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Accident Prevention and Detection System for Commercial Vehicles

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Abstract: Now a day's probably accidents of commercial vehicles on highway has increased. 80% of accidents happen because of Driver's unconsciousness and confusion. The solution for this accident prevention is quit complex and costly; hence consumer class of commercial vehicle is not capable to afford intelligent security system. Ultrasonic sensor based stationary radar system is an affordable solution for this problem which consist accident prevention and detection capability. The ultrasonic sensor & Accelerometer plays a vital role for preventing accidents and detecting the location of the same if required. Our main aim is to design a real time security system which is capable to detect stationary object for 180 degree front phase considering the dimensions of wheel track.

Keywords: SAE- Society of Automotive Engineering, ARAI- Automotive Research Assoc. of India.

I. INTRODUCTION

The ultrasonic array which is capable to count distance using velocity and time relation is mounted e as an eye of system. The signal can be imported by GUI for displaying purpose and main control for taking further actions. When the stationary object is detected the control system decides to suspend ignition circuit and apply brake tentatively for the stopping distance of 3 meters.

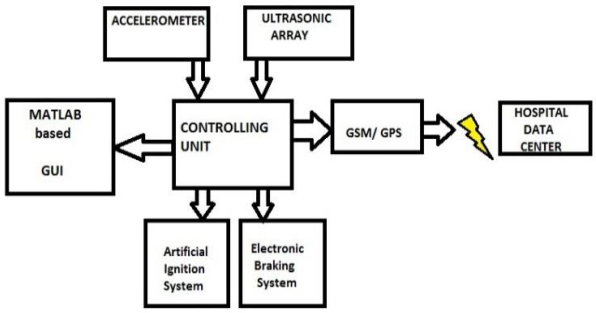

Fig. block diagram for Accident Prevention & Detection System.

In case of system failure if the accident happens the accelerometer can generate an interrupt which cause to send details of position to the data center of nearby hospitality services with the help of GPS/GSM. The main system consist the graphical observer with supervisory control on Ignition system and artificial braking system having hydraulic or electromagnetic brakes.

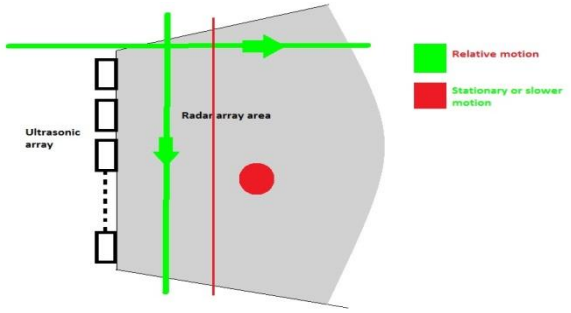

Fig. Efficiency and Reliability of System

II. LITERATURE SURVEY

This thesis studies the use of unmanned aerial vehicles to perform ice management in the Arctic Ocean by gathering information about and physically control the ice environment. Such a system is needed for safety reasons as marine operations are moving further north. In order to gather information about the ice environment, a UAV will be used for surface mapping. The quad copter Parrot AR. Drone 2.0 will be used as a test bed for implementing proposed strategies for guidance, navigation and control while doing surface mapping using a camera.

A guidance and navigation system is designed and implemented using measurements from onboard sensors and the camera system Optic track, which is used to measure position, velocity and orientation of the quad copter. Using these estimated states as parameters and inputs to a proportional-integral-derivative controller, the position will be controlled. Waypoints are calculated according to desired parameters provided by an operator. An autonomous guidance, navigation and control system that moves the drone in a search pattern inside a desired area requested by the operator. As the result of the designed surface mapping strategy.

An algorithm that performs object detection and mapping is implemented for the onboard camera to be able to detect objects in the lab setup. Back-projection of a 2D pixel point to respective world coordinates is implemented. C++ is used for all modules. [1]

Distance measurement of an object in the path of a person, equipment, or a vehicle, stationary or moving is used in a large number of applications such as robotic movement control, vehicle control, blind man's walking stick, medical applications, etc. Measurement using ultrasonic sensors is one of the cheapest among various options. In this paper distance measurement of an obstacle by using separate ultrasonic transmitter, receiver and a microcontroller is presented. The experimental setup and results are described and explained.[2]

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A rangefinder is a device that measures distance from the observer to a target, for the purposes of surveying, determining focus in photography, or accurately aiming a weapon. Some devices use active methods to measure (such as sonar, laser, or radar); others, available since the nineteenth century, measure distance using trigonometry (stadia metric rangefinders and parallax, or coincidence rangefinders). They usually use a set of known distances or target sizes to make the measurement**.[3]**

The most crucial problem for the mobile robot navigation is obstacles detection and their localization. The determination of obstacle position should be as accurate as possible in order to support robot self-localization procedures. In order to increase its efficiency the recognition of some feature of obstacles shapes should be done. The most advanced systems use laser range-finder and vision to solve this task. They allow obtaining a lot of data of a robot environment and the delivered information is quite precise.
Unfortunately these devices have some important drawbacks. Laser scanning range-finders are still expensive. Their drawback is that they scan only in a single plain. It causes that some obstacle cannot be detected. There are also available 3D laser range-finders. But measurements performed by them are time consuming. Therefore it is rather difficult to use them for on-line mobile robot navigation when a robot moves during a measurement execution. Considering vision systems the main disadvantages are computation consuming methods and a price of the system.**[4]**

III. DEVELOPMENT

You're driving at a safe speed on a moderately busy highway. It has not been snowing for long, but already the pavement is dusted with snow and becoming slippery. Suddenly, another motorist signals to enter your lane and makes a sharp veering motion. You are forced to slam on the brakes to avoid hitting the encroaching vehicle. The weight of your car is thrust forward from the heavy braking, putting added pressure on the front wheels to stop the car. Meanwhile, the sudden shift in weight has significantly reduced the amount of traction available for the back wheels. After a few seconds, the back wheels lock completely. You feel the back end of your car start to fishtail into the lanes on either side of you. Finally, the back-and-forth motion of the rear of the car overcomes the braking power of the front wheels and you spin around, face-to-face with oncoming traffic. Situations like this are potentially very dangerous. Electronic brake-force distribution is a vehicle safety feature that can prevent this kind of event.

The survey can be defined by an automotive company is that the total percentage of accident can be defined approximately 74% for the frontal crash of vehicle. To know the actual ratio further figure can be determined.

This is microcontroller based system using ultrasonic sensor which consists of wired interfacing & accelerometer with the same microcontroller.

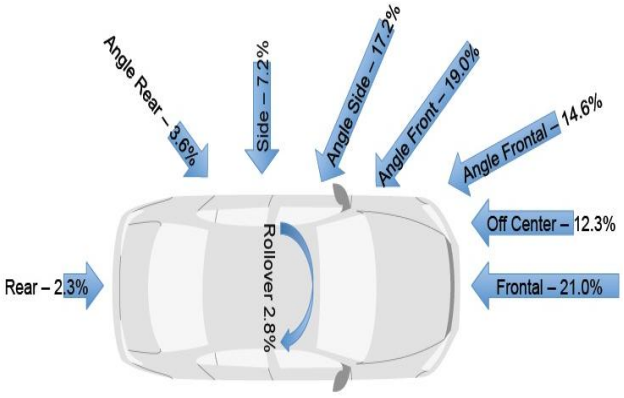

Fig. Accidental conditions for commercial vehicles

- To develop the information about Ultrasonic Sensor.
- To develop the information about accelerometer.
- To develop the information about CSD parts.
- To develop the commands required to interface ultrasonic array with microcontroller.
- To develop the information about electrical components required with their datasheets.
- To divide the whole project into few modules and design the individual module.
- To write a program for a microcontroller to display the received message.
- Making schematics and layouts of each module. Implementing hardware, Assembling kit and final testing of the project.

IV. ADVANTAGES

- COMPATIBILITY
- ACCURACY
- SPEED OF RESPONSE
- IMPACT OF ENVIRONMENT
- COST

V. SPECIFICATIONS

- Operating voltage: +12 V
- Operating current: 2A
- Operating range (in meters): 3.5m
- Output pressure: 200GPsI
- Response time: 100mS
- Display interface: semicircular co-centric

VI. RESULT

• Visualization of object on GUI
A graphical user interface (GUI) is a graphical display in one or more windows containing controls, called components that enable a user to perform interactive tasks. The user of the GUI does not have to create a script or type commands at the command line to accomplish the tasks. Unlike coding programs to accomplish tasks, the user of a GUI need not understand the details of how the tasks are performed. GUI components can include menus, toolbars, push buttons, radio buttons, list boxes, and sliders just to name a few. GUIs created using MATLAB tools can also perform any type of computation, read and

write data files, communicate with other GUIs, and display data as tables or as plots. The following figure illustrates a simple GUI that you can easily build yourself.

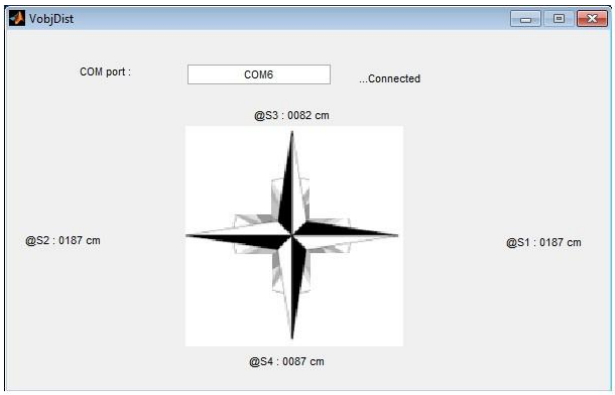

Fig GUI based on MATLAB2013a

• The GUI contains

1. An axes component.
2. A pop-up menu listing three data sets that correspond to MATLAB functions: peaks, membrane, and sinc.
3. A static text component to label the pop-up menu.
4. Three buttons that provide different kinds of plots: surface, mesh, and contour.

When you click a push button, the axes component displays the selected data set using the specified type of 3-D plot.

• Serial port interface in MATLAB

The MATLAB serial port interface provides direct access to peripheral devices such as modems, printers, and scientific instruments that you connect to your computer's serial port. This interface is established through a serial port object. The serial port object supports functions and properties that allow you to configure serial port communications Use serial port control pins Write and read data Use events and callbacks Record information to disk.

VII. FUTURE SCOPE

1. We can implement an Artificial Intelligence System.
2. Driver's Parameters:- Driver's parameters can be included for more accurate output such as,
   a) Eye Retina scanning.
   b) Body temperature analysis
   c) Skin stretches analysis
   d) Heart beat observation etc.
3. We can implement faster system using advance technologies.
4. We can use Beam sensor to cover the wider area.

VIII. APPLICATION

Particularly purpose of this system design is for Commercial class and Sedan class of vehicles. We can also develop such kind of system for consumer Automobile application.

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