Vehicle Collision Detection system And Avoidance system with pollution monitoring using IoT

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Abstract—**Today, a major part of accidents are due to sudden interference. Also speed is one of the reasons for most of vehicle accident. This paper is based on intensification of smart vehicle. The important objectives are to detect accident and alerting nearby help center using the geographical locations. The system is implemented using Raspberry pie concentrating on accident detection, avoidance and also pollution monitoring using Internet of Things.**

Keywords—*accident detection, accident avoidance, pollution monitoring, Raspberry pie, IOT.*

I. INTRODUCTION

Now a day, the increase in demand of automobiles has also increased the traffic hazards and road accidents. Life of people is at high risk. The reason behind this is lack of best emergency facilities available in our country. As the use of vehicles are increasing enormously hence causing more and more air pollution. As per the transportation green house gas emission, the air pollution will become major issue. Pollution monitoring system which shows the usage and also record of pollution by vehicles which is to be considered. Factors causing road accidents involves driver inattention, fatigue and immature behavior. Instead of concentrating on accident detection, and accident avoidance we should concentrate on car crash avoidance system in order to alert driver and will help in making decision to take proper action in avoiding the accident. The proposed system consists of accident detection, accident avoidance along with pollution monitoring.

II. PROPOSED SYSTEM

The proposed system consists of four units:

- Accident detection unit
- Accident Avoidance unit
- Pollution monitoring unit
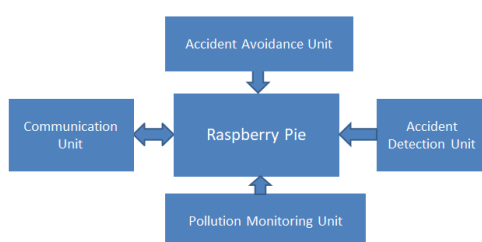- Data collection and communication unit

Fig.1. Proposed system

Wi-Fi is the medium of communication for every unit to communicate with each other.

During last few decades, progress in vehicular system is growing rapidly. The system plays key role in reducing collision and accidents. There have been attempts to develop an effective collision detection and avoidance system that is practical for use. Using internet of things technology makes great efforts in vehicular automation and different enhancement in accident detection and avoidance systems. IOT offers advanced connectivity of device, systems, and services that goes beyond machine-to-machine communications and covering number of protocols and applications.

III. SYSTEM DESCRIPTION

A. Accident avoidance unit

Accident avoidance unit: In this system real time tire pressure and tire temperature is measured in order to avoid accidents. It is divided into two sections:

- Tire pressure measurement system (TPMS).
- Accident avoidance system (AAS).

TPMS: It reports real time tire-pressure information to the driver of the vehicle through a pictogram display, or by a simple low-pressure warning light. Real-time tier pressure and tire temperature are measured using BMP180 sensor.
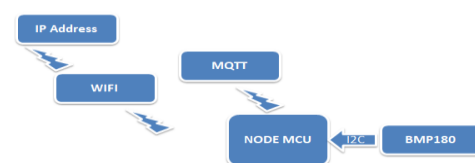

Fig.2. Tire pressure measurement system

AAS: For such a system flex sensor is interfaced with node MCU at analog pin A0, detecting the position of accelerator pad and causing the indicator to ON and off as the speed changes. Ultrasonic sensor is also used in order to maintain safe distance among vehicles to avoid accidents. Using MQTT protocol all data is forwarded to local server.
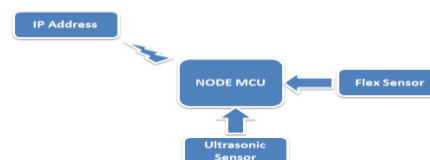

Fig.3. Accident avoidance system

B. Accident detection unit

- Accident is detected in real time when accident takes place. ADX1345 is used to detect tilt of vehicle and same sensor is used to detect impact (DASH). IT also enables to detect various intensity of impact.
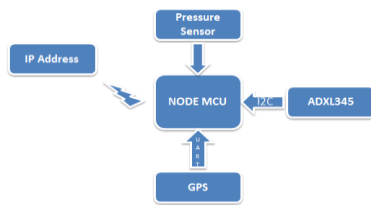
Fig. 4. Accident detection system

Fig.6. Raspberry Pi 3 Board

C. Pollution monitoring

In pollution monitoring system MQ7 sensor is used to measure amount of carbon monoxide in smoke generating from silencer due to fuel combustion, so that pollution factor of vehicle can be calculated. It also helps in maintaining monthly PUC reports.

Fig.5. Pollution monitoring unit

D. Communication unit

Wi-Fi is the medium of communication for every unit to communicate with each other.

IV. HARDWARE DESCRIPTION

A. Raspberry pi (R-Pi B-3):

It contains a processor and graphics chip, program memory (RAM) and various interfaces and connectors for external devices. All units are implemented by using raspberry pi3. Collective data from various units is stored in raspberry pi that data can be transmitted to existing CAN network using CAN protocol.

B. Sensors

Ultrasonic sensor, flex sensor and pressure sensors are used to develop accident detection unit. Flex senor detects the position of accelerator pad showing the speed of vehicle. Ultrasonic senor measures the distance and pressure.

Fig.7 . Ultrasonic and pressure sensor

Accident detection unit detects accidents using accelerometer.GPS and pressure also plays important role in accident detection unit. Pressure senor makes great effort in calculating acceleration motion.

Gas sensor (MQ7): Calculates pollution factor of vehicles and updates data and graphs to website.

V. CONCLUSION

This project eliminates communication gaps in reporting accidents. Many emergency processes can be improved with this innovation. In this project advance vehicle collision detection, avoidance system with pollution monitoring is obtained.

References

[1] S. Manna, S. S. Bhunia, and N. Mukherjee, "Vehicular pollution monitoring using IoT," International Conference on Recent Advances and Innovations in Engineering (ICRAIE-2014), Jaipur, 2014, pp. 1-5.

[2] S. S. Chandrasekaran, S. Muthukumar, and S. Rajendran, "Automated Control System for Air Pollution Detection in Vehicles," 2013 4th International Conference on Intelligent Systems, Modelling, and Simulation, Bangkok, 2013, pp. 49-51.

[3] K. N. Goh, J. Jaafar, E. E. Mustapha and E. T. E. Goh, "Automatic accident location detection system (AALDS)," 2014 4th World Congress on Information and Communication Technologies (WICT 2014), Bandar Hilir, 2014, pp. 63-69.

[4] B. S. Anil, K. A. Vilas, and S. R. Jagtap, "Intelligent system for vehicular accident detection and notification," 2014 International Conference on Communication and Signal Processing, Mel-maruvathur, 2014, pp. 1238-1240.

[5] M. S. Amin, M. A. S. Bhuiyan, M. B. I. Reaz, and S. S. Nasir, "GPS and Map matching based ve-hicle accident detection system," 2013 IEEE Student Conference on Research and Development, Putrajaya, 2013, pp. 520-523.

[6] Y. Wang, K. S. Bialkowski, A. J. Pretorius, A. G. W. du Plooy and A. M. Abbosh, "In-Road Microwave Sensor for Electronic Vehicle Identification and Tracking: Link Budget Analysis and Antenna Prototype," in IEEE Transactions on Intelligent Transportation Systems, vol. 19, no. 1, pp. 123-128, Jan. 2018

[7] E. Nasr, E. Kfoury and D. Khoury, ''An IoT approach to vehicle accident detection, reporting, and navigation,'' 2016 IEEE International Multidisciplinary Conference on Engineering Technology (CET), Beirut, 2016, pp. 231-236.

[8] Decade of action for road safety 20112020: Global launch, World Health Organization (WHO), Geneva, Switzerland. [Online]. Available: http://www.who.int/roadsafety/publication/decade - launch

[9] M. Peden, World report on road trafc injury prevention: Summary, World Health Organization (WHO), Geneva, Switzerland, 2004

[10] Global status report on road safety: Time for action, World Health Organization (WHO), Geneva, Switzerland, 2009.

[11] Sumit Garethiya1, Lohit Ujjainiya and Vaidehi Dudhwadkar, "predictive vehicle collision avoidance system using raspberry-bi" in Journal of Engineering and Applied Sciences, Vol. 10, no. 8, MAY 2015. J. Clerk Maxwell, A Treatise on Electricity and Magnetism, 3rd ed., vol. 2. Oxford: Clarendon, 1892, pp.68-73.

[12] Aishwarya S.R, Ashish Rai, Charitha, Prasanth M.A, Savitha S.C" an-iot based accident prevention tracking system for night drivers" international journal of innovative-research in science engineering andtechnology. Vol. 3, April 2015

[13] Vishwajeet H. Bhide" A Survey on the Smart Homes using Internet of Things (IoT)"international journal of advanced research on computerscience and management studies.Vol 2,December2014

[14] Spurti Shinde , Shweta Joshi , Nikita Shah , Shweta Tatiya , Preeti Kumari" Accident Detection and Alert Systems for Immediate Emergency Services: A Literature Review" International Journal of Science and Research

[15] Faisal Riaz, Muaz A. Niazi,]"*Road collisions avoidance using vehicular cyber-physical systems: a taxonomy and review"*Complex Adaptive Systems Modeling, 2016, Volume 4, Number 1, Page 1