



Article

Towards Strengthening the Resilience of IoV Networks—A Trust Management Perspective

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Abstract: Over the past decade or so, considerable and rapid advancements in the state of the art within the promising paradigms of the Internet of Things (IoT) and Artificial Intelligence (AI) have accelerated the development of conventional Vehicular Ad Hoc Networks (VANETS) into the Internet of Vehicles (IoV), thereby bringing both connected and autonomous driving much closer to realization. IoV is a new concept in the Intelligent Traffic System (ITS) and an extended application of IoV in intelligent transportation. It enhances the existing capabilities of mobile ad hoc networks by integrating them with IoT so as to build an integrated and unified vehicle-to-vehicle network. It is worth mentioning that academic and industrial researchers are paying increasing attention to the concept of trust. Reliable trust models and accurate trust assessments are anticipated to improve the security of the IoV. This paper, therefore, focuses on the existing trustworthiness management models along with their corresponding trust parameters, as well as the corresponding trust evaluation parameters and simulation, which provide the basis for intelligent and efficient model suggestions and optimal parameter integration. In addition, this paper also puts forward some open research directions that need to be seriously solved before trust can play its due role in enhancing IoV network elasticity.

Keywords: vehicular ad hoc networks; internet of vehicles; intelligent traffic system; trustworthiness management models; trust evaluation; smart cities



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1. Introduction

With the rapid advancement in the automotive industry, the number of vehicles in countries around the world is increasing at an unprecedented rate, resulting in severe challenges to the existing transportation system. On the one hand, traffic accidents occur frequently, hence, putting the lives of vehicular passengers and pedestrians at risk. The World Health Organization (WHO) released a report on road safety, stating that every year, around 1.35 million people die in road traffic accidents, and an average of one person dies in a traffic accident every 24 s. On the other hand, the issue of traffic congestion is becoming serious, not only restricting the orderly progress of urban traffic but also causing huge economic losses and environmental pollution. The Intelligent Transportation System (ITS) came into existence in order to reduce traffic accidents and alleviate traffic congestion. As an important component of smart cities, it paves the way for future transportation systems. The ITS combines data transmission technology, electronic sensing technology, information technology, computer technology, and various control technologies to build an efficient and real-time integrated traffic management system.

In recent years, wireless networking technology has matured. In particular, with the rapid development of long-term evolution (LTE) and fifth-generation (5G) mobile communication technology, the development of the concept of Internet of Vehicles (IoV) has attracted the attention of researchers. The use of 5G can facilitate vehicular networks