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Technology of Electronic Nose and Its Applications

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ABSTRACT

Intervehicle communication has become an extremely hot topic in networking research, opening up new research challenges well beyond those of classical mobile ad hoc network research. In October 2010, a Dagstuhl seminar has been organized bringing together many of the internationally leading experts in this field to discuss open issues and challenges related to IVC. This article reports the main findings of this meeting, that was set up to cover a wide range of topics. In particular, the following four areas were studied in working groups: Fundamental Limits and Opportunities of IVC, IVC Communication Principles and Patterns, Security and Privacy in IVC, and IVC Simulation and Modeling. A general conclusion drawn is that IVC is now at a turning point where the first generation systems are engineered and will soon be brought to the market, while at the same time, IVC is experiencing the beginning of a new era characterized by a more fundamental research approach. We then proceed to analyze existing networking protocols in a bottom-up fashion, from the physical to the trans-port layers, as well as security aspects related to IVC systems. We conclude the article by presenting several projects related to IVC as well as a review of common performance evaluation techniques for IVC systems.

Keywords: Intervehicle communication, modeling, techniques.

I. INTRODUCTION

Vehicular transportation is, and will remain, one of the main modes of transportation for millions of U.S. citizens and hundreds of millions around the world) in spite of increasing oil prices and environmental concerns. However, 38,252 Americans were killed in 2003 with 2,697,000 seriously injured. Furthermore, each day the average American spends 2.5 hours in his/her vehicle, a significant percentage of this time in traffic jams and at stop lights. The statistics are similar in many other parts of the world. Vehicular communication systems that can transmit and receive information to and from individual vehicles have the potential to significantly increase the safety of vehicular transportation and improve traffic flow on congested roadsare behavior metric chemical sensors which extrade resistance whilst uncovered to vapours.

Inter-vehicle communication systems (IVCs) rely on direct communication between vehicles to satisfy the communication needs of a large class of applications (e.g., collision avoidance, passing assistance, and platooning). IVC systems can be sup- plemented or, in some situations, replaced by roadside infra- structure, allowing for Internet access and several other applications. A more detailed discussion on the classification of vehicular communication systems is presented. This article is focused on pure IVC systems without roadside assistance. Recently the term vehicular ad hoc network (VANET) was introduced for multihop networks of vehicles not relying on roadside infrastructure. We chose to use the term IVC as it is more general, including single-hop networks. Furthermore, the term IVC is extensively used in the existing literature.

II. TECHNICAL DETAILS OF THE PAPER

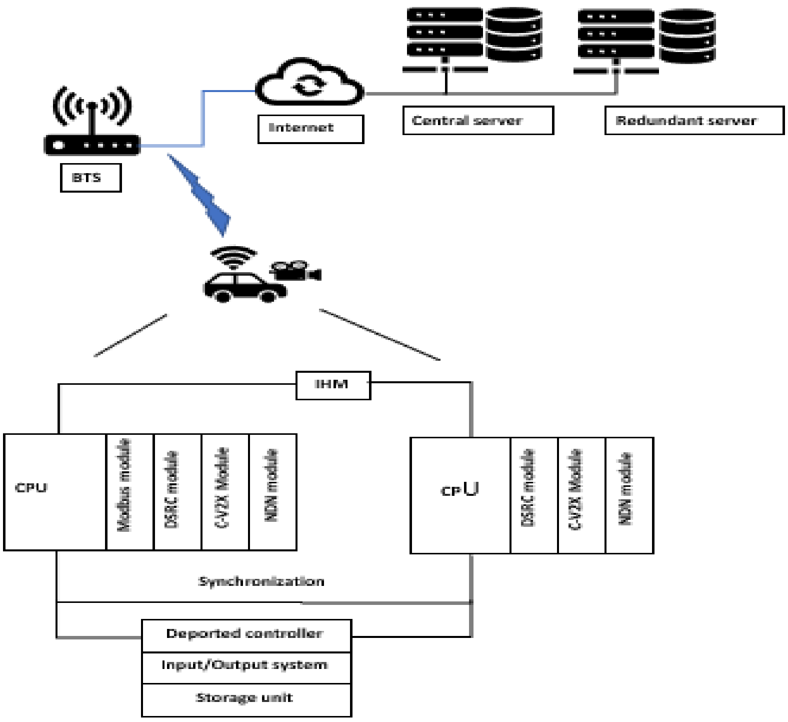

Fig 1. Proposed redundant architecture based on redundancy

The concept of redundancy is duplication, triplication, etc. one or more components of a sys- tem that perform the same function. There are two types of redundancy: hardware redundancy and software redundancy. Regarding hardware redundancy, this can involve several components such as ECU, power supply, communication bus, input/output modules (sensors and actuators), communication module, etc.

From a material point of view, the major risk is the unavailability of the computer. In circu- lation in the form of centralized Platoons, the leader manages all the Platoon member vehicles. If there is a fault with the leader computer, accidents can occur, since the inter-vehicle distance is very short. You can only react to brake when you detect that the leader computer is damaged, thereafter there is a risk of demining the flow of road traffic. Therefore, we propose to have two ECUs: One master ECU and the other in reserve. If an anomaly has been detected, the switchover takes place automatically to the reserve ECU. We can also make a redundancy at the level of the sensors, but since the vehicles are connected so if there is an anomaly in a sensor information

III. WORKING OF INTERVEHICLE COMMUNICATION

Inter-Vehicle Communication (IVC) systems exchange data from one vehicle to another by using on-board transceiver systems, without any need to road-side infrastructure. The main motivation for vehicular communication systems is safety and eliminating the excessive cost of traffic collisions. According to the World Health Organization (WHO), road accidents annually cause approximately 1.2 million deaths worldwide; one fourth of all deaths caused by injury. Vehicular communication systems are computer networks in which vehicles and roadside units are the communicating nodes, providing each other with information, such as safety warnings and traffic information. They can be effective in avoiding accidents and traffic congestion. Both types of nodes are dedicated short-range communications (DSRC) devices. DSRC works in 5.9 GHz band with bandwidth of 75 MHz and approximate range of 300 metres (980 ft).[1] Vehicular communications is usually developed as a part of intelligent transportation systems (ITS).

IV. APPLICATIONS

- Information and Warning Functions: road information to vehicles distant from the subjected site
- Communication based longitudinal control: Exploiting the look through capacity to avoid accidents, platooning vehicles etc.
- Co-operative Assistant Systems: Coordinating vehicles at critical points
- Added Value Applications: Internet Access, Location based services, Multiplayer

V. ADVANTAGES

- Stop And Go Adaptive Cruise Control
- Co-operative Driving
- Hazard Warning
- Merging and Lane Changing Warning

- Inter/Intra Platoon Communication

VI. CONCLUSION

In case of mobility models, the degrees of freedom are much larger. First, the scenario to be evaluated must be chosen. If this scenario is an urban area, we can either select a Manhattan grid or a real map. Furthermore, either a random or more realistic definition of vehicle routes could be used and finally, the decision whether and how traffic lights should be included is the last option. Considering propagation models, there are two main questions: Which impact do realistic propagation models have on the various IVC protocols? In which case could a simple propagation model be used in order to reduce complexity? By considering traffic rules and different vehicles types (motor cycles, cars and trucks) or a reduced amount of IVC aware vehicles this model could be further refined**.** we would like to encourage more research to investigate effects of propagation models and different mobility model options on higher and lower level IVC protocols. We also would like to recommend mentioning the various details of IVC simulations more accurately in future publications and we hope that this work helps to consider the influencing factors of IVC carefully. facilitates the task of updating HD maps, which is a major problem.

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