Method and Apparatus for Detecting Human Body in a Vehicle," U.S. Patent 7 276 030 B2, October 2, 2007.

[8] C. McLaren, J. Null, J. Quinn, "Heat Stressfrom Enclosed Vehicles: Moderate AmbientTemperature Cause Significant TemperatureRise in Enclosed Vehicles," Pediatrics, vol.116, no. 1, pp. e109-e112, July 2005.Recent Advances in Automatic Control, Modelling and SimulationISBN:

[9] Hao Q, Brady DJ, Guenther BD, Burchett J, Shankar M, Feller S (2006) Human tracking withwireless distributed pyroelectric sensors. IEEE Sens J 6:1683–1696.

[10] Hao Q, Hu F, Xiao Y (2009) Multiple human tracking and identification with wireless distributed pyroelectric sensors. IEEE Syst J 3:428–439.