Two Wheeler Guidance System Utilizing Ultrasonic Sensor, Rear View Camera and Accident Alert System

[1]Karande Nita, [2]Tambe Kirti, [3]Bhalerao Omkar
123Department of Automobile Engineering
Jaihind College Of Engineering, Kuran
Pune, Maharashtra, India

Hredeya Mishra
* Assistant Professor
Department of Automobile Engineering
Jaihind College Of Engineering, Kuran
Pune, Maharashtra, India

Abstract— A camera unit is mountable on rear of motorcycle. The camera unit includes a single-chip image sensor, such as a colour complementary metal oxide semiconductor image sensor, and includes an attaching unit that is structured to allow the camera unit to be attached to an existing structure of the motorcycle. The camera unit further includes a transmit unit to allow transmission of a signal representative of captured images and a receive unit to receive control signals to control parameters associated with the camera unit, thereby allowing the remote unit to control parameters of the camera unit, such as exposure, gain, white balance, colour saturation, brightness. The camera unit can be of a small size and weight, and can be completely integrated on a single-chip, thereby minimizing intrusiveness to the helmet wearer. The vehicle alert system project focuses on cooperative alert services based on timely and reliable communication under the challenging circumstances pertaining to a highly mobile vehicular network.

Keywords— *Single Chip Image Sensor, White Balance, Helmet Wearer, Colour Saturation.*

I.INTRODUCTION

"Many researches and invention are carried out for the improvement in the bike technology which is known as smart bike concept or superbike concept." This project is based on super bike concept in which we are going to improve the driving assistance using rear camera and ultrasonic sensors. This concept is derived from four parking system. Using this concept, we can eliminate side mirrors of the motorcycle, this causes improvement in aerodynamic shape of the motorcycle and increases the performance of motorcycle.The rear-view camera is a new robust and smart video driver assistance for automotive applications. This camera system able to transmit the video signal within a distance around 20 meters wirelessly and reliable. It is an embedded system based on a very-low-latency video encoder and designed to be extremely fast, cheap in production, reliable and safe against attacks and interference. The total signal delay is less than 40 meters. Coding time is around 10meters. Technological advancement has led the advancement and prevalence of wireless sensor networks in many of man's activities. The WSN consist of numerous low-costing sensor nodes that are organized to establish an ad hoc network via wireless communication module that is equipped on the nodes. The sensor nodes are equipped with different sensors. This rear parking sensor system is designed to assist the driver by providing an alert when the vehicle is travelling toward a nearby object. Never rely solely on this product to ensure the area is clear of children and obstructions. This product is not intended to replace existing safety procedures, but rather to add an additional safety tool for your vehicle. Vehicle Alert System is a project concerning the areas of cooperating embedded systems, vehicular ad-hoc networks, wireless sensor networks and wireless digital communication. A communication system, wireless or wired, has some sort of communication stack containing rules on how the actual communication should take place. These rules are encapsulated in protocols and can be organized into different layers stacked above each other.In the sewer inspection system under development and testing this system is mounted in the rear portion on vehicle which will move inside the fully or semi-filled sewer pipeline. The system will compute the distance of obstacle or blockage store it and also communicate the distance or location of the obstacle or blockage to the control station above ground.

II. RELATED WORKS

A. Ultrasonic sensor

Ultrasonic transducer uses the physical characteristics and various other effects of ultrasound of a specific frequency. It may transmit or receive the ultrasonic signal of a particular strength.
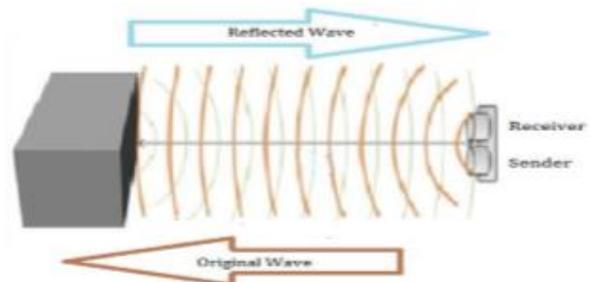

Fig-1: Ultrasonic sensor operations

Fig-2: Receiver

Fig-3: Transmitter

Fig-4: Sensor module

B. Camera Unit

Recently, the use of active safety technologies has increased, and various driver assistance systems are in practical use. In order to observe rear coming vehicles, we propose a system where a camera fixed inside a mirror case can continuously surveys the rear vehicle and displays the view captured by camera on the display unit fixed on the dash board.

Fig-5 Camera unit

C. Accident alert system

This system is based on new technology, its main purpose is to detect an accident and alert to the control room, so the victim can find some help. It can detect accidents the intensity of the accident without any visual contact from control room. If this system is inserted in every vehicle then it is easy to understand how many vehicles are involved in a particular accident and how intense is it. So that the help from control room will be according to the control room. The present board designed has both vehicle tracking and accident alert systems, which make it more valuable and useful. This board alerts us from theft and on accident detection also. This device detects fire accidents also by placing fire detector in one of the interrupt pins.
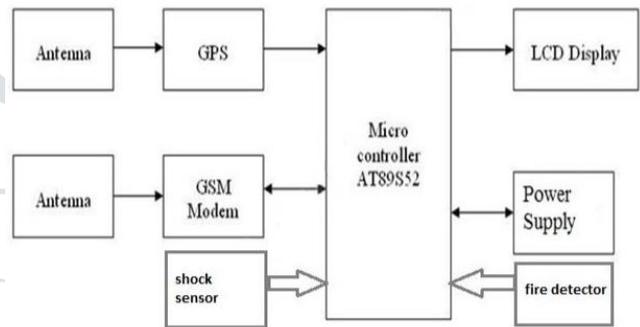

Fig-6: Block diagram

GPS abbreviates global positioning system and this is used to detect the latitude and longitude of the particular position and it also shows the exact time.

Fig-7: Shock sensor

III. REQUIREMENT ANALYSIS

In this section, we discuss the requirements of designing a wireless sensor network for a smart bike system. Although the conventional requirements of a car park system can be easily satisfied, we still need to address more challenging issues by taking advantages of wireless sensor network. In the following, we list some important requirements of smart bike system and then analyse the feasibility from the viewpoint of wireless sensor networks.

    A.   *Hardware component*

Component	Diagram	Level	Working
Ultrasonic sensors		Sensor level	Detection the car during the entry and exit.
LEDs(Red and Green)		Display level	Display the state of the car park (occupied or empty).

Fig-8: Hardware components

Ultrasonic sensors are cost effective and come with better accuracy. Xbee radios can communicate wirelessly between each other and it can transmit signal over large distance (indoor capacity 40m and outdoor capacity 120m)

GPS abbreviates global positioning system and this is used to detect the latitude and longitude of the particular position and it also shows the exact time. It detects these values anywhere on the earth. In our project it plays main role and it is the main source of the latitude and longitude of the vehicle to know the accident occurred location, or even for theft tracking of the vehicle. This gadget gets the coordinates from the satellite for each and every second. This device is the main component of vehicle tracking project.

Fig-9: GPS modem

GSM abbreviates global system for mobile communication; this is a second generation (2G) mobile network. This is widely used in all over the world for mobile communication. This GSM device consists of sim slot in which a sim can be inserted which has a unique number, this unique number is used for contact. This GSM device consists a unique number called imei number and this is different for each and every hardware kit. In our project the device is used for transmitting data. The data from GPS is transmitted to given mobile through this GSM itself.

Fig-10: GSM modem

For designing this hardware many types of devices are used to make it perfectly working.

- ❖ GSM
- ❖ GPS
- ❖ SHOCK SENSOR
- ❖ MICRO CONTROLLER AT89S52
- ❖ MAX232
- ❖ RS232
- ❖ LCD DISPLAY
- ❖ POWER SUPPLY

- ❖ FIRE DETECTOR
- ❖ SWITCH
- ❖ CRYSTAL OSCILLATOR
- ❖ LM7805
- ❖ W10M BRIDGE RECTIFIER
- ❖ LED
- ❖ RESET BUTTON

IV. AN OVERVIEW OF OUR SYSTEM

Ultrasound can be used for measuring wind speed and direction (anemometer), tank or channel fluid 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 liquid level, and also sea level (tide gauge), the sensor measures the distance (ranging) to the surface of the fluid. Further applications include: humidifiers, sonar, medical ultrasonography, burglar alarms, non-destructive testing and wireless charging. Systems typically use a transducer which generates sound waves in the ultrasonic range, above 18 kHz, by turning electrical energy into sound, then upon receiving the echo turn the sound waves into electrical energy which can be measured and displayed. The technology is limited by the shapes of surfaces and the density or consistency of the material. Foam, in particular, can distort surface level readings. This technology, as well, can detect approaching objects and track their positions.
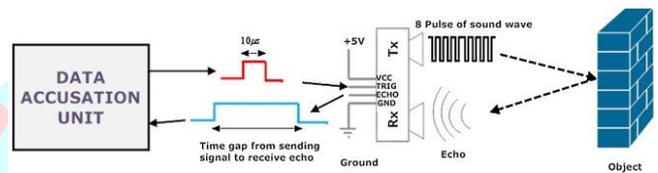

Fig-11: Ultrasonic sensor working

	wood	paper	cloth	plastic	Metal
wood	1.00				
paper	1.00	1.00			
cloth	-0.48	-0.45	1.00		
plastic	1.00	1.00	-0.46	1.00	
metal	1.00	1.00	-0.47	1.00	1.00

Table 1:Multiple correlation among five type of materials

*1) In this project, Arduino is used for controlling whole the process with a **GSM module**. GSM module is used for sending the alert SMS with the coordinates. **Accelerometer namely ADXL335** is used for detecting accident or sudden change in any axis. **We have used GSM Module SIM900A.***

Fig-12: Working of Arduino

Accident alert system

Accident in the sense it could be collision of two vehicles or fire accident inside the vehicle. These shock sensors are attached to the car on all sides of the vehicle and they all are connected to the OR gate .OR gate is used because to detect at least one sensor is high .the output from the or gate is connected to the interrupt pin of microcontroller and whenever this pin 12 is high the micro controller sends the message about the accident.

This vehicle tracking system takes input from GPS and send it through the GSM module to desired mobile/laptop using mobile communication. Vehicle Tracking System is one of the biggest technological advancements to track the activities of the vehicle. The security system uses Global Positioning System GPS, to find the location of the monitored or tracked vehicle and then uses satellite or radio systems to send to send the coordinates and the location data to the monitoring center. At monitoring center various software's are used to plot the Vehicle on a map. In this way the Vehicle owners are able to track their vehicle on a real-time basis. Due to real-time tracking facility, vehicle tracking systems are becoming increasingly popular among owners of expensive vehicles.
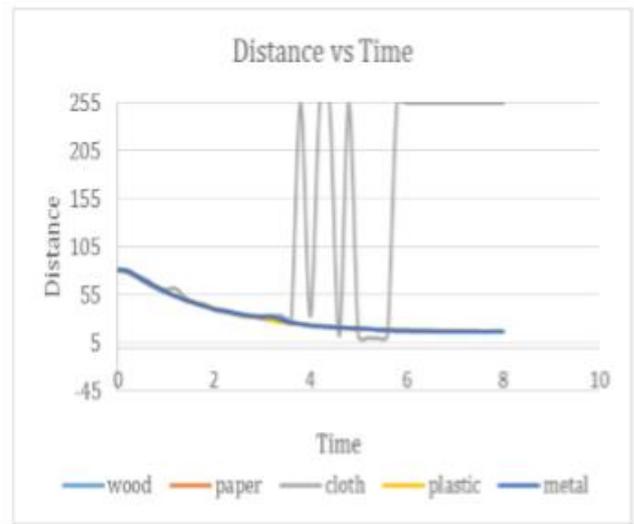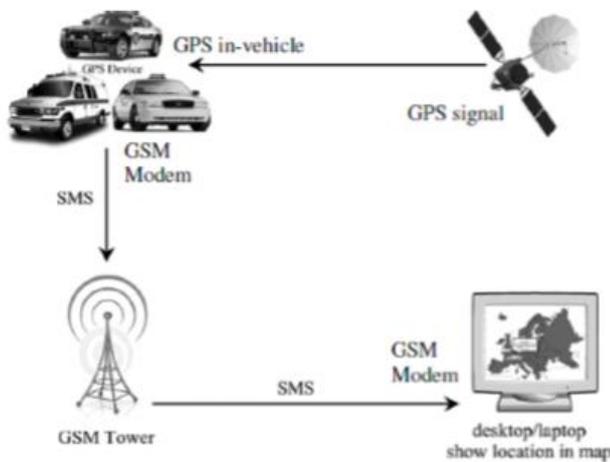

Chart 1: Distance of vehicle from obstructions
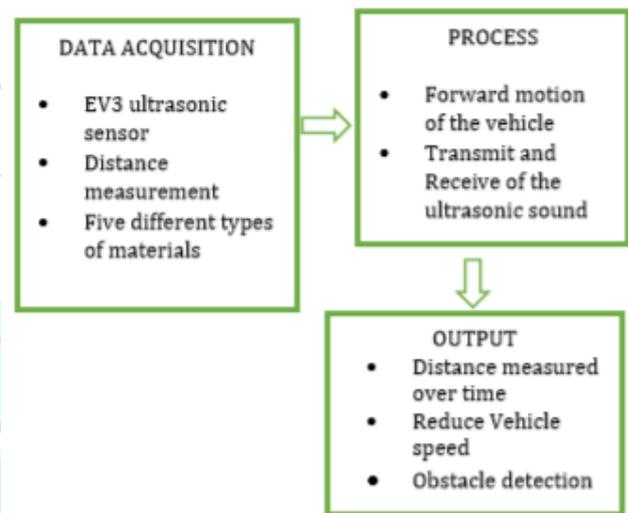

Fig-13: Overview of system

Fig-14: Methodology of study

V. DATAAND RESULT

The information provided in Chart-1 shows the distance of the vehicle from the obstruction. There are four obstruction namely: wood, paper, cloth, plastic and metal, different colors were used to represent them in the chart. The initial distance of the vehicle from the obstruction is about 80cm. As the time increases, the distance measured is supposed to decrease because the vehicle is getting closer to the obstacle. Four of the obstructions namely: wood, paper, glass and metal displayed a common pattern. The measured distance is erroneous for the rippled cloth, the sound waves was not reflected efficiently, in return the vehicle failed to execute the condition designed in the program. However, based on our observation, when the cloth is perfectly flattened, the vehicle was able to follow the specified program. Finally, for the wood, paper, plastic and metal, there was a consistency of the distance measured especially after four seconds and onwards.

VI. CONCLUSIONS

In this phase the result obtained by modification of motorcycle or super bikes with sensors and camera. In short this phase gives brief results of project. Conclusion will be drawn on the basis of analytical and experimental results. Vehicle tracking system makes better fleet management and which in turn brings large profits. Better scheduling or route planning can enable you handle larger jobs loads within a particular time. Vehicle tracking both in case of personal as well as business purpose improves safety and security, communication medium, performance monitoring and increases productivity. So in the coming year, it is going to play a major role in our day-to-day living.

Main motto of the accident alert system project is to decrease the chances of losing life in such accident which we can't stop from occurring. Whenever accident is alerted the paramedics are reached to the particular location to increase the chances of life. This device invention is much more useful for the accidents occurred in deserted places and midnights. This vehicle tracking and accident alert feature plays much more important role in day to day life in future. The system can be easily implemented in bikes and systems requiring the measurement of distance of an object or an obstacle from stationary or moving observation point where the ultrasonic sensor will be located.

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