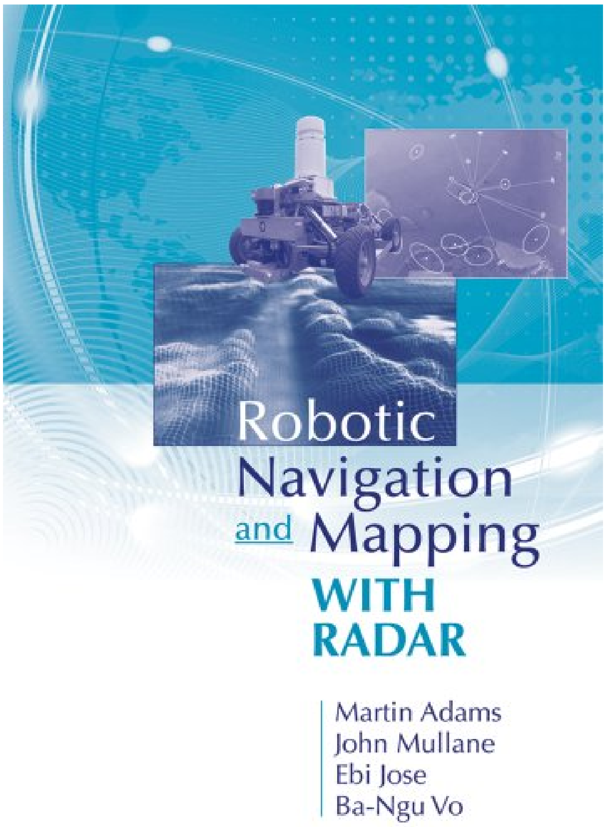
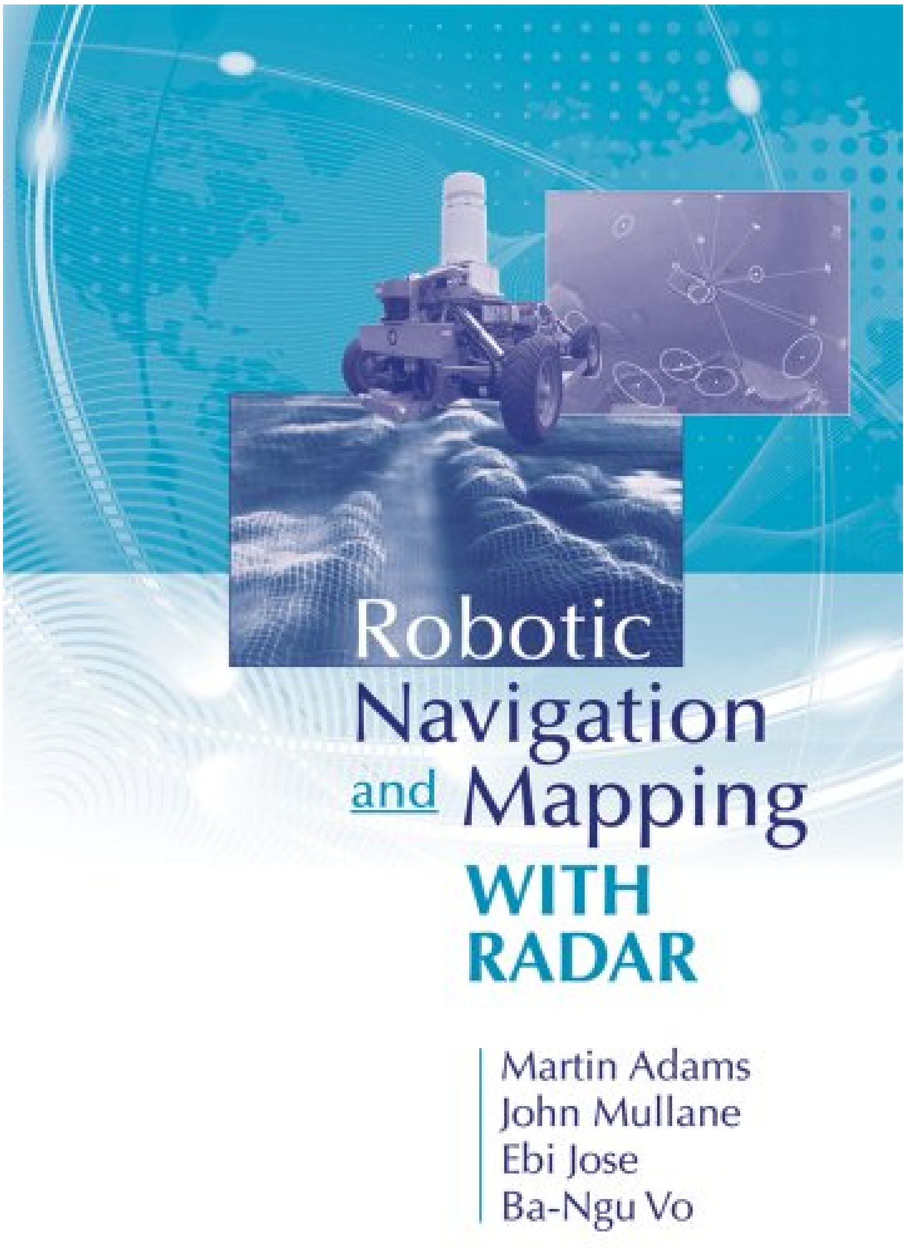
ROBOTIC NAVIGATION AND MAPPING WITH RADAR BY MARTIN ADAMS, EBI JOSE, BA-NGU VO




Robotic
Navigation
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WITH
RADAR
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About the Author
Martin Adams is professor in the Department of Electrical Engineering, Advanced Mining
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Ebi Jose is a senior research and development engineer at Singapore Technologies Electronics. He holds a Ph.D. in robotics from Nanyang Technological University.

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Focusing on autonomous robotic applications, this cutting-edge resource offers you a practical treatment of short-range radar processing for reliable object detection at the ground level. This unique book demonstrates probabilistic radar models and detection algorithms specifically for robotic land vehicles. It examines grid based robotic mapping with radar based on measurement likelihood estimation.
You find detailed coverage of simultaneous localization and Map Building (SLAM) – an area referred to as the "Holy Grail" of autonomous robotic research. The book derives an extended Kalman Filter SLAM algorithm which exploits the penetrating ability of radar. This algorithm allows for the observation of visually occluded objects, as well as the usual directly observed objects, which contributes to a robot's position and the map state update. Moreover, you discover how the Random Finite Set (RFS) provides a more appropriate approach for representing radar based maps than conventional frameworks.

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ROBO RADAR!!
By COSMIC TRAVELER
Are you an engineer or researcher who is interested in robotic applications that conduct navigation and mapping with radar? If you are, then this book is for you. Authors Martin Adams, The University of Chile and Ebi Jose and Singapore Technologies Electronics, have done an outstanding job of writing a book that presents solutions to the autonomous navigation and mapping of robotic vehicles based on the use of radar as the exteroceptive sensor.

The authors begin with a detailed discussion of the foundations that are laid out for understanding radar measurements and their related uncertainty, and extracting useful mapping information from them. Next, they describe the tools that will help you understand the principles of operation of the radars that are commonly used for the relatively short distance applications in robotics and their sources of error. Then, the authors provide the necessary background knowledge of detection theory, with principled methods for extracting landmark information from radar data, with quantifiable probabilities of detection and false alarms. They then give an overview of the state-of-the-art vector-based mapping and SLAM methods used in autonomous robotics research and highlight reasons why many of these methods are inappropriate for radar. Then, the authors address the issues of predicting the A-scope displays from MMW radars, which use the FMCW range estimation technique. They continue by focusing on the type of radar used in most robotic applications in the world--the FMCW device. Next, the authors introduce the concept that the variable to be estimated in occupancy grid mapping is not related to the spatial measurements, which are typically used in classical approaches. Then they apply the set formulation introduced earlier, to the feature-bsed map representation problem. The authors then show you how to use the FMCW radar for land-based SLAM experiments. Finally, they show you how to implement EKF, FastSLAM, and a version of the set; based SLAM termed Rao-Blackwellized PHD_SLAM, in a marine environment, with time of flight X-band radar.

This most excellent book lays out the foundations for understanding radar measurements and their related uncertainty; as well as, extracting useful mapping information from them. More importantly, this great book presents recent work that focuses on modeling the FMCW radar and increasing the probability of detection of targets based on scan integration methods.

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