Intelligent Wearable INTERFACES

Yangsheng Xu • Wen Jung Li • Ka Keung Lee

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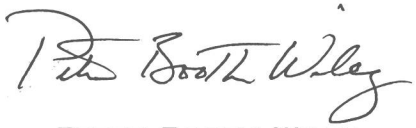

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To our families

PREFACE

When I was young, my favorite Chinese classic novel book was *Outlaws of the Marsh (Shui Hu Zhuan)*. The story was about how 108 heroes banded together on a marsh-girt mountain in what today is Shandong Province in China, became leaders of an outlaw army of thousands, and fought brave and resourceful battles against pompous, heartless tyrants. The most interesting hero, in my mind, is the "Flyer on Grass" (*Cao Shang Fei*). With his "light body skill" (*Qing Gong*), he could walk on tree leaves, grass, and on water as if flying. Years later, I really had a chance to witness such martial art being performed by well-trained *kung fu* masters. One observation I made then was that the *kung fu* master could perform vertical jumps of a height many times that of his human body with the help of the tree leaves. However, he simply could not perform the acrobatic task while the leaves were not available. Then I started to think, as scientists, would it be possible for us to design and build tools or interfaces that allow humans to accomplish extremely difficult tasks that were impossible with no such interfaces? Would it be more realistic and convenient to develop such interfaces, instead of making robots, for assisting human beings to accomplish tasks otherwise impossible?

This book is a collection of such efforts we made in the Chinese University of Hong Kong. We call this research area Intelligent Wearable Interfaces. Namely, we would like to develop interfaces with a certain level of intelligence that humans can wear for enhancing their capabilities in communications, actions, monitoring, and control.

It is the our hope that this book will be of interest to human–machine interface designers and engineers who study and develop interface systems designed for wearable applications. As mobile computing, sensing technology, and artificial intelligence become more advanced and their use more widespread, we feel that the subject area intelligent wearable interfaces will grow in importance.

I would like to acknowledge the support by grants from the Research Grant Council of the Hong Kong Special Administration Region (Project CUHK 3/98C, CUHK 4197/OOE, CUHK 4228/0IE, CUHK 43 17/02E, CUHK 4202/04E), and by the Hong Kong Innovation and Technology Fund under Grant ITS/140/01.

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and for their patience in teaching me, and from my wife Nancy and my son Peter for their moral support during the course of study.

YANGSHENG XU

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WEN J. LI

Our book reviewers have contributed their advice in making critical suggestions. We are also grateful for the effort of the editors and staff (George Telecki, Kellsee Chu, and Rachel Witmer, in particular) at Wiley-Interscience throughout the development of this book.

This book could not have happened without the support from our research and development team. The work on intelligent translation glasses presented in Chapter 3 is mainly performed by Mr. Xi Shi. Mr. Cedric K. H. Law's work laid the foundation of intelligent cap interface for wheelchair control, and the work is presented in Chapter 4. Mr. Bufu Huang, Miss Meng Chen, and Mr. Weizhong Ye developed the prototypes of the intelligent shoe, which form the contents in Chapter 5. We also wish to thank Mr. Xiaoning Meng and Mr. Huihuan Qian for their editorial assistance.

KA KEUNG LEE

The Chinese University of Hong Kong
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