Embedded Secured Authentication and Speed Limiting in Various Zones with Alert System

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Abstract: This framework primarily used to decrease the speed of the vehicles and increase the life of individuals from mishaps. Anyway it is minimal effort, adaptable, and strong framework to persistently screen and control dependent on buyer prerequisites, since it has low-control qualities, which empower it to be generally utilized in various zones. The goal of this is to reduce the speed of vehicles in different zones by utilizing a processor. And also a change is utilized to perceive the mischances. The speed of the vehicle can be diminished by utilizing ARM7 controller, ZIGBEE, IR sensors, GPS and GSM. Here we likewise utilizing Pulse rate observing, temperature and alcohol sensors are utilized to recognize the individual wellbeing pulse rate condition, temperature of vehicle and detects a person alcoholic or not, which make the environment as pollution free and also could able get the safety of the driver. Any issue with respect to the pulse rate condition or Vehicle condition sends the data to approved people through SMS. At the point when a vehicle goes into a busy zones, the IR sensors will recognize the vehicle and reduce the speed of the vehicle, Entry and exit status at the zones will show on the LCD. By sending a SMS through the cell phone to GSM which is put in vehicle we could capable of find the area of vehicle utilizing GPS. It will be extremely valuable when vehicle was theft;we could likewise stop the vehicle by sending SMS.

Keywords: VANET, IR Sensor's, ZIGBEE, GSM and GPS

I. INTRODUCTION

Safety is one of the major concerns in modern day transportation in India. Several measures are taken by the transport authorities for traffic control and safe commutation. Road accident is most undesirable thing to happen to a road users, however they happen regularly in heavy traffic roads and near to school zones. Most of the streets are particularly aware of the general rules and wellbeing measures while using streets yet it is only the laxity on part of street roads, which cause mishaps and accidents. We are clarifying a bit of the typical direct of individuals which results in mishap are Over Speeding, Drunken Driving, Distractions to Driver, Red Light Jumping, going through vehicles disallowed territory, safety precautions like Seat belts and Helmets and Non-adherence to way driving and overpowering wrongly. Diverse national and overall inspects have found these as most customary lead of Road drivers, which prompts accidents.Increase in speed duplicates the danger of mishap and seriousness of damage amid mishap. High speed vehicles are more inclined to mishap than the slower one and the seriousness of mishap will likewise be more if there should arise an occurrence of quicker the seriousness of mishap will

likewise be more in the event of quicker vehicles. Higher the speed, more noteworthy the hazard. At fast the vehicle needs more noteworthy separation to stop i.e. braking separation. A slower vehicle comes to end quickly while quicker one takes in length approach to stop and furthermore slides a long separation because of law of idea. A vehicle proceeding onward fast will have more prominent effect amid the accident and subsequently will cause more wounds. The capacity to pass judgment on the approaching occasions likewise gets decreased while driving at quicker speed which causes blunder in judgment lastly a crash[1].

The current observing frameworks is a vehicular correspondence framework. This sort of framework has poor execution of extension. The vehicles are went to the rapid contrasting with the typical speed of the required zone. On that time the mischance can be happened particularly sensitive places like school zones, industrials zones on that time couldn't control the speed of the vehicle and couldn't pass the information rescue search or detection events [2].

These present situation can be overwhelmed by utilization of vehicular communication by utilizing the IR sensors. This implementation framework is reducing as compared with the present existing system. As the technology in vehicular communication is converting from mechanical to electrical which made my paper will be more effective and useful for the society.

II. OBJECTIVE OF THE PROBLEM

The principle object of the paper is to show a reasonable model of a microcontroller based variable electronic speed representative that can be executed to control the speed of any vehicle depending on the local speed limit. The circuit is low cost, efficient and simple to implement on already existing vehicles. Each city, town or a town, can be checked and partitioned into individual zones. The division relies on the region under which the business, private, and industrial areas go under. There are some zones which are being a very busy traffic zone. At those places we need to have the least speed limit, with the residential and industrial zones having lesser traffic densities, the speed limits will vary accordingly. Separate the city or town into various zones with various speed ranges. Wireless communication has been established at all exit and entrypoints of zones about speed of vehicle. It also indicating the maximum allowable limit in the zone where the vehicle entered. A programmed MICROCONTROLLER placed in the vehicle unit which make the vehicle to reduce the speed.The vehicle speed will be varied based on duty cycle.

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It is very easy to assemble current vehicle information without disturbing its present arrangement.

III. RELATED WORK

The present implementation will be done based RF based identification. i.e the system was used RF transmitter with low frequency. It could be work for short distance so the zone capacity will be less. To avoid this we are upgrading our services to upgraded version.The intelligent transportation system (ITS) is envisioned by linking existing and emerging technologies of computers, wireless radio communications systems and sophisticated sensors to be used in vehicles and roads[3]. The present ITS system will be working with wireless communication technologies like RF, zigbee, GSM and Bluetooth

IV. SYSTEM DESIGN

In present situations the communication is developing very rapidly. To make more comfortable we had developed a new concept of internet of vehicle from on road junction to in-built vehicle by using IR sensors and also the information can be sent through the ZIGBEE transceiver to the vehicular communication system by the information processing and receiving terminal. Design of monitoring and control system for internet of vehicle from on road junction to in-built vehicle can be implemented by using the ARM processor. Here the processor can have internal analog to digital converters to convert the data from analog to digital and sent to the processing terminal. The data can be collected from the sensors can be sent to the processing terminal by using ZIGBEE wireless networks. Here we are using the technologies ZIGBEE, GPS, GSM, Alcohol sensor, Temperature sensor and Pulse Rate sensor. We are automating the systems by reducing manual operations to work with new technologies. In the present days Automated systems have less manual operations, flexibility, reliabilityand accurate[4].
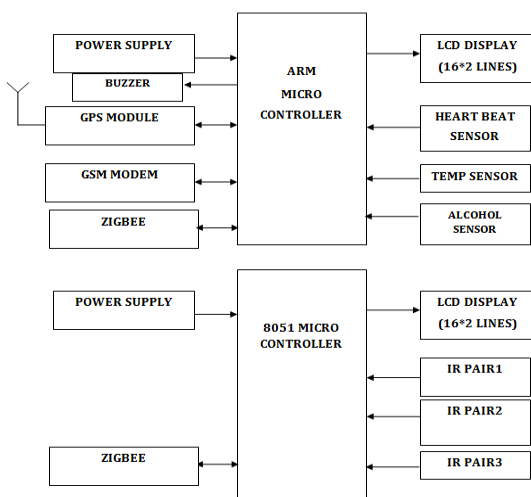

Fig1:Block Diagrams road side unit and vehicle unit of the proposed system

V. METHODOLGY

The proposed system will be divided intotwo categories they are naming as vehicle unit and road side unit. Vehicle unit consists of ARM7-LPC2148 Processor that can process the instructions according to our requirements such as taking the data from heart beat sensor, temperature sensor, alcohal sensor. Vehicle will be start based on 3 conditions that are measured using sensors. First condition is about alcohal level of the person who is driving the vehicle. If person will have less than the predefined alcohal level prescribed by government authority. This alcohalcan be calculated by using sensor (MQ3) that is placed in the vehicle unit. MQ3 sensor will regularly calculate the alcohal level that is taken by vehicle driver and transfer the information to ARM processor. ARM compares with the threshold level that was mentioned in the programme and switch the vehicle in ON /OFF condition based on level calculated. If the threshold level high vehicle will be in the OFF state else vehicle will be in the ON state. It will also check the temperature of vehicle and display the data on the LCD display. Then driver pulse rate will be calculated by using pulse oximeter sensor. If the pulse rate will be low or high then vehicle will stop else it will be in the moving state [5].

Road accidents were happened due to high speed at sensitive places like schools, rush on road. As the present vehicle will be designing with electric technology in place of mechanical. It is very easy for us reduce the speed of electric vehicles that will reduce the accidents at sensitive zones. Here in paper we are using IR sensors at sensitive zones which could able to reduce the speed at that zones. Here in my paper am describing IR sensors zones using road side unit. It was done with 8051 microcontroller that is connected with IR sensors with LM358 comparators. 8051 microcontroller connected with ZIGBEE transceiver which will be used to pass the information about the zone we are travelling. In this paper we were describing three zones for

different operations. IR zone 1 which is used to reduce the speed of the vehicle in sensitive school zone. Whenever the vehicle is in IR zone 1 ZIGBE transceiver that is placed vehicle unit will receive the information from zone1 reduce the speed to 20KMPH by using PWM technique. Here in my paper am using 100rpm DC motor which is connected with L293D motor driver IC. This motor will support PWM technique with duty cycle. In my paper to reduce the speed on time will decrease and off time will be increased.

IR zone 2 is connect tothe 8051 controller which will be used to stop the vehicles in no entry zones. The same L293D principle will be used here. In this zone off time will used and on time will be zero.

IR zone 3 is connect to the 8051 controller which will be used to prohibit the vehicles horn in sensitive zones like temples,hospitals to avoid the sound pollutions in those zones. The horn will not available even though we are giving horn in that area.

Vehicle unit will also consist of GSM and GPS. GPS used to identify the longitude and latitude of the vehicle where it is located. By sending a SMS through the cell phone to GSM which is put in vehicle we could capable of find the area of vehicle utilizing GPS [7]. It will be extremely valuable when vehicle was theft,we could likewise stop the vehicle by sending SMS [8].

The various steps in implementation and execution of this project is depicted below

Step1: Initialize the hardware according to the requirements, Install all the software's into PC for programming and communication of vehicle unit and road side unit.

Step2: Initialization of a road side unit to communicate to vehicle unit about zone using ZIGBEE communication.

Step3: Programming the both units to do the required operations.

Step4: Vehicle unit Respond to the road side unit and reduces speed or stops the vehicle or horn prohibition based on zone where the vehicle is located.

Step5: Location transfer using GSM as SMS.

Step6: Collect information from slave regarding existence of metal.

Step7: Sending information to central place regarding existence of metal in the unmanned zone area detected by slave robot.

Step8: Received information at central place for future investigation and Benchmarking.

VI.   HARDWARE IMPLEMENTATION

The hardware implementation of this projected system consists of an ARM7 microcontroller, 8051, IR pair with LM358 comparator, GSM, GPS, ZIGBEE transceivers connected to ARM7, 8051 and bumper switch, Pulse Rate sensor, Temperature sensor(LM35), Smoke sensor(MQ3), DC motor with L293D motor driver IC and buzzer.

VII.   DC MOTOR

A DC motor is a motor that uses direct electrical current (DC) as the source of its energy. Here in our application we are using zonal states and sensors to operate the dc motors which can run the motor in anti-clock wise direction. This DC motor is connected to controller through L293D motor driver IC which will works with H-Bridge operation. DC motor usedas vehicle.

Fig 2DC motor used as vehicle in our project with L293DFig

IR Sensors

IR transmitters and receivers successfully tuned and implemented using LM358 comparator to recognize the vehicles to demonstrate the speed limiting, locking and relieving application along prohibiting horn at the restricted zones. The zones are connected through basic micro controller 8051. 8051 zone based kit will also display the information in which zone vehicle has located. The same will also pass the information to vehicle unit using ZIGBEE wireless communication transceiver.
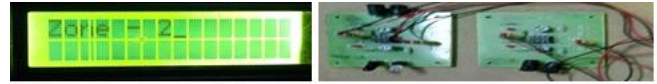

Fig3:IR transmitter and receiver pairs used on road side unit along with display in which zone the vehicle placed

GSM

This GSM Modem works with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. Applications like SMS Control, data transfer, remote control and logging can be developed easily. GSM SIM 800 is a low cost solution for cellular/ remote control projects. The modem comes with RS-232 for interfacing with computers and the TX and RX pins are provided for interfacing with other microcontrollers[6]. The initialization of mobile number in the hardware can be done after the network availability we used get the information on screen to send an SMS to store the mobile number. The process of sending the message will be starts with star followed by mobile number that need to get next updates. The corresponding registered mobile number will also get an update as modem initialized.

Fig4.GSM based processing operations and display information about mobile number

GPS

The Global Positioning System (GPS), is a satellite-based radionavigation system that provides geolocationto a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites.Obstacles such as mountains and buildings block the relatively weak GPS signals. In my paper am using GPS to locate the vehicle where it is located exactly based longitude and latitudes. To get the location user needs to send star followed by s to the number that was used in GSM.Location sent to the mobile phone based on SMS sentfrom registered mobile phone. We used to get location if the driver consumed alcohol and driving the vehicle. At that time vehicle will stop and sms sent to authorized person about location of the vehicle where it is located. We can able to start or stop the vehicle by sending SMS like star followed by one to start, star followed by zero to stop vehicle.
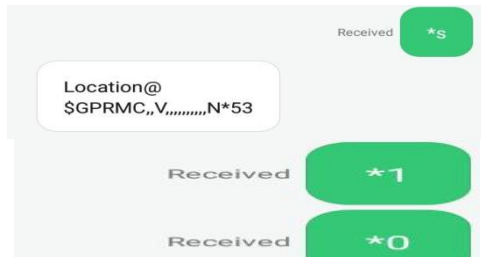
Fig5:Location sending to mobile phone based on commands

PULSE OXIOMETER

Pulse oximeter is a sensor based device which is used to monitor the pulse rate of the body and oxygen that is carried by system. It will be a small device attached to finger tip, works with, sending two wavelengths of light through the finger to measure your pulse rate and how much oxygen is in your system.

ZIGBEE

ZigBee is a new wireless technology that works for many applications to di in a variety of fields. It is working with standard communication protocol IEEE 802.15.4 specification for low data rates in the industrial, scientific, and medical radio bands. It allows the devices to communicate with one another zigbee.

Fig6. ZIGBEE Module Interfaced in the Hardware

VIII.   SOFTWARE'S TOOLS USED

KEIL C COMPILER

Keil Software is a standout amongst the most total improvement device underpins the LPC2148 processor under NXP (founded by Phillips), which is utilized all through industry.The installed software used to write embedded C programming by utilizing the Application and all directions of LPC2148 header files. Keil IDE was utilized to accumulate the program and check for errors by built the program with few defined steps that integrate in the IDE like assigning crystal frequency. Hex could also be generated using the IDE.

FLASH MAGIC

Flash Magic is used to send the hex code to the controller. It is produced by Embedded Systems Academy. By utilizing this product we can delete singular pieces or the whole Flash memory of the microcontroller. For the individuals who are working in hardware field is exceptionally helpful. It comprises of different parts, for example, COM port. Utilizing the "Correspondences" segment we can ready to pick the way a particular gadget associates with your PC. Select the COM port to be utilized and the baud rate. It is suggested that you pick a low baud rate first and increment it a while later.

IX.   EXPERIMENTAL RESULTS

After Successful initialization of Hardware, Program the LPC2148 Micro controller in vehicular unit and 8051 micro controller in road unit as per the requirements. After Initialization of vehicle unit and road unit the information will be displayed on LCD about status of IR pair'si.e. zone entry or exit. As per zones entry exit statuses vehicle unit respond as per the specifications given in the program. The detailed circuit shown in Fig. below
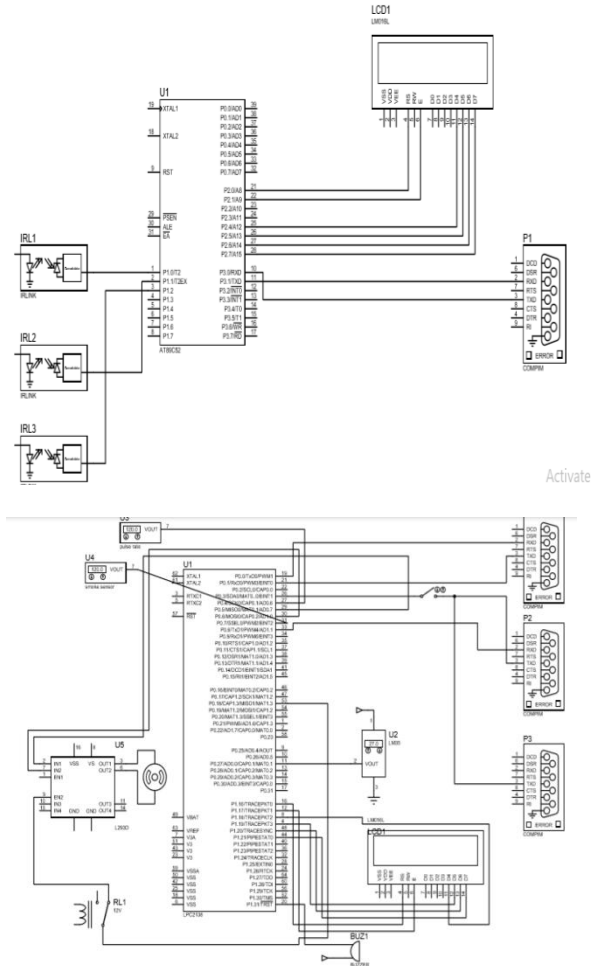

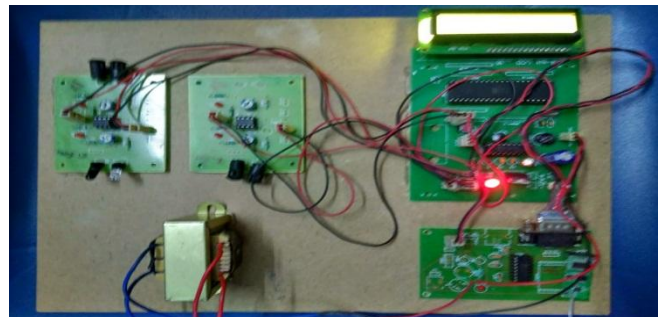**Fig7. Schematic for the road side unit and vehicle unit.**
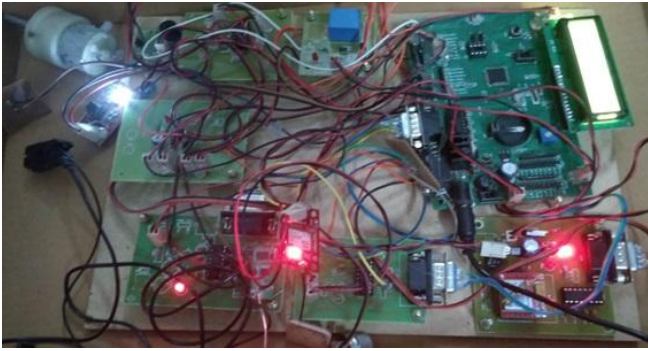

Fig8:Road side unit hardware implementation

Fig 9:Vehicle unit Hardware operation

Fig10.Display information on LCD in vehicle unit.

X. CONCLUSIONS

The project Embedded Secured Authentication and speed limiting in various zones with alert system design & development will limit the vehicular speed, blocks the vehicles in one ways and prohibit the horn in sensitive zones and GSM, GPS were used for passing the information as SMS along with longitude and latitudes. The system has designed and tested with all features integrated for the purpose of application successful.

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