



Autonomous Navigation with Radar

Martin Adams, The University of Chile and Ebi Jose, Singapore Technologies Electronics

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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.

Contents: Introduction. Part I: Detection and Mapping with Radar Mapping with Radar. Case Study: Short Range FMCW Radar. Detection Based on target Presence Probability. Robot Mapping Using Measurement Likelihoods. Part II: Radar Based Simultaneous Localization and Map Building Exploiting Radar s Multiple Line of Sight Capabilities. Part III: Map Representations for Radar Random Finite Set Based Mapping and Navigation. Coastal Feature Extraction with X-Band Marine Radar. Conclusions and Future Directions.



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