

Mansoura University



VEHICLE COLLISION AVOIDANCE SYSTEM

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- Egypt occupies the tenth position globally in road accidents.
 - Highway obstacle detection is one of the most difficult and challenging task in real time systems in yehicles.
 - California first introduced the obstacle detection techniques which uses impanation of ultrasound, infrared lasers and radars.
- Our target is to detect objects in the front side to avoid collisions.

Motivation



Related works..

	Project	Uses	Year
Audi	Braking guard	Radar	2013
BMW	Driving Assistant Plus	Camera, radar, sensors	2013
Mercedes- Benz	radar based forward collision warning	combination of stereo camera and radar sensors to detect pedestrians in front of the vehicle	2013
Volvo	Volvo introduced the first cyclist detection system.	Lidar laser sensor that monitors the front of the roadway	2013

Objectives

1. Detecting the cars blocks

2. Calculate the distance between two cars

3. Give an alarm and decrease the speed when exceed the minimum distance

Proposed System

This project aims to create a low cost, retrospective solution that can be implemented in large scale to help reduce a significant number of accidents.

This project focuses on development of a crash warning and avoidance system that monitors the environment of the vehicle constantly and assisting the driver in avoiding a collision.

The Proposed Analysis Framework:





Logitech USB webcam

The webcam has a frame rate is 30 fps with video capture resolution of 1024 x 768.



Hardware (Raspberry Pi 3Model B+):

- Raspberry Pi is a small sized single board computer like credit card.
- 50% faster than Raspberry pi 2 .
- It costs 35 \$
- It consist of :
- 1. Processor
- **2. RAM**
- 3. Networking
- 4. Peripherals
- 5. Video



1-Processor

The Raspberry Pi 3 uses a Broadcom BCM2837 SoC with a 1.2 GHz 64-bit quadcore ARM Cortex-A53 processor, with 512 KB shared L2 cache





The Raspberry Pi 3 have 1 GB of RAM



3- Networking

The Raspberry Pi 3 is equipped with 2.4 GHz WiFi 802.11n (600 Mbit/s) and Bluetooth 4.1 (24 Mbit/s) in addition to the 10/100 Ethernet port.



4- Peripherals

The Raspberry Pi may be operated with any generic USB computer keyboard and mouse.



Raspberry Pi 3Model B+:

5- Video

The Raspberry Pi 3 able to decode H.265-encoded videos in software.

It contains :

HDMI ouput to lcd display and oput to touche screen display









Software algorithm



Microsoft Visual Studio

Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft .Visual Studio supports different programming languages and allows the code editor provided a language-specific service exists. Built-in languages include C,C++ and C++/CLI (via Visual C++).





OpenCv

OpenCV (Open Source Computer Vision) is a library of programming functions mainly aimed at real-time computer vision .

Applications :

in our project we used Opency For Some Applications such as Motion understanding and Object identification.

Programming language:

OpenCV is written in C++ and its primary interface is in C++, There are pingings in Python, Java and MATLAB.

OpenCV



- Cmake:

CMake scripts can produce Microsoft Visual Studio project and solution files.

Where is the source code: C:/Projects/OSG/OSG-3.0.1	Browse Source
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Code blocks :

Code Blocks is a free , open-source cross platform IDE. Code blocks supports different programming languages as C,C++and paython.This also installs codeblocks-common and codeblocks-contrib, which gives several libraries and some plugins and compilers such as :

- GNU GCC Compiler (we use this compiler)
- Intel C/C++ Compiler
- SDCC Compiler
- Tiny C Compiler
- GDC D Compiler







Putty :

- Putty is a very useful application that can be used to connect to serial ports and Secure Shell(SSH) to Raspberry Pi's.
- Putty is mostly used on Windows to connect to remote devices but it can also run on a Raspberry Pi.

ware;

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About	Close window on exit: Always Never Only on clean exit Open Cancel	



VNC Viewer :

VNC is a graphical desktop sharing system that allows you to remotely control the desktop interface of one computer from another. It transmits the keyboard and mouse events from the controller, and receives updates to the screen over the network from the remote host

On our Pi (using a monitor or via SSH), install the TightVNC package.



EXPERIMENTAL SETUP

- We Test our project on both (windows and raspbian systems).
- We use a high definition video input.
- This video is saved in system memory and basic detection operations are performed by the code.
- algorithms are allowed to run and perform basic image processing functions.

EXPERIMENTAL SETUP

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Conclusions and Future /Work

- We introduce a system with low cost and real time image processing.
- An illustrative comparative analysis is performed on the test video captured by USB webcam and the Haar cascade classifier operations are performed in OpenCV on Raspberry Pi board.
- The future scope of this above work is to a generate a novel distance measuring algorithm based on canny edge detection principle to measure the distance between the objects and vehicles and efficiently minimize the risk of accidents especially in areas densely infested with people.
- can use RADAR and LIDAR to overcome weather changes to make a better performance for getting a detailed images.

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- International Journal of Modern Engineering Research (IJMER) (Automotive Collision Avoidance System)
- Automotive Collision Avoidance Methodologies Sensor-Based and ITS-Based) -Rawa Adla, Nizar Al-Holou, Mohannad Murad -Department of Electrical and Computer Engineering University of Detroit Mercy Detroit, Michigan, USA.

Thank You