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Design of on Board Unit For Automatic Severity Estimation of Automotive Accidents

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Abstract— New communication technologies integrated into modern vehicles provide a chance for higher help to individuals hurt in traffic accidents. Recent studies show however communication capabilities ought to be supported by AI systems capable of automating several of the choices to be taken by emergency services, thereby adapting the rescue resources to the severity of the accident and reducing help time. To enhance the general rescue method, a quick and correct estimation of the severity of the accident represent a key purpose to assist emergency services higher estimate the specified resources. This paper proposes a unique intelligent system that is in a position to automatically sight road accidents, notify them through transport networks, and estimate their severity supported the thought information of information} mining and knowledge abstract thought. Our system considers the foremost relevant variables which will characterize the severity of the accidents (variables like the vehicle speed, the sort of vehicles concerned, the impact speed, and also the standing of the airbag). Results show that a whole information Discovery in Databases (KDD) method, with associate degree adequate choice of relevant options, permits generating estimation models which will predict the severity of latest accidents. we tend to develop a paradigm of our system supported off the peg devices and validate it at the Applus+ IDIADA Automotive analysis Corporation facilities, showing that our system will notably cut back the time required to alert associate degreed deploy emergency services once an accident takes place.

Keywords—KDD, Data Mining, Vehicular Networks, Traffic Accident Assistance, Applus+ IDIADA.

I. INTRODUCTION

During the last decades, the full range of vehicles in our roads has full-fledged a stimulating growth, creating traffic density higher and increasing the drivers' attention necessities. The immediate impact of this example is that the dramatic increase of traffic accidents on the road, representing a heavy downside in most countries. As associate example, 2,478 people died in Spanish roads in 2010, which suggests one death for each eighteen,551 inhabitants [1], and 34,500 people within the whole international organization died as a Result of a traffic accident in 2009 [2].

To reduce the amount of road fatalities, conveyance networks can play AN increasing role within the Intelligent Transportation Systems (ITS) area. Most ITS applications, like road safety, fleet management, and navigation, can believe knowledge changed between the vehicle and also the road aspect infrastructure (V2I), or maybe directly between vehicles (V2V) [3]. the mixing of censoring capabilities onboard of vehicles, beside peer to peer mobile communication among vehicles, forecast important enhancements in terms of safety within the close to future..

Before inbound to the zero accident objectives on the future, a quick and economical operation throughout the hour following a traffic accident considerably will increase the chance of survival of the burned, and reduces the injury severity. Hence, to maximize the advantages of victimization communication systems between vehicles, the infrastructure ought to be supported by intelligent systems capable of estimating the severity of accidents, and mechanically deploying the actions needed, thereby reducing the time required to help burned passengers. Several of the manual selections taken these days by emergency services area unit supported incomplete or inaccurate information, which can get replaced by automatic systems that adapt to the particular characteristics of every accident. A preliminary assessment of the severity of the accident can facilitate emergency services to adapt the human and material resources to the conditions of the accident, with the ensuing help quality improvement.

In this paper, we tend to benefit of the employment of vehicular networks to gather

Precise info concerning road accidents that's then wont to estimate the severity of the collision. we tend to propose Associate in Nursing estimation supported data processing classification algorithms, trained victimization historical information concerning previous accidents. Our proposal doesn't specialize in directly reducing the quantity of accidents, however on rising post collision help.

The rest of the paper is organized as follows: Section two presents the design of our planned automatic system to enhance accident help.

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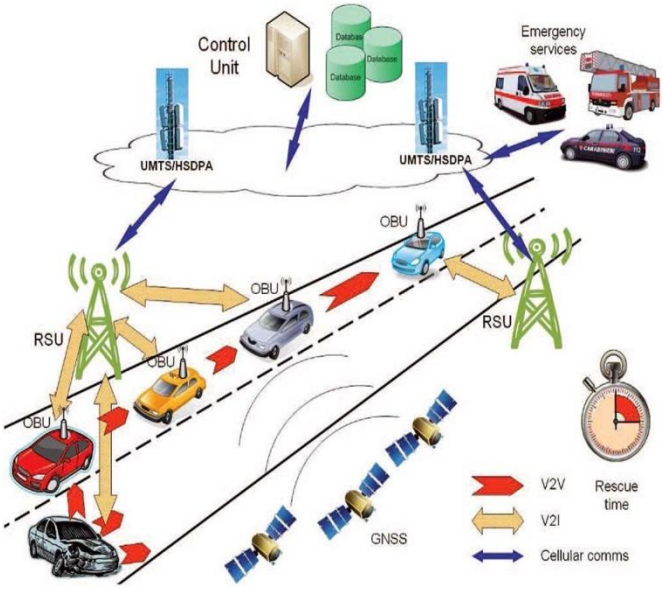


Fig. 1. Architecture of Our Proposed System for Automatic Accident Notification and Assistance Using Vehicular Networks.

II. OUR PROPOSAL

Our approach collects information obtainable once a traffic accident happens, that is captured by sensors installed on board the vehicles. The info collected square measure structured in an exceedingly packet, and forwarded to a distant management Unit through a mix of V2V and V2I wireless communication. Supported this information, our system directly estimates the accident severity by examination the obtained information with information coming back from previous accidents hold on in an exceedingly information. This info is of utmost importance, for instance, to see the foremost appropriate set of resources in an exceedingly operation. Since we would like to think about the information obtained simply once the accident happens, to estimate its severity directly, we have a tendency to square measure restricted by the info automatically recoverable, omitting alternative information, e.g., concerning the driver's degree of attention, drowsiness, etc.

III. ARCHITECTURE OVERVIEW

Fig. 1 presents the overview of the vehicular architecture used to develop our system. The proposed system consists of several components with different functions. Firstly, vehicles should incorporate an Onboard unit (OBU) responsible for: (i) detecting when there has been a potentially dangerous impact for the occupants, (ii) collecting available information coming from sensors in the vehicle, and (iii) communicating the situation to a Control Unit (CU) that will accordingly address the handling of the warning notification. Next, the notification of the detected accidents is made through a combination of both V2V and V2I communications. Finally, the destination of all the collected information is the Control Unit; it will handle the warning notification, estimating the severity of the accident, and Communicating the incident to the appropriate emergency services.

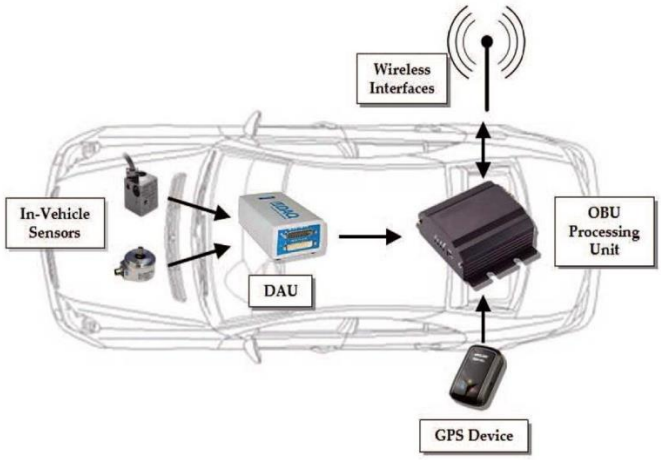


Fig. 2. Onboard Unit Structure Diagram.

The OBU definition is crucial for the projected system. This device should be technically and economically possible, as its adoption during a wide selection of vehicles might become large during a close to future. Additionally, this technique ought to be receptive future software system updates. though the look of the hardware to be enclosed in vehicles at first consisted of special purpose systems, this trend is heading towards general systems as a result of the constant inclusion of recent services.

The information exchange between the OBUs and also the metallic element is formed through the web, either through different vehicles acting as internet gateways (via UMTS, for example), or by reaching infrastructure units (Roadside Units, RSU) that give this service. If the vehicle doesn't get direct access to the metallic element on its own, it will generate messages to be broadcast by near vehicles till they reach one amongst the said communication ways. These messages, once disseminated among the vehicles within the space wherever the accident took place, also serve the aim of alerting drivers traveling to the accident space concerning the state of the affected vehicle, and its doable interference on the conventional traffic flow.Our proposed design provides:

- Direct communication between the vehicles concerned within the accident,
- Automatic causation of an information file containing necessary information concerning the accident to the management Unit, and .
- A preliminary and automatic assessment of the harm of the vehicle and its occupants, based mostly on the information returning from the concerned vehicles, and a information of accident reports. Consistent with the reported data and also the preliminary accident

estimation, the system can alert the specified rescue resources to optimize the accident help.
- Eg. concerning the driver's degree of attention, drowsiness, etc

IV. ONBOARD UNIT STRUCTURE

The main objective of the planned OBU lies in getting the accessible info from sensors within the vehicle to work out once a dangerous scenario happens, and reporting that scenario to the closest management Unit, moreover on alternative closes vehicles that will be affected.

Fig. 2 shows the OBU system, that depends on the interaction between sensors, the information acquisition unit, the process unit, and wireless interfaces:

- In vehicle sensors. They're needed to notice accidents and supply info regarding its causes. Accessing the info from in vehicle sensors is feasible today mistreatment the Onboard nosology (OBD) customary interface, that is the entry purpose to the vehicle's internal bus. This customary is necessary in Europe and USA since 2001. This encompasses the bulk of the vehicles of this automotive park, since the proportion of compatible vehicles can continue to grow as terribly previous vehicles square measure replaced by new ones.

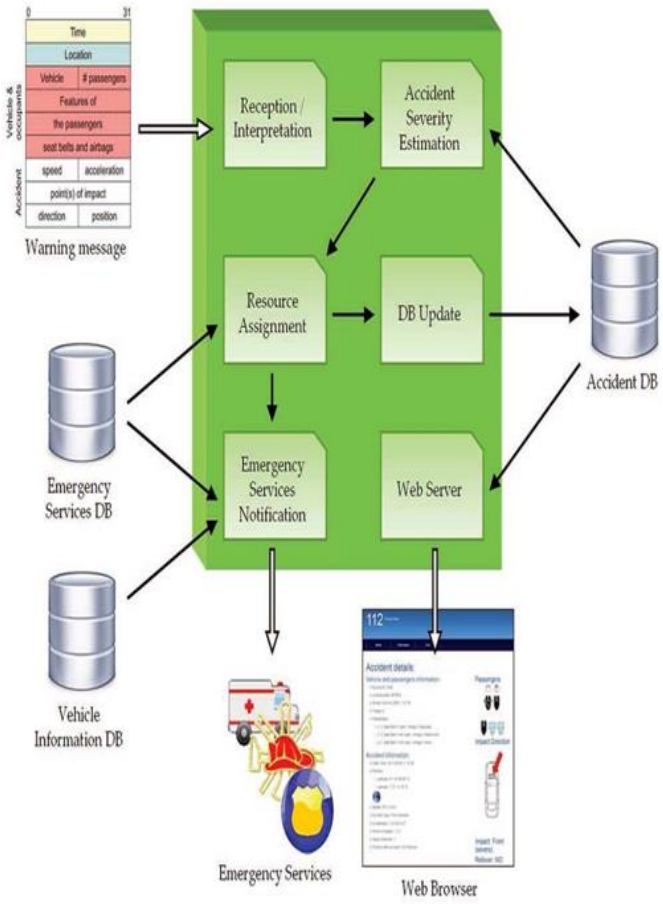


Fig. 3. Control Unit Modular Structure

- Data Acquisition Unit (DAU). This device is chargeable for sporadically grouping information from the sensors accessible within the vehicle (airbag triggers, speed, fuel levels, etc.), changing them to a standard format, and providing the collected information set to the OBU process Unit.
- OBU process Unit. it's responsible of process the info coming back from sensors, deciding whether or not associate degree accident occurred, and notifying dangerous things to near vehicles, or on to the management Unit. the data from the DAU is gathered, understood and wont to confirm the vehicle's current standing. This unit should even have access to a positioning device (such as a GPS receiver), and to totally different wireless interfaces, thereby facultative communication between the vehicle and therefore the device center

V. CONTROL UNIT STRUCTURE

The management Unit (CU) is associated to the response center in charge of receiving notifications of accidents from the OBUs put in vehicles. Specifically, the management Unit is answerable for coping with warning messages, retrieving information from them, and notifying the emergency services concerning the conditions underneath that the accident occurred. Fig.3 shows the modules enclosed within the management Unit to achieve all its objectives at intervals our projected system:

- Reception/interpretation module. the primary step for the metal is to receive a warning message from a collided vehicle, and then there should be a module waiting for the arrival of messages and retrieving the values from the various fields.
- Accident severity estimation module. When a new accident notification is received, this module can determine however serious the collision was, and the severity of the passengers' injuries.
- Resource assignment module. When deciding the severity of the accident, an extra module is Used to outline resource sets tailored to the precise situation.
- Information update module. the information collected from the notified accident area unit keep into the present database of previous accidents, increasing the data about the accident domain.
- Internet Server module. The management Unit incorporates a Web Server to permit simple image of the historical information recorded and also the current accident situations requiring help. an online interface was chosen so as to extend user friendliness and interoperability.
- Emergency services notification module. When the information has been properly managed, the notification module sends messages to the emergency services as well as all the data collected, the calculable severity, the counseled set of resources, moreover as further data concerning the vehicles concerned within the collision

(for preliminary planning of the rescue operation). the data about vehicles consists of ordinary rescue sheets.

- Which highlight the necessary or dangerous components of a specific vehicle that ought to be taken into consideration during a rescue operation: batteries, fuel tanks, etc.,
- One of the foremost necessary modules within the management Unit is accountable of the Accident Severity Estimation, i.e., providing a relative live of the potential impact of the collision on the integrity of the vehicles and people concerned. To obtain this estimation, we have a tendency to build use of historical data about previous accidents contained in AN existing database, through a method of information Discovery in Databases (KDD).
- The KDD approach will be outlined because the nontrivial process of distinctive valid, novel, probably helpful, and understandable patterns from existing knowledge. The KDD
- Process begins with the understanding of the applying specific domain and also the necessary previous data. After the acquisition of initial knowledge, a series of phase's area unit performed:

  - *Selection:* This part determines the knowledge sources which will be helpful, so it transforms the data into a standard format.

  - *Preprocessing:* during this stage, the chosen knowledge should be clean (noise reduction or modeling) and preprocessed (missing knowledge handling).

  - *Transformation:* This part is guilty of acting a reduction and projection of the information to search out relevant options that represent the information relying on the aim of the task.

  - *Data mining:* This part primarily selects mining algorithms and choice ways which is able to be used to realize patterns in knowledge.

  - *Interpretation/Evaluation:* Finally, the extracted patterns should be taken. This step may additionally include displaying the patterns and models, or displaying the data taking under consideration such models. We propose to develop an entire KDD method, starting by choosing a helpful knowledge supply containing instances of previous accidents. the information collected are structured and preprocessed to ease the work to be drained the transformation and data processing phases. the ultimate step can consist on decoding the results, and assessing their utility for the particular task of estimating the severity of road accidents.

VI. RESULT AND ANALYSIS

A. The Hardware System Turns on

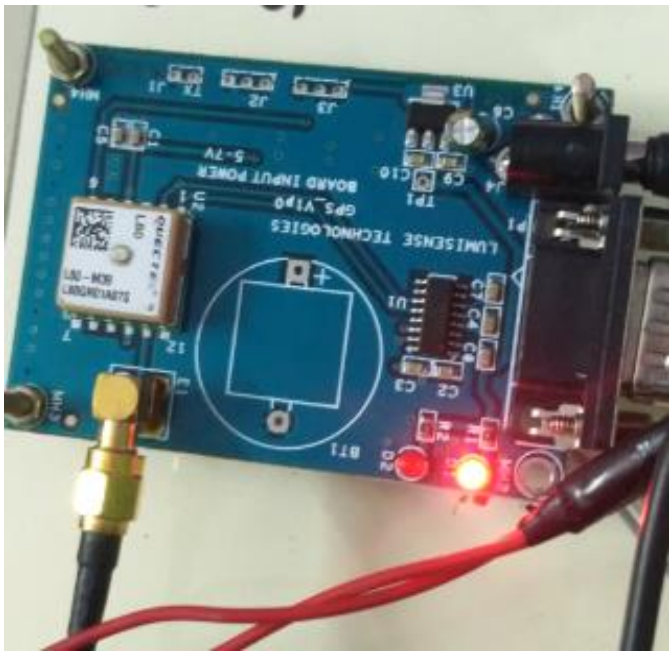
Fig.4 Hardware of the Project

B. The Display of on Board Unit when Turns on

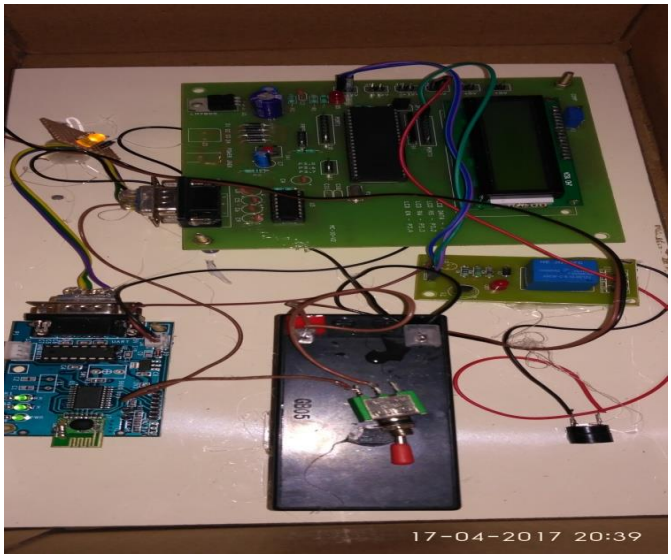
C. If the Accident Occurred the System Will Notify This Message

D. The System Will Send The Information of Accident To a GSM Mobile No. Through GSM Module with Longitude And Latitude Values . the Pictures are Depicted Below.

E. GPS Module when Turned on



F. Vehicle Section Unit



VII. CONCLUSION

The new communication technologies integrated into the automotive sector provide a chance for higher help to people cut in traffic accidents, reducing the latency of emergency services, and increasing the knowledge they need regarding the incident simply before beginning the rescue method. to the current finish, we tend to designed and implemented a paradigm for automatic accident notification and help supported V2V and V2I communications. However, the effectiveness of this technology may be improved with the support of intelligent systems which might automatism the choice creating method related to associate degree accident. A pre famous person assessment of the severity of associate degree accident is required to adapt resources consequently. This estimation may be done by exploitation historical knowledge from previous accidents employing a information Discovery in Databases method. Most of the present work targeted on data processing in traffic accidents relies on knowledge sets wherever a awfully restricted preprocessing and transformation were performed. when a careful choice of relevant attributes, we tend to showed that the vehicle speed may be a crucial consider front crashes, however the sort of car concerned and also the speed of the hanging vehicle are additional necessary than speed itself in facet and impinge on collisions. The standing of the airbag is additionally terribly helpful within the estimation, since things wherever it absolutely was not necessary to deploy the airbag seldom turn out serious injuries to the passengers. The studied classification algorithms don't show outstanding variations, however we tend to demonstrate that, if we tend to are able to classify the accidents looking on the kinds of impacts, we will perceptibly increase the accuracy of the system, particularly for front crashes wherever the vehicle is typically the hanging one. to the current finish, we tend to developed a paradigm that shows however intervehicle communications will create accessible the knowledge regarding the various vehicles concerned in associate degree accident. Moreover, the positive results achieved on the $64000 tests indicate that the accident detection and severity estimation algorithms are sturdy enough to permit a mass readying of the projected system

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REFERENCES

[1]. Dirección General de Tráfico (DGT). (2010). The Main Statistics of Road Accidents Spain [Online]. Available: http://www.dgt.es/portal/es/seguridad_vial/estadistica.
[2]. Eurostat: Statistical Office of the European Communities. (2012) Transport Statistics in the EU [Online].Available:http://epp.eurostat.ec.europa.eu/portal/page/portal/transport/data/main_tables.
[3]. J. Miller, “Vehicle to vehicle to infrastructure (V2V2I) intelligent transportation system architecture,” in Proc. IEEE Intell. Veh. Symp., Eindhoven, Netherlands, Jun. 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 Intell. Transp.Syst. Mag., vol. 2, no. 2, pp. 6–20, Oct. 2010.
[5]. M. Fogue et al., "Prototyping an automatic notification scheme for traffic accidents in vehicular networks," in Proc. 4th IFIP WD,Niagara Falls, ON, Canada, Oct. 2011.
[6]. M. Fogue et al., "Evaluating the impact of a novel message dissemination scheme for vehicular networks using real maps,"Transp. Res. Part C: Emerg. Technol., vol. 25, pp. 61–80, Dec. 2012.
[7]. B&B Electronics. (2012). The OBDII Home Page [Online].Available: http://www.obdii.com.
[8]. U. Fayyad, G. PiatetskyShapiro, and P. Smyth, "The KDD process for extracting useful knowledge from volumes of data," Commun.ACM, vol. 39, pp. 27–34, Nov. 1996.
[9]. M. Hall et al., "The WEKA data mining software: An update," SIGKDD Explor., vol. 11, pp. 10–18, Nov. 2009.
[10]. European New Car Assessment Programme (Euro NCAP). (2012) Test Procedures [Online]. Available: http://www.euroncap.com/testprocedures.aspx.
[11]. Nat. Hwy. Traffic Safety Admin. (NHTSA). (2012). National Automotive Sampling System (NASS) and General Estimates System (GES) [Online]. Available: http://www.nhtsa.gov/NASS/ .
[12]. Nat. Hwy. Traffic Safety Admin. (NHTSA). (2012). FTP Site for the General Estimates System (GES) [Online]. Available: ftp://ftp.nhtsa.dot.gov/GES/.
[13]. K. Yu and E. Dutkiewicz, "Geometry and motionbased positioning algorithms for mobile tracking in NLOS environments," IEEE Trans. Mobile Comput., vol. 11, no. 2, pp. 254–263, Feb. 2012.
[14]. M. Hall, "Correlationbased feature selection for machine learning," Ph.D. dissertation, Dept. Comput. Sci., Univ. Waikato,Hamilton, New Zealand, 2008.
[15]. R. Kohavi and G. H. John, "Wrappers for feature subset selection,"Artif. Intell., vol. 97, pp. 273–324, Dec. 1997.
[16]. J. R. Quinlan, C4.5: Programs For Machine Learning. San Francisco,CA, USA: Morgan Kaufmann Publishers, Inc., 1993.
[17]. G. F. Cooper and E. Herskovits, "A Bayesian method for the induction of probabilistic networks from data," Mach. Learn.,vol. 9, pp. 309–347, Oct. 1992.