

SMART CAR SEAT

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To my beloved Mom and Dad

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ABSTRACT

This project is about designing a device call “Smart Car Seat” that will prevent a child from being left alone in the vehicle with extreme temperature. This project is inspired by the increasing number of children death in that condition year by year. The objectives of this project are to detect a motion in a car, to measure the temperature and to alert someone from risk the infant. This project helps to protect a child by reminding the parent that the child is in the car with temperature rising via a keychain accessory. This device consists of two sensors (temperature and motion sensors), two PICs to combine circuits, transmitter and receiver to transmit the signal and buzzer as output as alarm to the parent. This device operates when there is a motion detected and the temperature reached the maximum temperature value. If both input high, a signal will transmit to the keychain and beep the buzzer.

ABSTRAK

Projek ini berterusan merekebentuk satu alat yang dinamakan “Smart Car Seat” yang akan mencegah kanak-kanak daripada tertinggal seorang diri di dalam kenderaan dan terdedah kepada suhu yang tinggi. Projek ini adalah inspirasi daripada peningkatan jumlah kanak-kanak yang mati disebabkan kejadian tersebut tahun demi tahun. Objektif projek ini adalah untuk mengesan pergerakan di dalam kereta, mengukur suhu dan member amaran kepada ibu bapa daripada membahayakan kanak-kanak tersebut. Projek ini membantu melindungi kanak-kanak dengan cara mengingatkan ibu bapa bahawa anak mereka berada dalam keadaan bahaya dengan aksesori rantai kekunci. Alat ini terdiri daripada 2 jenis pengesan (pengesan pergerakan dan pengesan suhu), dua buah PIC untuk menggabungkan litar, penghantar dan penerima isyarat dan buzzer sebagai bunyi amaran. Alat ini beroperasi apabila pergerakan dikesan dan suhu mencecah nilai maksima suhu yg telah ditetapkan. Jika kedua-duanya dikesan, satu isyarat akan dihantar ke rantai kekunci dan buzzer akan berbunyi.

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CHAPTER I

INTRODUCTION

1.0 Overview

The purpose of this project is to design a device to help ensure the safety of children especially infants that are accidentally left in a car. This project includes a system for alerting someone that a child is left in a safety seat in a vehicle at the temperature is raising. A motion detector is used in order detect the presence of the child while the temperature circuit monitors the temperature levels in the car to determine if the child is in danger. The PIC circuit is used to combine both circuits. If motion is detected and the temperature reached the specify value, the RF transmitter will transmit a signal to RF receiver to remind them that a child is left in the car by alarm sound. The RF receiver is attached to the car keys so that it will alert parents to prevent any danger occur.

1.1 Project Objectives

The objectives of this project are:

- a) To design a circuit that will detect a motion in a car.
- b) To design a temperature circuit sensor that can measure the temperature in a vehicle.

- c) To design a circuit that will alert someone from risk the infant.

1.2 Problem Statement

Each year we shocked by cases that involved innocent children died after being left inside a hot vehicle. Statistics shows that total number of United State of America (U.S.) hyperthermia deaths of children left in cars for 2007 and 2008 are 35 and **42 respectively [1]**. This tragedy most occurred because of carelessness by leaving them alone accidentally in a vehicle for a long time. Heat is just another reason not to leave them since infants are particularly susceptible dehydration and may quickly suffer a deadly heat stroke (hyperthermia). The large numbers of children die in those types of conditions being an inspiration of this invention.

1.3 Scope of Project

The scopes of this project are divided into two block diagrams which are car seat block diagram and receiver block diagram. The circuits involve are:

a) Car Seat (Transmitter circuit.)

- i. Passive Infrared Sensor (PIR) is use for motion detector circuit to detect the presence of the child in the car seat
- ii. LM35 is use as the temperature sensor to detect if the temperature reached 35°C.
- iii. An AND gate IC is use to determine the condition is high when both inputs are high.
- iv. The transmitter transmit signal when both condition is high by using RF Transmitter Module (315MHz).

b) Keychain (Receiver circuit)

- i. Receiver (RF Module) receives signal from transmitter by using RF Receiver Module.
- ii. Buzzer is use to alert and indicate about their child to the parents.

c) PIC circuit

Two PIC16F876A microcontrollers are uses to combine both sensors and to receive signal for the keychain circuit by using C language programming.

1.4 Project Methodology

First, literature review is done and then the circuits are tested and designed. Then, microcontroller for transmitter and receiver is programmed. After the program and the circuit are successful by simulation, the hardware and software were integrated and tested. The methodology of the project is shown from the figure below:

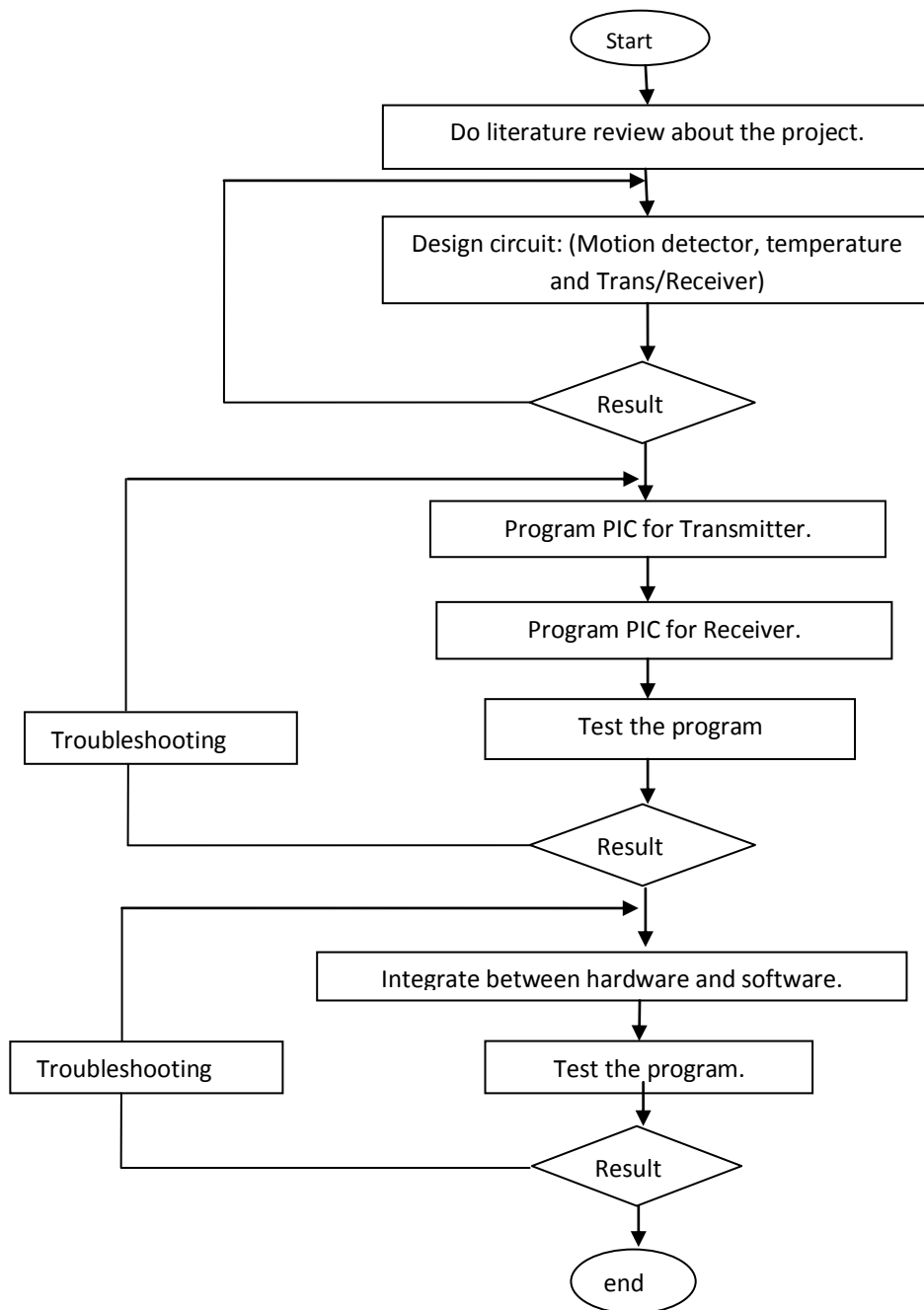


Figure 1.1 Flow Chart of Project Methodology

1.5 Report Structure

This report contains of five main chapters. The titles of each chapter are Introduction, Literature Review, Project Methodology, Results and Discussion and Conclusion.

In Chapter 1, this report starts with the brief introduction of the project. The objectives, scope of project, problem statement and methodology of the project are stated.

In Chapter 2, literature review of the project is explained. The theories of the devices and other components such as sensors and microcontroller that are related to this project are stated.

In Chapter 3, the methodology and the process of the project will be discussed. Also including the advantages of the method and components selected.

In Chapter 4, results of finding the project are recorded followed by discussion of the project.

In Chapter 5, the last chapter, the conclusion of this project is made and future recommendation is stated to improve this project.

CHAPTER II

LITERATURE REVIEW

2.1 Recent Projects

2.1.1 Hyperthermia Prevention Child Car Seat

This project is build up by a project team of Craig Fella, Sushanth Anumalu and Dan Manjarres. This project is to design a car seat that can sense when a child is placed in or removed from the seat and if the inside of a car is over 90 degrees Fahrenheit. If both conditions are true, the car seat will call 911 on an attached cell phone. The cell phone could be equipped with a built-in GPS locator, to help police find the vehicle [2]. The block diagram of the project is as shown below:

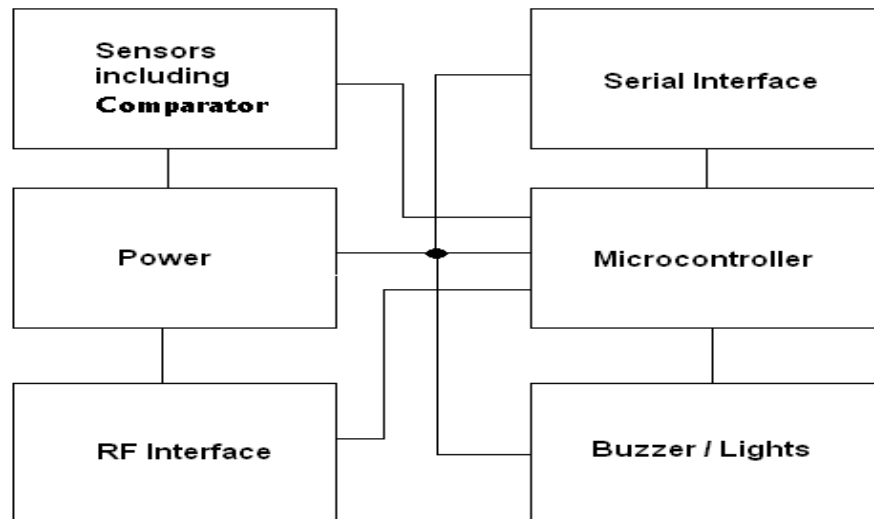


Figure 2.1 Block diagram 1

2.1.1.1 Description of block diagram:

a) Sensors

This block contains the flex sensors used to detect the presence of a child; the thermistor based voltage divider used to detect a dangerous temperature, and 2 analog comparator circuits that send high logic levels to the microcontroller when the corresponding condition is true. This part is only present on the car seat [2].

b) Serial Interface

This block contains parts needed to interface to the cell phone via a PC-style serial port. This includes a 9 pin d-sub connector and an rs-232 level shifter. The modem control lines and UART data lines interface to the microcontroller. This part is only present on the car seat [2].

c) RF interface

This block contains the antenna, LINX chip, and a voltage divider used to limit the range of transmission/reception. This will be a transmitter chip on the car seat, and a receiver chip on the key chain. This interface will be connected to a UART on the microcontroller [2].

d) Microcontroller

This block contains our microcontroller, and any circuits needed to support programming and debugging of it [2].

e) Buzzer/Lights

This block contains whatever our attention-getter is. On the keychain this will be a piezoelectric buzzer, on the car seat this may be the horn and headlight relays of the car. This is driven off of a GPIO pin of the microcontroller [2].

f) Power

This block contains a battery and a circuit for charging it from the cigarette lighter on the car seat, and a pair of watch batteries on the key chain [2].

2.1.2 Smart Car Seat

The purpose of this project is to prevent child death by hypothermia as a result of being left in a car in extreme temperatures. This is a project by Jason Carter, Steve Kopchik and JD Johnson [3]. The block diagram is as shown below:

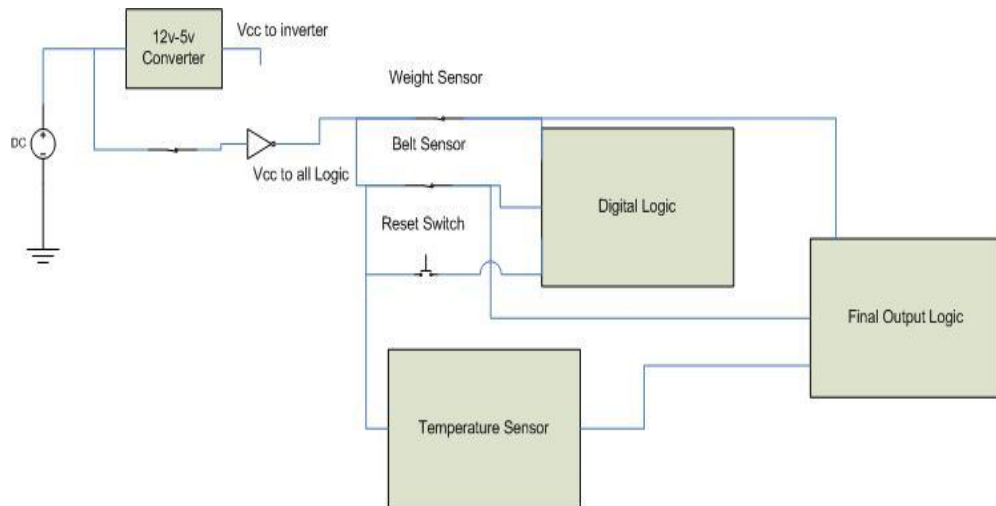


Figure 2.2 Block Diagram 2

2.1.2.1 Description of block diagram:

a) Temperature Sensor

The temperature sensor uses a temperature sensitive transistor output that goes through a voltage divider and is sent into a logic circuit [3].

b) Weight sensor

The weight sensor will use a simple mechanical method of separating insulated bolts by springs so that when a weight is placed on the seat, the springs will compress and the bolts will touch, creating an electrical connection [3].

c) Belt sensor

The belt sensor will work in a similar way. When the belt is buckled, two wires will touch to make an electrical connection [3].