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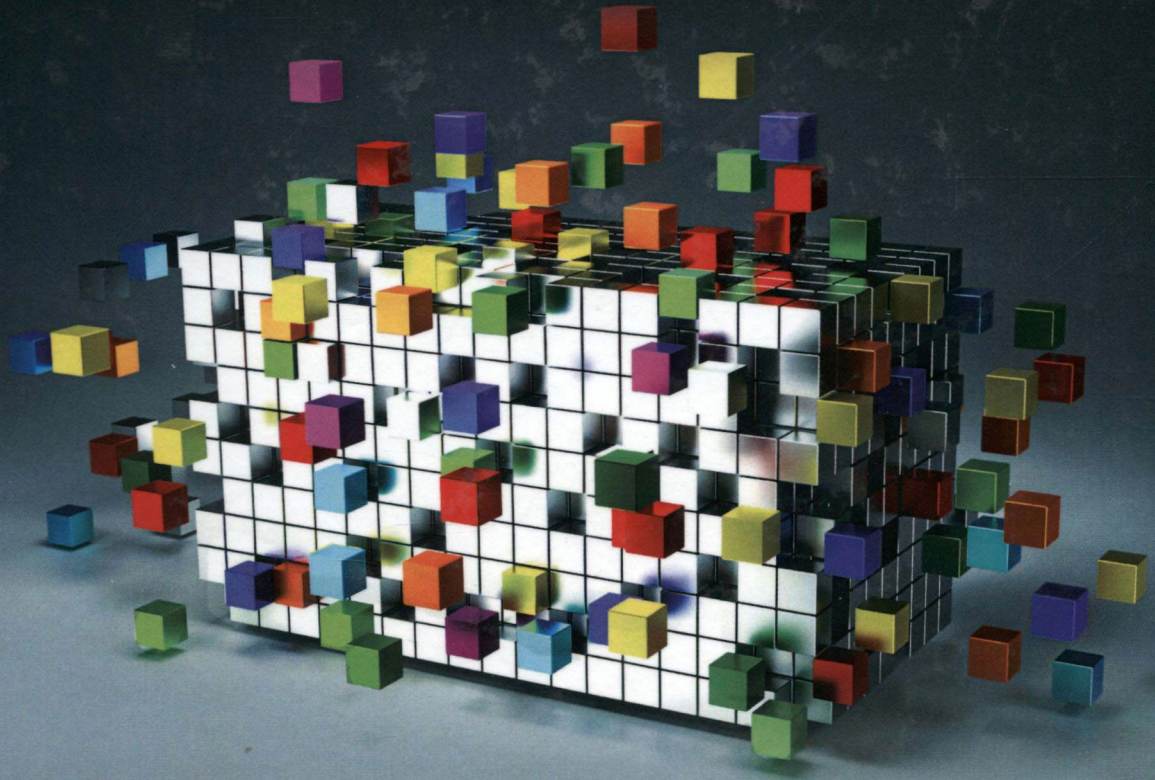
Multisensor Data Fusion

From Algorithms and Architectural Design to Applications



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Dedicated to my wife, Emna, whose Zen-like patience continues to amaze;
to my parents, without whom I would not be where I am today.

Hassen Fourati

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Preface

The technology of multisensor data fusion seeks to combine information coming from multiple and different sources and sensors, resulting in an enhanced overall system performance with respect to separate sensors and sources. Multisensor data fusion has gained in importance over the last decades and found applications in an impressive variety of areas within diverse disciplines: navigation, sensor networks, intelligent transportation systems, security, medical diagnosis, biometrics, environmental monitoring, remote sensing, measurements, robotics, and so forth. Different concepts, techniques, and architectures have been developed to optimize the overall system output in applications for which sensor fusion might be useful and enables development of concrete solutions.

The idea for this book arose as a response to the immense interest and strong activities in the field of multisensor data fusion during the last few years, both in theoretical and practical aspects. This book is targeted toward researchers, academics, engineers, and graduate students working in the field of sensor fusion, estimation and observation, filtering, and signal processing.

This book captures the latest data fusion concepts and techniques drawn from a broad array of disciplines. With contributions from the world's leading fusion researchers and academicians, this book has 34 chapters, divided roughly into two sections, and covers the fundamental theory and recent theoretical advances, as well as showcasing applications of multisensor data fusion. Each chapter is complete in itself and can be read in isolation or in conjunction with other chapters of the book. Chapters 1 through 23 in Section I are devoted to the state of the art and novel advances in multisensor data fusion algorithm design. New materials and achievements in optimal fusion and multisensor filters are provided. In Section II, Chapters 24 through 34 mostly showcase multisensor data fusion advancements in fields such as medical applications, navigation, traffic analysis, and so on.

We are grateful to all the contributors for sharing their valuable knowledge and we expect this book to offer a good balance between academic and industrial research throughout the different chapters. We sincerely hope that this book will be a source of inspiration for new concepts and applications and stimulate further the development of data fusion architecture. We would also like to acknowledge CRC Press and its staff for technical and editorial assistance that improved the quality of this book and resulted in its publication. Finally, we hope readers will enjoy this book and that it will prove to be a useful addition to the increasingly important and expanding field of data fusion.

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