Foreword

Smartphones now provide a multiplicity of functions and services, most of which require seamless outdoor/indoor location and navigation functions. These location-based services need increasing high performance location and sophisticated interfaces with users. Starting with the introduction of high sensitivity GPS chips in the early 2000’s, the past decade has witnessed tremendous advances and diversity of approaches related to mobile device location and navigation, and interaction with users. Expectations from users have more than kept us, and researchers in academia and industry, continuously trying to catch up with their seemingly insatiable needs for enhanced performance. Documentation of the body of knowledge from which these developments have taken place is spotty and often difficult to find. *Ubiquitous Positioning and Mobile Location Based Service in Smart Phones* fills that much needed gap and is extremely timely.

The authors, under the expert editing and contributions of Dr. Ruizhi Chen, have done a truly remarkable job of assembling this book on the state of the art of existing and emerging positioning and navigation methods used for location based services for handheld devices. The book is logically divided into three sections. Each chapter covers a specific topic and can therefore be conveniently read independently. The first section of the book deals with smartphone outdoor and indoor positioning using RF methods, with emphasis on GNSS as it should be, given the universal availability of the latter. A chapter on RFID contains an introduction to the treatment of integration with other sensors, including self-contained inertial measuring units. The second section focuses on the combination of diverse positioning methods into a single solution to improve availability, accuracy and reliability performance. Visual-aided navigation is finally coming of age, and a timely chapter describing the fundamentals and advances in this area is provided. Given the emphasis on smartphones, such a book would not be complete without the third section, which deals with topics related to the mapping information needed by smartphone users, including a most interesting chapter on 3D city visualization. The book concludes with a recreational application that now routinely uses GNSS, namely hiking.

*Ubiquitous Positioning and Mobile Location Based Service in Smart Phones* is rich in detailed descriptions and illustrations while keeping the mathematical and physics details to a minimum in order to maximize accessibility and readability by an increasingly large numbers of developers and users who want to immerse themselves in this rapidly expanding field. The book coherently treats, in detail, a list of topics that have been so far dispersed in numerous conference proceedings and often addressed only in a cursory manner. It will be invaluable as an aid to university graduate students, mobile phone manufacturers, and the rapidly growing number of application developers.

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Gérard Lachapelle has been involved in GNSS R&D since 1980, first in industry and, since 1988, in academia. He currently holds a Canada Research Chair in Wireless Location within the PLAN Group at the University of Calgary, where he has been a Professor since 1988. He has contributed to numerous aspects of ground- and satellite-based navigation and has received scores of awards for his work. During his university career, Professor Lachapelle has successfully transferred many GNSS technologies to industry and governments. He holds degrees from Laval University, the University of Oxford, the University of Helsinki, and the Technical University at Graz.