Chapter 39
Secure Cyber–Physical Systems for Improving Transportation Facilities in Smart Cities and Industry 4.0

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ABSTRACT

The main aim of this strategic research proposal is to develop a model of secure transportation system using efficient CPS which not only reduce the unnecessary accident rates but also increase safety system that enhances the livability of smart cities and Industry 4.0. Although the main focus is efficient security solutions, dynamic and intelligent approaches of the future security solutions will be able to detect the evolving threats and cyberattacks during the data or signal transmission between the users and service providers.

INTRODUCTION

Minimization of traffic problems, optimization of accuracy measurements (reception of vehicular communication) and automation facilities of the future driverless vehicles can be anticipated through real-time communications between advanced cyber-physical system (CPS) sensors and devices. Although an efficient transportation system and vehicular communication technologies are essential to improve the smart facilities such as minimum energy consumption with maximum security, smart transportation system depends on the CPS which is the revolution of industry 4.0. However, cyber-physical infrastructure is the major driving force of the future smart transportation system like a traffic monitoring system with all necessary security facilities. Transportation industries make sure that security solutions designed,

developed and implemented for future evolving threats should protect the complete transportation system. Although 4G and basic 5G dominate the vehicular communication and main infrastructure of the legacy transportation system, 5G introduces many novel approaches and features to improve the traffic monitoring facilities through the intelligent transport systems.

The main aim of this strategic research proposal is to develop a model of secure transportation system using efficient CPS which not only reduce the unnecessary accident rates but also increase safety system that enhances the livability of smart cities and industry 4.0. Although the main focus is efficient security solutions, dynamic and intelligent approaches of the future security solutions will be able to detect the evolving threats and cyber attacks during the data or signal transmission between the users and service providers.

Based on the literature review and existing data related to the accidental rate, locations, etc., efficient CPS can be modified to combat the potential attacks. Employing CPS will not only allow us to improve the future transportation system but also will help us to develop an appropriate theoretical model with minimum energy consumption and maximum security. Further, CPS will allow us to enhance the security features according to the evolving technologies. Here, the appropriate technology of industry 4.0 revolutions and necessary security policies based on blockchain (BC) will be employed to improve the transportation services. As a specific methodology, a theoretical model designed and developed for securing automotive service allowed me to analyze the various security issues focused on the transportation system. Despite many unsecured traffic services between the users and service providers, the intelligent system considered in the theoretical model detects the malicious messages and information from the transportation services quickly and efficiently.

According to the research idea of securing future transportation system, I hope that the proposed model will provide the new security solutions with minimum energy consumption and maximum security solutions. Although selected topology of block structure based on the size of the specific road is considered with BC, the study of early results confirm that BC enhances the security solutions in the future transportation system used in the industry 4.0.

This CPS based research will be leading us to deliver a practical security solution based on industry 4.0 for the future transport systems in smart cities. Here, evolving threats created from the dynamic environments must be identified, detected and resolved with minimum cost and maximum energy efficiency.

Improving secure automotive environments in favorite cities is one of the 2030 visions. In the current industrial revolution, governments of the popular countries plan to execute the driverless vehicles soon. In this environments, automotive services will be improved with the efficient use of security technologies based on industry 4.0. Despite many solutions, efficient security solutions will reduce accidental rate. Regarding the driverless vehicles, the accidental rate may be slightly lower than existing transport systems, but cybersecurity will create the different types of accidents without any warning or pre-knowledge. Here, passengers (users) should be able to solve the cybersecurity problems as quick as possible. In this situation, CPS will help us to provide the necessary solutions and immediate actions. Instead of improving technological capabilities, security issues should be applied to protect the current automotive system as well as the future technologies used within the industry 4.0. The accident may happen in many different ways such as drivers' attitude, conditions of the roads, etc. The automotive system can monitor the drivers' attitudes, but it has to monitor the passengers' attitude and behavior when passengers are using driverless vehicles. Infotainments created through the vehicular communication are for useful purposes such as shortest path during the traffic situation. However, the wrong informa-

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