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Flying insects are intelligent micromachines capable of exquisite maneuvers in unpredictable environments. Understanding these systems advances our knowledge of flight control, sensor suites, and unsteady aerodynamics, which is of crucial interest to engineers developing intelligent flying robots or micro air vehicles (MAVs). The insights we gain when synthesizing bioinspired systems can in turn benefit the fields of neurophysiology, ethology and zoology by providing real-life tests of the proposed models.

This book was written by biologists and engineers leading the research in this crossdisciplinary field. It examines all aspects of the mechanics, technology and intelligence of insects and insectoids. After introductory-level overviews of flight control in insects, dedicated chapters focus on the development of autonomous flying systems using biological principles to sense their surroundings and autonomously navigate. A significant part of the book is dedicated to the mechanics and control of flapping wings both in insects and artificial systems. Finally hybrid locomotion, energy harvesting and manufacturing of small flying robots are covered. A particular feature of the book is the depth on realization topics such as control engineering, electronics, mechanics, optics, robotics and manufacturing.

This book will be of interest to academic and industrial researchers engaged with theory and engineering in the domains of aerial robotics, artificial intelligence, and entomology.

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Editorial Review

Review

From the reviews:

“This book is a timely reminder of the beauty and agility of flying insects. ... Comprising of 21 Chapters, 50% written by engineers and 50% written by biologists in the field, this book brings together a collection of works rarely seen outside of a tight circle of like-minded individuals. ... The research compiled for this book represents the state-of-the-art in flying insect analysis, design and fabrication leading to an understanding of further developments in this area.” (Stephen D. Prior, The Aeronautical Journal, December, 2010)

About the Author

Dario Floreano is the director of the Laboratory of Intelligent Systems at EPFL Lausanne. He has authored books on evolutionary robotics and bio-inspired artificial intelligence, and he has given invited talks on the topic at major conferences in robotics, computational intelligence, artificial life and natural computing. Jean-Christophe Zufferey is a scientist at EPFL Lausanne, specializing on research into aerial, bio-inspired and evolutionary robotics. He founded a company that specializes in educational robotics and indoor flyers, and he has gliding and flying pilot licenses. Mandyam V. Srinivasan heads the Visual and Sensory Neuroscience team at the Queensland Brain Institute. He studies the behaviour of small animals, in particular insects, and seeks to elucidate principles of flight control and navigation, and to explore the limits of the cognitive capacities of small brains. Charlie Ellington is Professor of Animal Mechanics at the University of Cambridge, and his interests are in the fields of biomechanics and comparative physiology, with a particular fascination for animal flight.

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