

Automated Approach to Collision Avoidance In Vehicles at Emergency Scenarios

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Abstract

This precedent model is a reminiscent to the following systems – Google car to X communication, Volvo, Benz and Texas car. We have added gratification to the existing system. The existing system were developed using radar and GSM. The users were being acknowledged with an SMS on occurrence of crash. The advancement includes the location of the crash, obstacle deduction during road bends before a certain distance, fault in the vehicle's functioning and an alert which notifies 3 of the driver's speed dial contact or the emergency number of the nation through both call and SMS. This process includes efficient devices like arm processor, IR sensor and buzzer alarm by the usage of these components results in overall cost effective and robust implementation of the system. This ensures safety of the driver and the passengers travelling along. This system has an improved efficiency than the existing system.

Keywords: Automation system, collision avoidance, obstacle detection, GSM based monitoring vehicles, GPS tracking, automatic call log detection

I. INTRODUCTION

UN General Assembly urged all nations to launch a decade of action on road safety from 2011. Characteristics of accidents show it isn't a single cause, arising from a particular combination of circumstances and is preceded by many near misses. In this scenario the topic of choosing the role played by the human factor in the gamut of accident occurrence stands apart due to its complexity. Accidents may occur due to the breakdown of vehicle, brake faults, flat tyre, spark plug faults etc. To prevent this we are developing a system using IR sensor along with Bluetooth module. The IR senses the obstacle ahead in the path of the vehicle and notifies the user.

The movements of the vehicle can be controlled by means of a Bluetooth module. This module which is used to determine the particular direction of the vehicle & will automatically turn off irrespective of the Bluetooth commands. To improve the system by using GPS and GSM where GPS is used to identify the location of the place and GSM which is used to send message to the drivers relative the GSM acts as transmitting and receiving system.

II. LITERATURE REVIEW

M F. Saaid, (2014) This paper represents the GPS and GSM to test the accuracy of the location that is send to the system through microcontroller. The hardware and program development is done by research and error as the controller does not interact with both module at the same time. The experiment is done in three set of tests so that the system accuracy can be determine when stationary and in motion on vehicle, output controlling to the system. The result of the test concludes that the system can provide standard GPS coordinate when requested via Short Message Service. The system can also be used to control an actuator.

Arindam Mondal,(2015) This paper is concured with the orbit tracking by multiple agents. The control scheme has three aspects connectivity assurance, collision avoidance, and formation. The concept of this has been used to acquire and maintain the desired formation pattern along with velocity .The proposed control pattern is further extended to the problem of target system. It includes the roundedness of control actions. The realization of proposed system is manifested through extensive simulations in 2D and 3D environments using 6 and 60 agents, respectively.

Md. Shahinoor Mannan (2015) this paper presents a proxy approach towards picture and practise of GSM based remote device controller using SIM548C. By using GSM to avoid the early developments of the system .The possible future transformation of long distance controller systems to choose GSM Module SIM548C including its GPRS and GPS features. Brief picture of the developed prototype based on DTMF over GSM network is conferred. The extant applications of long distance controller systems are including but not limited to some respected places, thus the convention and practice of such systems to control and track moving objects.

Dr. P.A.Harsha Vardhini (2016) This paper presents an adequate practice of security system for the moving vehicles using SMS alert system. The system uses microcontroller and the components used in the intended work are related with detecting the accident, saving the phone numbers, and sending the SMS. The major elemental is the Atmel microcontroller AT89S52 which performs all the operations related to controlling. The security for the vehicles is detected by using vibration sensor. This detection is sent in the form of an SMS alert to mobile using GSM. The embedded system enclosed with the fundamental is fit inside the vehicle for accident detection.

Yufeng Lian (2016) This paper presents a control expedient for prolonged collision avoidance to improve the safety of four wheeler motor driven electric vehicles. The two major system in collision avoidance. It has safety between driving roads with an adhesive deficient in tire and road and the contribution is a new braking force based on constrained adorning braking strength extension. RCP and HIL simulation experiments are drifting out to manifest the effectiveness and affability in practise are elongated in CA system.

Amir Khajepour (2016) This paper is presented to maintain a collision free way for autonomous vehicles. In this path planning, a 3D virtual dangerous electric field is formulated as an increasing functions of the road and obstacle. The Multi-constrained Model Predictive Control problem are calculated the angle from the front steering to prevent the vehicle from a moving obstacle. The simulations are combined in the case where moving obstacles exist. The results show that the proposed path planning approach is effective for many driving scenarios and controller provides dynamic tracking performance and good movementability.

Joseph Funke(2016) This paper presents a new supremacy structure that includes path tracking, vehicle stabilization, and collision avoidance and mediates to conflicting objectives by specific collision avoidance. The system is enforced by using model predictive and feedback controllers. It includes stabilization and collision avoidance. Experimental data from an autonomous vehicle demonstrate the controller safely driving at the vehicle's handling limits and suddenly introduced in the middle of a turn it avoiding an obstacle.

Ping-Fan Ho (2017) This paper present a Wi-safe Compared to vision based and radar PCA systems, It has an advantage of Non Line of Sight and assist drivers in discovering pedestrians in NLOS and blind spots where the views of drivers are blocked by buildings, vehicles, or other obstacles. Wi-safe can save split seconds. Instead of using wireless access in vehicular environments dedicated short-range communications to protect pedestrians. The results show that Wi-safe can achieve and even exceed the PCA requirements.

Yucong Lin (2017) This paper was contrive to avoid collisions with moving obstacles, such as commercial aircraft and the safe operation of unmanned aerial vehicles. The exertion of sampling based path planning methods for a UAV to avoid collision with comical aircraft. The variations and utilization are along with collision prediction using reachable set. The methods are in software and hardware loop simulations and real flight experiments. It generates collision free paths in real time for the different types of UAVs among moving obstacles, angles and speeds.

Maneuvers Scott Schnell (2017) This paper presents a combined driver model that will identify different individual driver behaviors. The driver model consists of a compensatory transfer function and an anticipatory component and is integrated with the design of the individual drivers desired path. The utility of the proposed model is stability to predict a drivers steering wheel. It is compared by two different drivers model parameter sets to the group average to show that each driver has a unique set of parameters. The model is validated by showing that its daily driving parameters differ from its predicted CA parameters.

Lorenzo Sabatini (2017) This paper for achieving complex dynamic behaviors in multirobot systems. In this system partitioned into two subgroups are dependent and independent robots. Independent robots are used to control input and their motion. Dependent robots solve a tracking problem to defined fixed point trajectories. The control strategy is explicitly addresses the collision avoidance problem in a non conflicting manner. The combination of these control actions allows the robots to execute in a safe way. And the proposed methodology is validated by means of simulations and experiments on real robots.

Milton Cesar Paes Santos(2017) This paper for unmanned aerial vehicle UAV navigation and positive potential function is designed to take into the movement of obstacles. Thus, the controller with potential function that the UAV moves close to zero to ensure safe navigation in dynamic and unknown environments. An indoor framework with just one RGB D sensor, which is a combination of a RGB camera with a depth sensor based on infrared light, was used to estimate the positions of the UAV and obstacles. Thus the experiment is carried out to simulate to run using a Parrot AR.

III. EXISTING SYSTEM

The system introduces a collision avoidance system which is based on the vehicle safety alarm. This collision avoidance system is with some drivers needs a clear visualization throughout the entire driving. The system analysis the appropriate speed of the host vehicle and actual distance between the upcoming vehicle and host vehicle. When the following car is in risk of crash, the system will inform or warn the driver that the current speed is not safe, and help drivers to decelerate or brake. With the development of vehicle safety alarm, a new way to develop the collision avoidance system is put forward. By using the safety alarm in vehicles,

the system can collect information and compares the actual value along with the reference value in order to generate the significant alarm in the vehicle and also alert the person through the communicated equipment.

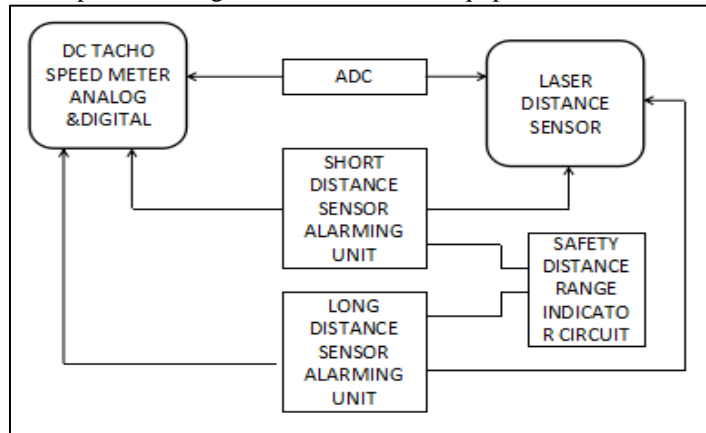


Fig. 1:

In order to reduce or avoid the losses that the precrash system brings, the researchers have been working for improving the safety of vehicles. The main achievement contains the active way and the passive way to enhance the safety. The passive way means the technology to reduce the losses when the crash happens. The dc speed meter which is used to measure the speed of the vehicles as well as laser distance sensor measures the short and long distances between the vehicles. The analog output from the above sensors are given to adc to convert into digital output. As soon as it alarms the short and long distance sensor alarming unit. When the laser distance vector detects the obstacle along with the measurement of both long and short alarming unit sensors.

Finally, some experiments describe about collision avoidance and demonstrate the feasibility of this system in risk detection and crash avoidance. By using safety alarm vehicles people can prevent accidents in congested area.

IV. PROPOSED WORK

The main ideology of this article is to evict the hindrance that was being faced in the existing system. The bottle necks were false locations and inaccuracy of data on the sides of the vehicle, as the existing system was employed only on the front and back of the vehicle to avoid rear collisions.

Our analysis is to implement GPS and GSM technology to receive instant alerts regarding the crash and if any case breakdown occurs. We have also employed Bluetooth module for signal strength instead of Wi-Fi

This working system deals with collision avoidance on all four of your vehicle. LPC812 microcontroller receives the input from the IR sensor on the obstacle and its distance in the path of the vehicle. This data is transmitted to the input and output system.

The input system is connected to the braking and accelerating system in case of any sudden obstacle appearance the brakes will be applied automatically. The output system will be notified and the distance and the type of object will be acknowledged to the user.

Another arrow to our quiver is we will notify the ambulance and nearby hospital on the arrival of the ambulance as well as the victim's relatives on speed dial.

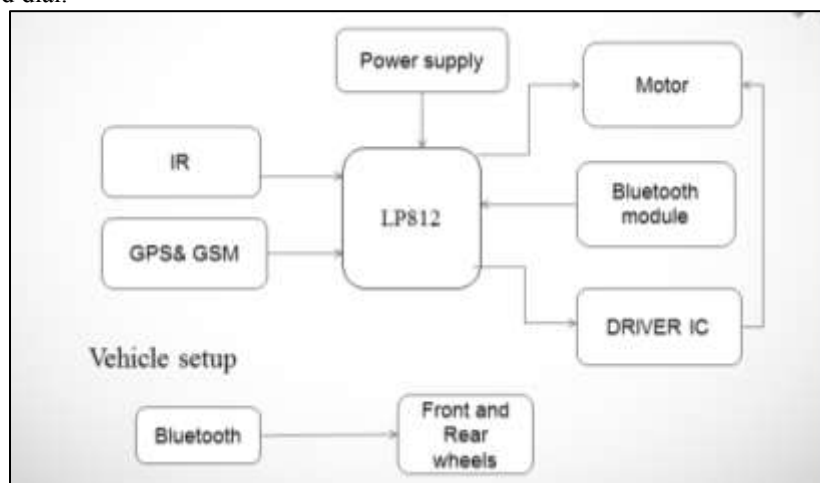


Fig. 2:

V. SYSTEM DESCRIPTION

A. LPC812:

The LPC812 is based on ARM cortex-M0+.It is operating at CPU frequency of up to 30MHZ belonging to 32bit MCU family. The LPC812 include one I²C, three USART'S, two SPI interfaces. It supports a memory size of 16KB of flash memory and 4KB of SRAM. It has CRC engine, three types of timers namely self-wake-up, state configurable, multi-rate timer, one comparator and has 18 general –purpose I/O pins.LPC812 has a Flexible configuration of I/O pin function. Additionally it has a unique device serial number for identification and high speed GPIO interface which is connected to the ARM cortex-M0+I/O bus.



Fig. 3:

B. Bluetooth Module BT24:

It is a Bluetooth qualified module version of V3.0 and the module works under UART protocol. It is a low cost series for applications under Bluetooth functionality.BT24 can work with any mobile devices or smart phones. It does add extra processing module and it extends the support up to high-fidelity stereo audio applications. The module comprises 13 integrated antenna like GPIO, SPI, I2C, PCM, DAC and A/D lines. Additional features can be supported, configured and ordered to pre-loaded.

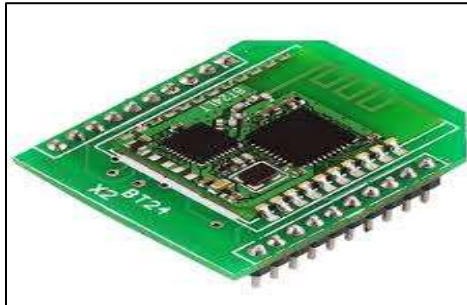


Fig. 4:

C. GPS:

GPS abbreviated as Global Positioning system which provides geolocation and information of time to a GPS receiver anywhere or near the earth. It does not require any user to transmit data, it is operating independent of any telephonic or internet reception.GPS uses satellites that will determine the current location. It also provides weather and traffic alerts and offers to search a current location within a specific radius.



Fig. 5:

D. GSM:

GSM (Global System for Mobile communication) is a cellular technology that operates at frequency band of either 900 or 1800 MHZ. This system compresses and digitizes data and sends it through a channel with two other streams of user having a data, which is in its own slot used for transmitting mobile voice and data services. GPS is a digital mobile telephony system along with the

other technologies emerge as the evolution of wireless mobile communication like GPRS(General Packet Radio System)GSM has a harmonized spectrum that operate on different frequency bands.



Fig. 6:

E. IR Sensor:

An electronic instrument that can sense certain characteristics of its surroundings by emit –detect methodology the capable of measuring heat measuring object distance measuring motion of the target.as IR waves are not visible to human eyes lie between visible and microwave radiation. Infrared wavelength ranges from 0.75 to 1000 10^{-6} .it has various application in everyday life starting from your TV remote .the sensors typically use led or lasers for sources. The transmission medium is usually vacuum and also used in night vision devices infrared astronomy tracking, restoration, imaging water analysis petroleum, exploration etc.



Fig. 7:

F. Driver IC:

The motor driver IC is an integrated circuit chip.it is used to control motors in autonomous bots.l293d acts as an interface between the microprocessor and the motor in the robot .it can drive and control two dc motors simultaneously .almost all microprocessors operate at low voltage a small amount of current is required to operates the motors at high voltages .thus the current cannot support to the motor from the microproseccor. Commonly used circuit is H-bridge circuit.



Fig. 8:

VI. CONCLUSION

The objectives of the survey were successfully completed and the paradigm was developed. If the prototype was made into product we can prevent the rate of road accidents gradually. It can be done in a cost efficient manner. Although the main focus lies on the prevention of accidents, we also give access to the processor to stop the vehicle in case of brake faults, engine faults and also indicate obstacles from a certain distance and in case of crash the user's speed dial contacts will be updated along with the location of the accident as well as the ambulance will be called through emergency dial.

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