Assignment on "Real Time Pre-Crash Vehicle Detection System."

Real Time and Embedded System

B.Tech-Sem 8th-CSE-BTCSRE8025

(Spring Semester 2016)

Submitted to

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Abstract

This project is about a real time pre-crash vehicle detection system. As there is a huge growth of vehicles and with the same narrow-sized road it is very difficult for the driver to drive safely without a crash on the road. If for a small amount of time if a vehicle driven has missed his attention then it will result in crash of the vehicle with front vehicle even if the vehicle is in low speed. Now-a-days many sensors are available in the market for the detection of pre-crash between vehicles. I am using IR sensor system for detecting real time pre-crash between vehicles.

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Chapter 1

INTRODUCTION

Seeing the growth of vehicles in large number and with the same narrow size road it is very difficult for the driver to drive a vehicle safely without a crash on the road. If for a small fraction of time if a vehicle driven has missed his attention then it will result in crash of vehicle with front vehicle even if the vehicle is in less speed. In congested traffic sometimes a vehicle owner gets frosted and he can’t keep watch on vehicle in slow moving traffic. In such a situation this pre-crash vehicle detection system proved to be an excellent system from preventing a crash.

Chapter 2
LITERATURE REVIEW

1. A Real-time Precrash Vehicle Detection System:

This paper was presented by *Zehang Sun, Ronald Miller, George Bebis and David DiMeo*[1] an in-vehicle real-time monocular precrash vehicle detection system. The system acquires grey level images through a forward facing low light camera and achieves an average detection rate of 10Hz.

The vehicle detection algorithm consists of two main steps: multi-scale driven hypothesis generation and appearance based hypothesis verification. In the multi-scale hypothesis generation step, possible image locations where vehicles might be present are hypothesized. This step uses multiscale techniques to speed up detection but also to improve system robustness by making system performance less sensitive to the choice of certain parameters. Appearance-based hypothesis verification verifies those hypothesis using Haar Wavelet decomposition for feature extraction and Support Vector Machines (SVMs) for classification. The monocular system was tested under different traffic scenarios (e.g., simply structured highway, complex urban street, varying weather conditions), illustrating good performance.

My review: As per my view, the cost of the project is too high since **low light camera** will cost too much. Further, the cost of developing the algorithm which includes **multi-scale driven hypothesis generation** and appearance based **hypothesis verification** which will include some **processing** for the classification of the same.

Chapter 3

PROPOSED MODEL

In my proposed system, I am using an *Infrared transmitter* and *receiver* combination system which is attached to a *8051 based microcontroller board*. A *buzzer* is attached to a microcontroller based embedded board along with a *controller of brake* which will push the the brake if distance is nearest. The IR sensor system continuously sends signals and monitors any car or other obstacles are in front of car.

The distance up to which IR sensor can work may be up to 1 meter and increasing the distance of may increase the cost of the IR sensor which might be failing in the feasiblity test. So, when any obstacle or vehicle detected by IR sensor system, it will send a signal to the 8051 based embedded board. This board after receiving this signal send a signal to the **buzzer system** which will work immediately and control is then tranferred to the **braking system** to stop the vehicle from crashing. Vehicle driver can control his vehicle as per this buzzer signal when the vehicle is at 100 cms distance away from the front vehicle.

But if for an unseen scenario, if the driver is unable to control the vehicle, the braking system will automatically run its function to stop the vehicle. Hence, the pre-crash of the vehicle can be detected in real time as well as prevent from crashing by applying brakes automatically which is attached with the embedded board, if the driver fails to stop the car even after the buzzer beeps.

3.1. HARDWARE AND SOFTWARE USED:

Software : Embedded ‘C’

Tools : Keil and Flash magic.

Hardware : LPC2148(ARM7) 8051 Microcontroller.

3.2. APPLICATIONS:

1. Real time to track the assets.

2. Can be used for collision detection for any objects.

3. Can be used to find any objects in a hole, where bigger tools is not possible to reach.

3.3. ADVANTAGES:

1. Low cost of the materials.

2. Automated operation of the system.

3. Low power consumption.

4. Security.

3.4. BLOCK DIAGRAM:

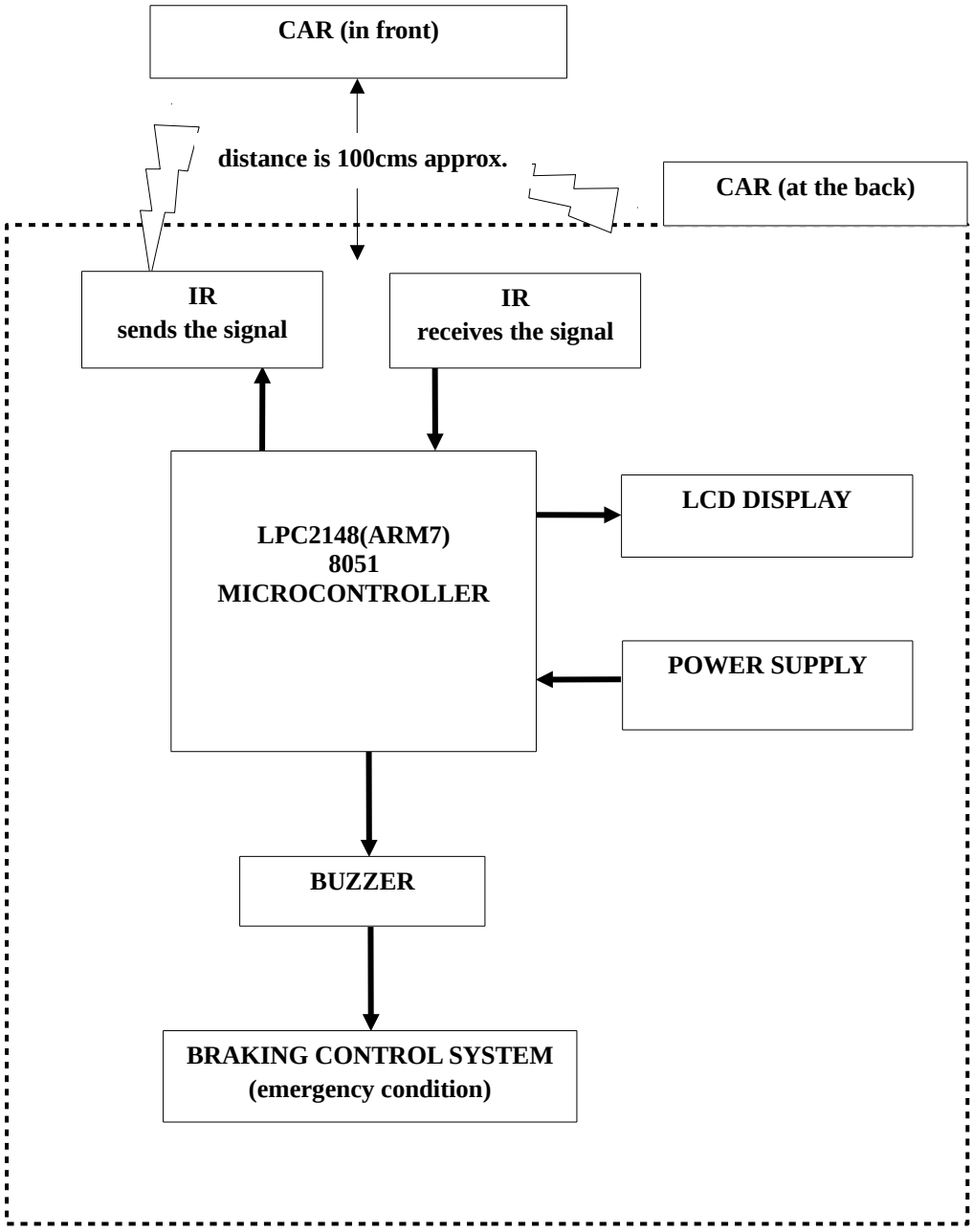

Figure 3.4. Working of the model

Chapter 4

CONCLUSION AND FUTURE WORKS

In the proposed system I have used an *Infrared transmitter* and *receiver* combination system which is attached to a *8051 based microcontroller board*. A *buzzer* is attached to a microcontroller based embedded board along with a *controller of braking system* which will push the brake if distance is nearest. The IR sensor system continuously sends signals and monitors any car or other obstacles are in front of car. Since its just a model which has been designed, so the test phase is still in process.

For future, if any other problems found in the testing phase it will be rectified simultaneously. Further, some more features could be added for more better detection of the vehicles sideways, as well as from the backside.

References

[1] Zehang Sun, Ronald Miller, George Bebis and David DiMeo, “A Real-time Precrash Vehicle Detection System” (2002).

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