

Dedication

I want to dedicate this book to my wife and best friend of many years, Bonnie Alfriend. Without her support and encouragement, my research that led to my portion of this book would not have been possible. I also want to dedicate it to my two children, Kyle and Kim, and my four grandsons, Brandon, Travis, Tyler and Erik; they enrich my life.

Terry Alfriend

To my wife Sharada, for her ever-present love; to my parents Venkat Rao and Sita for their guidance; to Vivek and Meera for the motivation.

Srinivas Vadali

To my wife, Michal, for the road; to my parents, Arie and Sara, for the wisdom; to my sons, Eytam and Oshri-Yahel, for the meaning.

Pini Gurfil

To my wife Carolyn and daughter Amelia.

Jonathan How

To my family, friends, and colleagues – your support, advice, and patience made this work a pleasure.

Louis Breger

About the authors

Dr. Terry Alfried is currently the TEES Distinguished Research Chair Professor of Aerospace Engineering at Texas A&M University, where he was the Department Head for 1997–2001. He is also a Visiting Professor at the Naval Postgraduate School. He is a member of the NAE, a Fellow of the AAS and AIAA and a member of the International Academy of Astronautics. He has served as an Associate Editor and Editor-in-Chief of both the AAS Journal of the Astronautical Sciences and the AIAA Journal of Guidance, Control and Dynamics. He is also the recipient of the AAS Dirk Brouwer Award and the AIAA Mechanics and Control of Flight Award. He is a member of the Air University Board of Visitors. In 2007 he was selected to give the Von Karman lecture at the 2008 Israel Aerospace Sciences Conference. In 2005 he, along with six others from the US and Russia, received the AAAS International Scientific Cooperation Award. His BS and PhD are from Virginia Tech in Engineering Mechanics and he received his MS in Applied Mechanics from Stanford University. His research interests are in space surveillance, astrodynamics, satellite attitude dynamics and control and spacecraft design.

Dr. Srinivas R. Vadali has been a member of the faculty at Texas A&M University since 1986, where he is currently the Stewart & Stevenson-I Endowed Professor of Aerospace Engineering. He served on the faculty of Iowa State University from 1983 till 1985. He received his B.Sc. (Hons) in Mechanical Engineering from Sambalpur University, India, his M.E. (Distinction) in Aeronautical Engineering from the Indian Institute of Science, and his Ph.D. in Engineering Mechanics from Virginia Tech. He is a Fellow of the AAS and an AIAA Associate Fellow. He has served as an associate editor of the AIAA Journal of Guidance, Control, and Dynamics.

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Dr. Jonathan P. How is a Professor in the Department of Aeronautics and Astronautics at the Massachusetts Institute of Technology (tenured in 2003, promoted to Full Professor in 2007). He received a B.A.Sc. from the University of Toronto in 1987 and his S.M. and Ph.D. in Aeronautics and Astronautics from MIT in 1990 and 1993, respectively. He then studied for two years at MIT as a postdoctoral associate for the Middeck Active Control Experiment (MACE) that flew on-board the Space Shuttle Endeavour in March 1995. Prior to joining MIT in 2000, he was an Assistant Professor in the Department of Aeronautics and Astronautics at Stanford University. He has graduated a total of 28 Ph.D. students while at MIT and Stanford University on topics related to GPS navigation, multi-vehicle planning, and robust/hybrid control. He has published more than 200 articles in technical proceedings, and 59 papers in technical journals. Current research interests include: (1) Design and implementation of distributed robust planning algorithms to coordinate multiple autonomous vehicles in dynamic uncertain environments; (2) Spacecraft navigation, control, and autonomy, including GPS sensing for formation-flying vehicles; and (3) Adaptive flight control to enable autonomous agile flight and aerobatics. Professor How was the planning and control lead for the MIT DARPA Urban Challenge team that placed fourth in the recent race at Victorville, CA. He was the recipient of the 2002 Institute of Navigation Burka Award, a recipient of a Boeing Special Invention award in 2008, is the Raymond L. Bisplinghoff Fellow for MIT Aeronautics/Astronautics Department, an Associate Fellow of AIAA, and a senior member of IEEE.

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