Prevention of Collision in Cars with the Help of Thermal and IR Cameras

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ABSTRACT
As many types of high performance cars being introduced in the market nowadays it is the need of the hour to make them safer. The purpose of this project is to prevent the collision between the humans and the cars in roads by effectively monitoring the conditions thereby, having the automated brakes and also atomising the suspension setup for the prevention from any obstacles. This is an emerging technology that uses both the IR & Thermal imagery cameras (sensors) linked with the braking and the suspension setup with the help of a micro controller. Though auto braking systems are been developed they are not fully effective since they are not completely linked with suspension setup. Hence height adjustable air suspension is used here in link with the automated braking setup with the collective data's obtained from the sensors and processed through a micro controller.

Keywords
Automation, Braking setup, Suspension adjustment

1. INTRODUCTION
This chapter has the overview of the automatic braking system with the help of tool kit using Lab view.

1.1 Image Processing
In imaging science, image processing is any form of signals processing for which the input is an image, such as photograph or video frame; the output of image processing nay be either an image or set of characteristics or parameters related to image. Most image processing techniques involve treating the image as a two-dimensional signal and applying standard signal processing techniques to it. Image processing usually refers to digital image processing but also optical analog images are also possible .This article is about general techniques that apply all of them. The acquisition of images (producing the input images in the first place) is referred to as imaging. Closely related to image processing are computer graphics and computer vision. IN computer graphics, images are manually made from physical models of objects, environments and light source instead of being acquired via imaging devices such as cameras from nature scenes as in most animated movies, computer vision on the other hand is often considered as high-level image processing out of which a machine /computer software intends to decipher the physical contents of image or a sequence of images. In modern sciences technologies, images also gain much broader scopes due to the ever growth importance of scientific visualization. Examples include microarray data in general research, or real-time multi-assestprotofolio trading in finance.

1.2 Virtual Instrumentation
Virtual instrumentation is one of the controllable software and modular measurement hardware to create user-defined measurement systems, called virtual instruments. Traditional hardware instrumentation systems are made up of pre-defined hardware components such as digital multi-meters and oscilloscopes that are completely specific to their stimulus, analysis or measurement functions. Because of their hard-coded function, these systems are more limited in their veracity than virtual instrumentation systems. The primary difference between hardware instrumentation and virtual instrumentation is that software is used to replace large amount of hardware. The software enables complex and expenditure hardware to be replaced by already purchased computer hardware. Additional software purchases like National Instruments Lab VIEW and other graphical programming languages helped grow adoption by making it easier for new programmers to develop systems.

1.3 Introduction to LabVIEW
LabVIEW- Laboratory Virtual Instrument Engineering Workbench is a system-design platform and development environment for a visual programming language from National Instruments. This programming approach helps the user to handle the programs much efficiently with proper equipped knowledge which generates easy understanding and better reliability of the programming methodology.

1.3.1 Applications
Acquiring Data and Processing Signals

- Measurement any sensor on any bus.
- Perform advanced analysis and signal processing.
- Display data on custom user interfaces.
- Log data and generate reports.
- Automatic the validation or manufacturing test of your product.
- Control multiple instruments.
- Analyze and display test results with custom user interface.

Academic Teaching

- Apply an interactive, hands-on training to learn.
- Combine algorithm design with real world data measurements.
- Increase application performance with multi-core processing.

Embedded Monitoring and Control Systems

- Reuse ANSI and HDL code.
- Integrate off-the shelf hardware.
- Prototype with FPGA technology.
- Access specialized tools for medical, robotics and more.

Instrument Control

- Automate data collection.
- Control multiple instruments.
- Analyze and display signals.

1.3.2. Vision and Motion

The Vision Development Module is designed to help you develop and deploy machine vision applications. It includes hundreds of functions of to acquire Images from a multitude of cameras and to process images by enhancing them for checking for presence ,locating features ,identifying objects, and measuring part.

1.3.3. Introduction to braking systems

A braking system is a common piece of stopping equipment that helps in stopping materials from moving one position to another position. Rankings are especially useful in applications of transporting vehicles or some other transportation ways which makes it mandatory for all vehicle systems. Many braking systems are available and used according to the various needs of our daily needs. There are many braking systems such as air brake system oil brake system and hydraulic braking systems which are widely used in large manufacturing industries.

1.3.4. Applications

- Used mostly to control speed in speed limit roads.
- ABS-Anti Braking locking systems are used to control sudden braking of cars and jerking

2. HARDWARE SPECIFICATION

2.1 Block Diagram of Braking and Suspension Setup

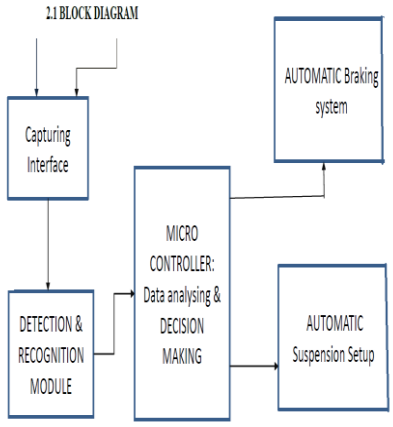

Fig 2.1(Description of braking and suspension setup)

2.2 Ultrasonic sensor

Ultra sonic sensors are also known as trans receivers when they both send and receive , more generally called transducers, works on the principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Active ultra-sonic sensors generate high frequency sound waves and evaluate echoes which is received back by sensor measuring the time intervals between sending signal and receiving echo to determine the distance to an object. Passive ultra-sonic sensors basically microphones that detect ultra-sonic noise that is present under certain conditions.

The technology can be used for measuring wind speed and direction, tank or channel level, and speed through air or water. For measuring speed or direction a device uses multiple detectors and calculates the speed from the relative distances to particulates in the air or water. To measure tank or channel level the sensor measures the distance to the surface of the fluid. Further applications include

1. Humidifiers
2. Medical ultra sonography
3. Burglar alarms
4. Nondestructive testing

2.3 Microcontroller

The microcontroller used in this block and setup diagram is **ATMEGA8-16PI.**

1. This microcontroller is used to calculate frequency of every zone in each areas and will control the speed of every cars or other automobiles passing in that safety zone.
2. The operating range for this microcontroller is about 4.5 to 5.5v and hence can be used with the help of ordinary batteries.
3. The data ROM size is 512-bytes and it will pass information simultaneously.
4. The data ROM type used is EEPROM.
5. EEPROM is Electrically Erasable Programmable Read Only Memory.
6. In this type of memory the user can program on their own to read the memory.
7. To erase the memory the electrical signals are passed to it and the temporary memory can be stored.
8. The maximum operating voltage for this processor is 85 degree Celsius.

3. SOFTWARE DESCRIPTION

3.1. DAQ Assistant

Creates, edits and runs takes using NI-DAQmx refer to the NI-SAQmx read me for a complete listing of device NI-DAQmx supports when you place this express VI on the block diagram. The DAQ assistant launches to create a new task. After you create a task you can double-click the DAQ generation, place a while loop around the DAQ assistant express VI for continuous single point input or output. The DAQ assistant express VI might not provide optimal performance.

3.2. Vision Acquisition

Creates and edits acquisition using NI vision acquisition express VI. The NI vision acquisition wizard is launched by placing the express VI on the block diagram. Select an acquisition source and configure an acquisition using NI-IMAQ,NI-IMAQdxx or simulate an acquisition by reading an AVI or image from a folder.

3.3. For Loop

The for loop is used to iterate up to values from i=n values and are good for using outside the loop. For loop is used to check for initial conditions and will send information from one node to another.

3.4. While Loop

The while loop is used to iterate until stopping condition occurs and hence goes indefinitely. While loop is good for inside loop and will send the information to the final loop for execution.

3.5. Boolean Function

The Boolean function is used to determine digital output that is either ON or OFF and 0 or 1.This Boolean function can also be used for switching conditions. In this setup it is used for showing TRUE or FALSE condition and the output is displayed.

3.6. LED Indications

The LED displays are used to display the speed in digital format and hence the speed will be accuracy when compared to analog meters. In this different LEDs are used to display different speeds at different zones.

4. SIMULATION RESULTS

4.1 Block Diagram of Simulation

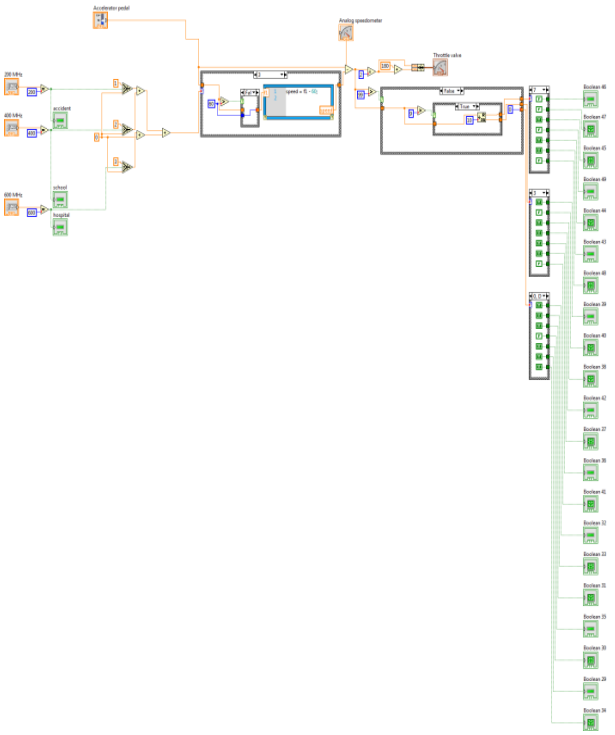

Fig.4.1Description of Block diagram of Simulation

4.2 Front Panel of Simulation

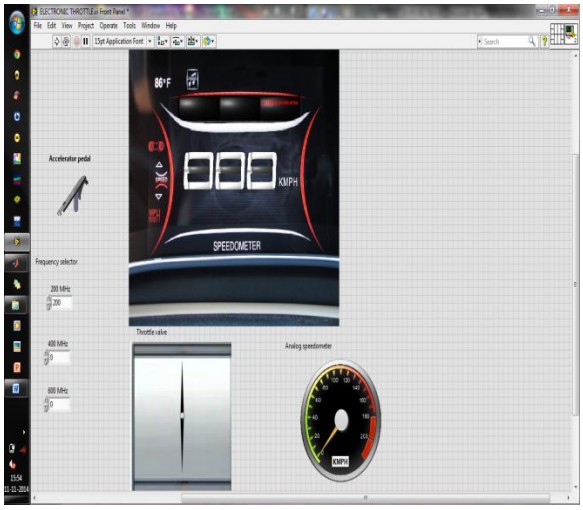

Fig.4.2 Front Panel simulation

5. CONCLUSION

The results are shown for the LabVIEW based image processing systems. Some of the most important application of machine vision systems in industry are systems that ensure quality control of manufactured products. The complete project is simple, inexpensive and efficient. The main purpose of this project is to recognize defects in the collision of cars and avoid accidents in the roads in our day-to-day increasing traffics and accidents.

5.1 Future Enhancement

In future the the accidents and collisions of cars can be prevented by introducing improved hardware & creating accident free zones at all the roads.

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