

## Preface

The term Mechatronics is a portmanteau of “Mechanics” and “Electronics” (MECHANics elecTRONICS). Mechatronics is the blending of mechanical, electronic, and computer engineering into an integrated design. Mechatronics systems use microprocessors and software, as well as special-purpose electronics. The main objective of this interdisciplinary engineering field is the study of automata from an engineering perspective, thinking of the design of products and manufacturing processes.

Today, mechatronics has a significant and increasing impact on engineering; on the design, development, and operation of engineering systems. Mechatronics systems and products are well established in a large number of industries such as aircraft, automotive, computers, electronics, robotics/automation, computerized machine tools, communications, and biomedical.

The aim of this book is to present a collection of examples illustrating the state-of-the-art and research developments in mechatronics. Chapter 1 presents mechatronics systems based on CAD/CAM. Chapter 2 covers modeling and control of ionic polymer–metal composite (IPMC) actuators for mechatronics applications. Chapter 3 covers modeling and simulation of analog angular sensors for manufacturing purposes. Chapter 4 contains information on robust control of atomic force microscopy. Chapter 5 is dedicated to automated identification. Chapter 6 covers an active orthosis for gait rehabilitation. Finally, in Chapter 7, an intelligent assistive knee exoskeleton is presented.

This book can be used as a reference for a final undergraduate engineering course or as a comprehensive study on mechatronics at the postgraduate level. Also, this book can serve as a useful reference for academics, mechatronics, and automation researchers; mechanical, manufacturing, and computer engineers; and professionals in mechatronics, robotics, and related industries. The interest of this

book is evident for many important centers of the research, laboratories, and universities throughout the world. Therefore, it is hoped that this book will encourage and enthuse other research into this important field of engineering and technology.

The Editor acknowledges gratitude to ISTE-Wiley for this opportunity and for their professional support. Finally, I would like to thank all the chapter authors for their availability to work on this project.

J. Paulo Davim,  
University of Aveiro, Portugal,  
March 2011