International Journal of Emerging Technology in Computer Science & Electronics (IJETCSE)
ISSN: 0976-1353 Volume 13 Issue 3 –MARCH 2015.

DESIGN OF ACCIDENT DETECTION SYSTEM BASED ON VEHICULAR NETWORKS AND INFRASTRUCTURE NETWORKS FOR FUTURE GENERATION VEHICLES

A.VIVEK YOGANAND[1], SAGALA NITIN[2], S.PARTHASARATHY[3], M.VIGNESH[4]

*[1]Assistant Professor, Department of Computer Science and Engineering,
Veltech Multitech Dr.Rangarajan Dr.Sakunthala Engineering College,
Avadi, Chennai, Tamil Nadu, India.*
*[2, 3,4]Final Year B.E, Department of Computer Science and Engineering,
Veltech Multitech Dr.Rangarajan Dr.Sakunthala Engineering College,
Avadi, Chennai, Tamil Nadu, India.*

[1]vivekyoganand@veltechmultitech.org
[2]Sagalanitin@gmail.com
[3]parthasarathys94@gmail.com
[4]Viky7494@gmail.com

***ABSTRACT*-Modern communication technology integrated into vehicles offer an opportunity for better assistance to people injured in traffic accidents. To improve the overall rescue process, a fast and accurate estimation of the severity of the accident is needed. Our system is able to automatically detect road accidents, notify them through vehicular networks, and estimate their severity based on the concept of data mining and knowledge inference and thereby reduce the time needed to alert and deploy emergency services after an accident takes place.Results show that a complete Knowledge Discovery in Databases (KDD) process, with an adequate selection of relevant features, allows generating estimation models that can predict the severity of new accidents.**

***Keywords:*Database, Rescue Resources, Vehicle infrastructure, Severity Estimation, Accident Notification.**

1. INTRODUCTION

During the last decades, the total number of vehicles in our roads has experienced a remarkable growth, making traffic density higher and increasing the driver's attention requirements. The [1] immediate effect of this situation is the dramatic increase of traffic accidents on the road, representing a serious problem in most countries. As an example, 2,478 people died in Spanish roads in 2010,which means one death for every 18,551 inhabitants, and 34,500 people in the whole European Union died as a result of a traffic accident in 2009. To [2] reduce the number of road fatalities, vehicular networks will play an increasing role in the Intelligent Transportation Systems (ITS) area. Most ITS applications, such as road safety, fleet management, and navigation, will rely on data exchanged between the vehicle and the roadside infrastructure (V2I), or even directly between vehicles (V2V).

I. RELATED WORKS

1) The [3] integration of sensor capabilities on-board of vehicles, along with peer-to-peer mobile communication among vehicles, forecast significant improvements in terms of safety in the near future.
2) Before[4] arriving to the zero accident objective on the long term, a fast and efficient rescue operation during the hour following a traffic accident (the so-called Golden Hour) significantly increases the probability of survival of the injured, and reduces the injury severity.

2. LITERATURE SURVEY

We can see that these approaches are too limited by the wireless technology used, which provides a very short communication range. [5]Moreover, they have only been used to determine the fatigue or stress-level, probably due to the invisibility of finding real cases to test their efficiency on the estimation of the injuries suffered after an accident. [6]The integration of ECG sensors in modern vehicles could be an excellent opportunity to collect information about heal

the signs after the occurrence of an accident, since our proposed architecture would allow the notification of the gathered data to the Control Unit for further processing and classification by means of intelligent algorithms.

3. EXISTING SYSTEM

Many of the manual decisions taken nowadays by emergency services are based on incomplete or inaccurate data. Vehicular [7] Networks are either V2V or V2I and not the combination of both. For the obtained information about accident all the rescue team arrives unknowingly for what type of accident happened.

Type of accident severity is not estimated.

II. PROBLEMS IN EXISTING SYSTEM:

- Time taken for rescue operation is more.
- Rescue Resources wasted unknowingly.
- Not accurate prediction of severity of the accident.
- Emergency services are based on incomplete and inaccurate data.
- Only V2V or V2I is implemented and not the combination of both.

4. DESCRIBED PROPOSED MODEL

- This project directly estimates the accident severity by comparing the obtained data with information coming from previous accidents stored in a database.
- This approach collects information available when a traffic accident occurs, which is captured by sensors installed on-board the vehicles.
- The data collected are structured in a packet, and forwarded to a remote Control Unit through a combination of V2V and V2I wireless communication.
- Based on this information, our project determines the most suitable set of resources in a rescue operation.
- It considers the information obtained just when the accident occurs, to estimate its severity immediately.

III. ADVANTAGE OF PROPOSED MODEL

- A fast and accurate estimation of the severity of the accident.
- Reduces the number of road fatalities, vehicular networks.
- Rescue resources saved without wasting.

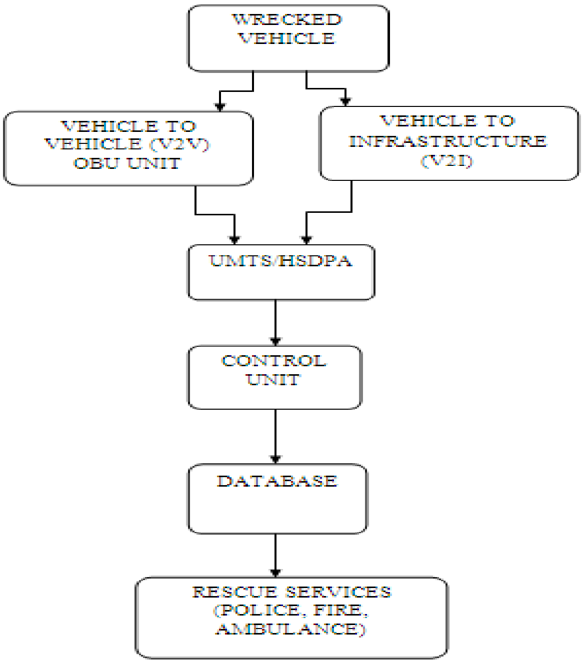

Fig. 4.1.1. System Architecture

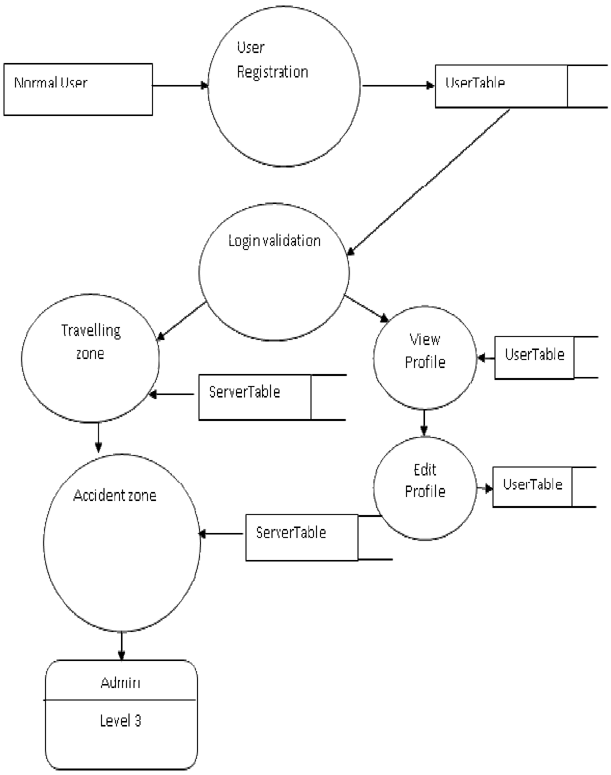

Fig.4.1.2.Data flow diagram

TABLE I
Most relevant variable for vehicle damage

Attribute	Vehicle damage				Passenger	
	Full Set	Front	Side	Rear-end	Full Set	Front
Body Type	✔		✔	✔	✔	✔
Light Condition	✔	✔		✔		
Model Year				✔		
Point of Impact	✔		✔		✔	
Road Align[a]						✔
Road Profile[b]		✔				✔
Rollover	✔	✔	✔	✔	✔	
Speed	✔	✔	✔	✔	✔	✔
Speed limit	✔	✔	✔	✔	✔	
Surface condition				✔		
Trailer			✔	✔	✔	
Vehicle role[c]		✔	✔			
Weather			✔	✔		
Airbag					✔	✔
Age						
Restraint system					✔	✔
Seat position						
Sex						
Veh. damage estim.					✔	✔

TABLE II
Variable dependency for estimating vehicle damage

Accident type	Dependences
Front accident	*Light condition, Speed limit* ⟶ *Speed*
	Speed ⟶ *Rollover, Vehicle role*
Side accident	*Body type* ⟶ *Speed, Trailer, Rollover*
	Speed limit ⟶ *Speed*
	Speed ⟶ *Rollover, Vehicle role*
Rear-end accident	*Light condition, Surface condition, Speed limit* ⟶ *Speed*
	Speed ⟶ *Rollover*
	Body type ⟶ *Trailer*
	Weather ⟶ *Surface condition*

We determined the optimal variable subset with thethree different schemes, and we chose for our final subset
those variables selected by, at least, two of the previous algorithms. All the tested variables and the results of the feature selection process. The top part ofthe table contains variables about the vehicle involved inthe accident, and hence also applicable to the occupants ofthat vehicle. The bottom part shows variables only applicableto individual occupants. We compared the results ofthe process when using the whole data set available (*FullSet*), and dividing these data into three subsets dependingon the direction of the impact.As shown, we find noticeable differences between thesets determined for the full set of accident data, and foreach of the divisions depending on the direction of theimpact. The most relevant attributes (in almost all cases)are the body type, the occurrence of rollover, the speed,the speed limit, the presence of a trailer, the airbag status,and the estimation on vehicle damage. When we divide theinstances, new important values appear, like the road profilewhen considering front accidents, or the light conditionfor rear-end crashes, which were not detected when usingthe full data set.

The obtained results are very useful to estimate the effectivenessof the system, as well as determining the needed data to be collected from the crashed vehicles. The presentedBayesian models generate accurate enough predictionsto be used in the Control Unit of our system.

IV. ALGORITHM

Step 1: For new registration process, the user has to give all his details for storing his basic information in the database.

Step 2: Once he/she has registered they have to login with his/her used id and password.

Step 3: When the login is successfully done, the user gets redirected to the users interface page.

Step 4: Similar, when the data owner logins in the webpage the page is redirected to corresponding page

Step 5: When the accident occurs the in-vehicle sensors sends information to the OBU.

Step 6: The OBU collects information from the sensors and sends it to the control unit.

Step 7: The control unit is responsible for sending alert messages to the rescue team.

Step 8: The control unit compares previously stored accident reports and estimates the severity.

Step 9: Based on the severity the appropriate rescue team will be sent.

5. RESULT AND ANALYSIS

- In this paper, we take advantage of the use of vehicular networks to collect precise information about road accidents that is then used to estimate the severity of the collision. [8]We propose an estimation based on data mining classification algorithms, trained using historical data about previous accidents. Our proposal does not focus on directly reducing the number of accidents, but on improving post-collision assistance

- Although the design of the hardware to be included in vehicles initially consisted of special-purpose systems, this trend is heading towards general-purpose systems because of the constant inclusion of new services. The information exchange between the OBUs and the CU is made through the Internet, either through other vehicles acting as Internet gateways (via UMTS, for example), or by reaching infrastructure units (Road-Side Units, RSU) that provide this service. If the vehicle does not get direct access to the CU on its own, it can generate messages to be broadcast by nearby vehicles until they reach one of the aforementioned communication paths. These messages, when disseminated among the vehicles in the area where the accident took place, also serve the purpose of alerting drivers traveling to the accident area about the state of the affected vehicle, and its possible interference on the normal traffic flow.

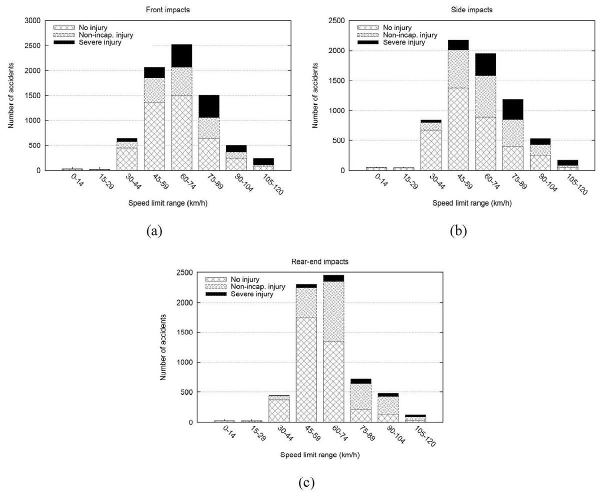

Fig.5.1.1.Influence of speed limit (a) Front (b) Rear and (c) Side

6. CONCLUSION

Here we have introduced a new communication technologies integrated into the automotive sector offer an opportunity for better assistance to people injured in traffic accidents, reducing the response time of emergency services, and increasing the information they have about the incident just before starting the rescue process. To this end, we designed and implemented a prototype for automatic accident notification and assistance based on V2V and V2I communications. However, the effectiveness of this technology can be improved with the support of intelligent systems which can automate the decision making process associated with an accident. A preliminary assessment of the severity of an accident is needed to adapt resources accordingly. This estimation can be done by using historical data from previous accidents using a Knowledge Discovery in Databases process.

7. REFERENCES

[1] Dirección General de Tráfico (DGT), ―The main statistics of road accidents. Spain,2010.

[2] Eurostat: Statistical Office of the European Communities,―Transport statistics in the EU, ‖ 2012.

[3] J. Miller, ―Vehicle-to-vehicle-to-infrastructure (V2V2I) intelligent transportation system architecture,‖ in 2008 IEEE Intelligent Vehicles Symposium, june 2008, pp. 715–720.

[4] F. Martinez, C.-K. Toh, J.-C. Cano, C. Calafate, and P. Manzoni, ―Emergency services in future intelligent transportation systems based on vehicular communication networks,‖ IEEE Intelligent Transportation Systems Magazine , vol. 2, no. 2, pp. 6–20, summer 2010.

[5] M. Fogue, P. Garrido, F. J. Martinez, J.-C. Cano, C. Calafate, and P. Manzoni, ―Prototyping an automatic notification scheme for traffic accidents in vehicular networks,‖ in 4th IFIP Wireless Days Conference , October 2011

[6] M. Fogue, P. Garrido, F. J. Martinez, J.-C. Cano, C. T. Calafate, and P. Manzoni, ―Evaluating the impact of a novel message dissemination scheme for vehicular networks using real maps,Transportation Research Part C: Emerging Technologies , vol. 25, pp. 61–80, December 2012, DOI: 10.1016/j.trc.2012.04.017.

[7] B&B Electronics, ―The OBD-II Home Page,‖ 2012, available at http://www.obdii.com.

[8] U. Fayyad, G. Piatetsky-Shapiro, and P. Smyth, ―The KDD process for extracting useful knowledge from volumes of data,‖ Communications of the ACM , vol. 39, pp. 27–34, November 1996.

[9] M. Hall, E. Frank, G. Holmes, B. Pfahringer, P. Reutemann , and I. H. Witten, ―The WEKA data mining software: an update,‖ SIGKDD Explorations, vol. 11, pp. 10–18, November 2009.

[10] National Highway Traffic Safety Administration (NHTSA), ―National Automotive Sampling System (NASS) and General Estimates System (GES),‖ 2012.

[11] K. Yu and E. Dutkiewicz, ―Geometry and Motion-Based Positioning Algorithms for Mobile Tracking in NLOS Environments,‖ Mobile Computing, IEEE Transactions on , vol. 11, no. 2, pp. 254–263, feb. 2012.

[12] M. Hall, ―Correlation-based feature selection for machine learning,‖ Ph.D. dissertation, Department of Computer Science, University of Waikato, Hamilton, New Zealand, 2008.