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An IoT Cloud Based School Zone Vehicle Monitoring System

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Abstract: Road accidents are rising day by day. Major reason for these mishaps is due to rash driving or over speeding of the vehicle. This speed control mechanism will help in limiting the speed of the vehicle. The system is designed by using a tiny microcontroller which will reduce the size and cost of the hardware. The proposed system also suggests a child safety mechanism specially designed for students in the school zone roadways. The system does various tasks such as recognizing information of each vehicle using IOT cloud service, which will interchange the data with the RF reader by means of radio waves and display each school's name on the screen. This allows the driver to know the school zone roadway and control the vehicle with safety measures.

Keywords: - IoT Cloud System, Sensors, Embedded systems.

I. INTRODUCTION

Accidents commonly occurs due to rash driving and over speed of the vehicle in the Road.Rash drivers do not bother about human lives.The Accidents rates are increasing year by year due to increase in vehicles.The Government has taken many steps to avoid accidents. Most of the manufacturers have developed a Laser control system but its cost is too high. When human crosses the road it cannot detect properly so we tried to develop a system in a simple manner. Instead of Laser, IR module was replaced and it only works under a line of sight.So finally we decided to use RF. RF transmitter is placed in the School zone areas and receiver is placed in the vehicle.The information of the vehicle is received by the controller and the current speed will be monitored by a separate module or by using a ultrasonic sensor which sends information to the controller.The controller first compares the drivers speed.If the driver does not decrease the speed,the controller transfers automatically and limits the drivers speed. If any mishaps, robbery or kidnap occurs near school zone,the information of the drivers vehicle, speed and registration no will be transferred by the controller to the school management with the help of an IoT module.The information stored in an IoT module will be sent by the management to the nearest police station. Then the penalty amount is paid by the owner.

II. LITERATURE REVIEW

1)Abhirup Das, Abhisek Ray, Abhisek Ghosh, Swarasree Bhattacharyya, Debaleena Mukherjee, T.K. Rana,"Vehicle Accident Prevent cum Location Monitoring System" Industrial Automation and Electromechanical Engineering Conference (IEMECON),2017 8th Annual,2017- The proposed system in which accidents can be reduced by monitoring eye blinking of the driver. It indicates the drowsiness,obstacles located in the road and the drunken state of the drivers.Automatic pre-cautionary system is activated based on the above alarming condition.Accident and its probable location are also generated at nearby police station that helps in initiating medical help. In normal cases, no medical help is received due to the non-availability of accident information. This happens mainly at night and in roads where the traffic is low.

2)In Jung Lee, Hoseo University 336-795, Sechuli 165, Baebangmyun, Asan, Chungnam,"An Accident Detection System on Highway Using Vehicle Tracking Trace"ICTC 2011- The proposed system paved an accident detection using vehicle tracing stream. Which monitors the vehicle in each lane.When accident occurs, the lane has no stream in any interval and the monitoring system detects the accident at anytime.

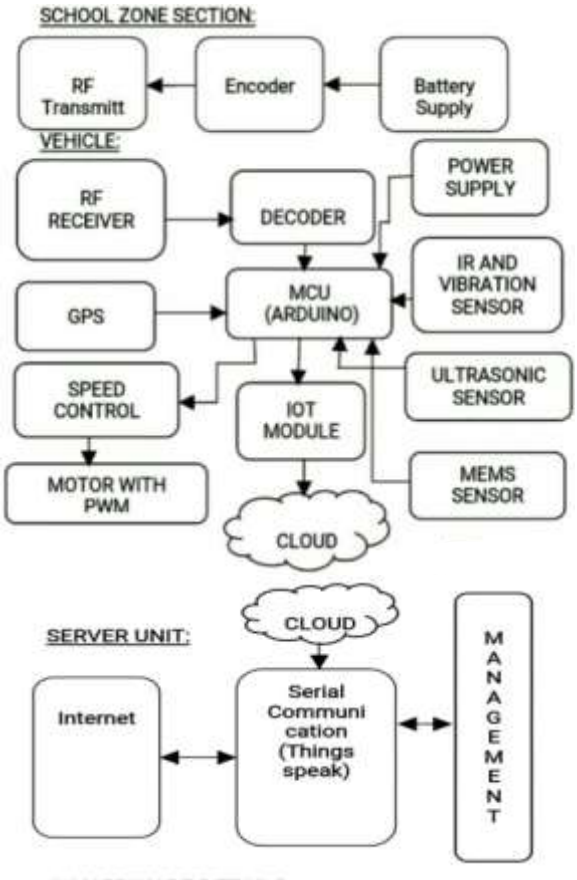
3)Prashant A. Shinde, Prof. Mr. Y.B. Mane,"Advanced Vehicle Monitoring and Tracking System Based on Raspberry Pi" IEEE 9th ISCO,2015-The proposed system would place inside the vehicle whose position is to be determined on the web page and monitored at real time and there is comparison between the current vehicle path and already specified path inside the file system of Raspberry pi. If the vehicle's speed goes beyond the specified value of the speed, then also the warning message will be sent from system to the owner mobile.

III. PROPOSED SYSTEM

A possible alternative solution for addressing the issue of road accidents is by considering mobile traffic sensors directly installed in private and public transportation and other volunteer vehicles. In such a scenario a fast real-time processing of big traffic data is fundamental to prevent accidents. Our IoT Cloud system, besides private drivers, it is very useful for critical helpful service such as ambulances. Experimental prototype proves that our system provides acceptable response times that allows drivers to receive alert message in useful time to avoid the risk of possible accidents.

IV. SYSTEM DESIGN

The blocks of the proposed system consists of the Chips and the ICs namely-Encoder chip, Decoder chip, RF Transmitter-Receiver module, IR and Vibration sensor, Ultrasonic sensor, Mems sensor, GPS, PWM motor, Ardunio UNO controller, IoT Module, LCD display.



BLOCK DIAGRAM

A.HARDWARE DETAILS:

1)RF TRANSMITTER/RF RECEIVER MODULE: The transmitter and the receiver (TX/RX)Pair operates at a frequency of 433MHz. The transmission occurs at the rate of 1Kbps-10Kbps. The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter[4]. The ATmega328 has 32 KB (with 0.5 KB used for the bootloader). It also has 2 KB of SRAM and 1 KB of EEPROM. The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers[5]. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). To receive the data from the road side transmitter, RF Receiver is needed. RX will have 4 pins same as that of Transmitter.

2)ARDUINO UNO: The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

3)UART: The Universal Asynchronous Receiver/ Transmitter (UART) controller is the key component of the serial communications subsystem of a computer. A UART is used to convert the transmitted information between its sequential and parallel form at each end of the link. Each UART contains a shift register which is the fundamental method of conversion between serial and parallel forms.

4)ULTRASONIC SENSORS: It is also known as Transceivers(send and receive).Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor[4]. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object. Here the distance between the vehicle 1 and vehicle 2 is 50cm.If the vehicle 2 is in the distance of 50cm from vehicle 1,it automatically take right side and it starts to move.[1]

5)GPS: The Global Positioning System (GPS) is a satellite-based navigation system made up of at least 24 satellites.To calculate your 2-D position (latitude and longitude) and track movement, a GPS receiver must be locked on to the signal of at least 3 satellites. Once your position has been determined, the GPS unit can calculate other informations. Such as speed, track, trip distance, distance to destination, sunrise and sunset time. Here the antenna passes the signal in the open field.

6) IOT SIM800: An IoT module is a small electronic device that connect to wireless networks and sends and receives data. SIM800 is a complete Quad-band GSM/GPRS solution in a SMT type which can be embedded in the customer applications.SIM800 support Quadband 850,900,1800,1900 MHz. It can transmit voice,sms and data information with low power consumption.

7)IR SENSOR: An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor[4]. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes, that can be detected by an infrared sensor. If any vehicle is passing on the side of vehicle 2, the vehicle 2 will stop and it will be in same position.

8)VIBRATION SENSORS: Using Vibration sensors we can measure and analyze displacement, linear velocity, and acceleration.The displacement, velocity, or acceleration of the sensor depends on the frequencies of interest and the signal levels involved. The friction that brings the mass to rest is defined by the damping coefficient, and the rate at which the mass vibrates forward and backward is its natural frequency. Mainly it is used for Accident detection.

9)ENCODERS AND DECODERS: Encoders are digital IC generally consists of an Enable pin which is usually set high to indicate the working. It consists of 2^n input lines and n output lines with each input line being represented by a code of zeros and ones which is reflected at the output lines. In RF communication, the Encoder can also be used for converting parallel data to serial data. Decoders are digital ICs which are used for decoding. A decoder can be used to obtain the required data from the code or can also be used for obtaining the parallel data from the serial data received.

10)16X2 LCD DISPLAY: An LCD is an electronic display module which uses liquid crystal to produce a visible image.

The 16X2 LCD display is a very basic module commonly used in DIYs and circuits. The 16X2 displays 16characters per line in 2 such lines. In this LCD each character is displayed in a 5X7 pixel matrix. Main parts of the board are LCD Connecter, Contrast Adjustment Preset, Interface Header, and Backlight Control Jumper. Here the LCD display is used to check the vehicle is in stable or unstable near school zone.

11)MEMS SENSOR: Micro-Electro-Mechanical Systems consists of mechanical elements, sensors, actuators, and electrical and electronics devices on a common silicon substrate. The sensors in MEMS gather information from the environment through measuring mechanical, thermal, biological, chemical, optical, and magnetic phenomena.

B)SOFTWARE DETAILS:

ARDUINO SOFTWARE: Arduino consists of both a physical programmable circuit board and a piece of software, or IDE(Integrated Development Environment) that runs on your computer code to the physical board.In this,IoT(the microcontroller unit is connected to ESP8266 module) sends the data with the help of Wifi by using trigger link.The language used here is Embedded C.

V. CONCLUSION

In the speed limit area, there is another transmitter that contains stop information. When the vehicle enters into the normal area its speed does not decrease and it goes normally and hence no action is performed. But when the vehicle enters into the restricted areas, its speed is limited. The transmitter module sends information that contains the limit of speed a vehicle can go inside the speed limited region. Then the signal or information is received by the receiver and the signal acquired from the speed meter is given to the controller. The signal is basically analog in nature and will be converted into digital by a digital processor. The signal from the transmitter and the speed meter is compared by the controller. Initially the current speed is less than the transmitted speed and when the vehicle goes normally, no action is required. Secondly, if the information from the speed meter is greater than the transmitted speed in the transmitter module, the controller waits for few second to check whether the driver has reduced the speed to the below value and if the driver does not reduce the speed, it automatically takes control and reduces the speed according to the need. At the same time the information is transmitted to the nearest police station. The information contains the vehicle number and the time. Fine or penalty amount is collected by the nearest tollgate or the check post. At the end, the control is released by the controller to driver. The Advantage of the proposed System consists of v2v communications, VANETs, accident avoidance system and obstacle avoidance vehicle.

VI. FUTURE SCOPE

In future, the functionalities of both the vehicles proposed here will be implemented in a single vehicle to make the system more effective. The vehicle can be operated by hybrid renewable energy to reduce the carbon emission and noise pollution. Implementation of automatic control of motor drives could be improved for better diversion of obstacle and vehicle avoidance. This will make the rash drivers to be in control at restricted areas.

REFERENCES

[1]Abhirup Das, Abhisek Ray, Abhisek Ghosh, Swarasree Bhattacharyya, Debaleena Mukherjee, T.K. Rana,"Vehicle Accident Prevent cum Location Monitoring System" Industrial Automation and Electromechanical Engineering Conference (IEMECON),2017 8th Annual,2017.

[2]In Jung Lee, Hoseo University 336-795, Sechuli 165, Baebangmyun, Asan, Chungnam,"An Accident Detection System on Highway Using Vehicle Tracking Trace" ICTC 2011.

[3]Prashant A. Shinde, Prof. Mr. Y.B. Mane,"Advanced Vehicle Monitoring and Tracking System Based on Raspberry Pi" IEEE 9th International Conference on Intelligent System and Controls (ISCO),2015.

[4]Srivas M C,Akshay R S,Ashwin Krishna, Rajeshwari Hedge, Department of Telecommunication Engineering, "An Efficient Model to Limit Vehicle Speed using Wireless Technology",2014.

[5]Shauna L. Hallmark, Neal Hawkins and Skylar Knickerbocker, Center for Transportation Research and Education,"Use of DSFS as a Speed Transition Zone Countermeasure in Small, Rural Communities" IEEE 18TH ICTCS,2015.

[6]Kalpana seelam, Ch.Jaya Lakshmi, Dept. of EIE, V.R. Siddhartha Engineering College,Vijayawada,"An Arduino based Embedded System in Passenger Car for Road Safety"International Conference on Inventive Communication and Computational Technologies-ICICCT 2017.

[7] Nehal Kassem, Ahmed E. Kosba, and Moustafa Youssef, "RF-based Vehicle Detection and Speed Estimation",Vehicular Technology Conference (VTC Spring), 2012.

[8] SeokJu Lee; Tewolde, G.; Jaerock Kwon, "Design and implementation of vehicle tracking system using GPS/GSM/GPRS technology and smartphone application,"Internet of Things (WF-IoT), O2014 IEEE World Forum on , vol., no., pp.353,358, 6-8 March 2014.

[9] Gupta A. , Ojha S. , Kumar V. , Singh V., Malav V.,"Alcohol Detection with Vehicle Controlling " ,International Journal of Engineering and Management Research ,Volume-6, Issue-2, March-April 2016.

[10] Prof. Kulkarni P. H., Ms. Wafgaonkar R., Ms.Gujarathi S.S., Mr. Ahirrao G.,"Alcohol Detection and Automatic Drunken Drive AvoidingSystem",Int. Journal of Engineering Research and Applications ,Vol. 4, Issue 4(Version 2), April 2014.

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