# Vehicular Communications for Smart Cars

## Protocols, Applications and Security Concerns

Niaz Chowdhury • Lewis M. Mackenzie

CRC Press
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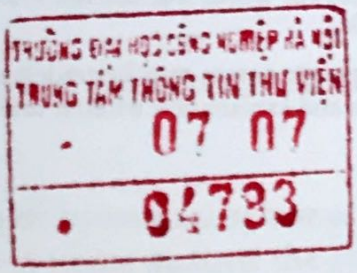
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# Preface

The use of vehicles, in the widest sense of the word, has a long history in human society. The availability of wireless radio communication is somewhat more recent but, even so, commercial vehicles such as ships, airlines, and railways have been using the technology for over a century. For example, when the Titanic issued its distress signal using radio telegraphy in 1912, the technology was in wide use in the North Atlantic despite having been available for only a decade. It is perhaps surprising that, where road vehicles are concerned, it has taken so long to form any kind of widely deployed Vehicle to Vehicle (V2V) communication system, and even in today's world connected "smart cars" still belong mostly in textbooks. However, we are of the view that the technological, commercial, and political conditions are now in place to transform this situation very rapidly in the near future.

A V2V system can offer a wide range of powerful applications to improve the driving experience. The safety applications that such a technology would enable could undoubtedly greatly reduce the number of accidents. At the same time, value-added services such as digital maps, traffic information, and better routing could enhance the driving experience and shorten travel times. Entertainment applications such as web browsing, reading, gaming, movies, and music could make the journey more pleasant for passengers. These applications require appropriately designed underlying protocols and supporting technologies to make them available securely in a highly mobile environment.

This book offers eight chapters that examine the main underlying elements that might make a regular vehicle smart. Nevertheless, it would be impossible to cover a broad topic like V2V communication with appropriate depth in a single book of this nature and emphasis is given, rather, to addressing the key issues that arise in the area. The use of the Internet of Things (IoT), big data, and broadcasting techniques is examined in various chapters, emphasizing security, warning dissemination, the communication networks available, and other enabling technologies such as blockchain.

Chapter 1 reviews the IoT-enabled use of visible light optical camera communication in smart cars. Chapters 2 and 3 describe the accident warning system and its use of broadcasting in message dissemination, respectively. Chapter 4 reviews a business aspect in the mix by investigating the uses of big data in smart city transportation to accelerate business growth. Chapter 5 takes a futuristic approach to secure smart vehicles using blockchain technology in the quantum era. The remaining three chapters, 6, 7, and 8, investigate security issues in autonomous vehicles, communication networks, and accident warning systems.

Although doctoral students and early career researchers are the primary audience and the material is pitched at that level, senior researchers and academics should also appreciate its content. The author list of the book contains a mixture of academics, consultants, and scientists, allowing it to present a portfolio of contributions. The editors applaud their participation and hope to see these efforts contribute to making the smart car concept a widespread reality in the near term.