

Preface

Wireless networking is gaining significant momentum in several areas of application due to advantages encompassing mobility, reconfigurability, easy commissioning, and spatio-temporal sensing. While initial focus of wireless networking has been on communication and sensing alone, a new field now has emerged that uses the same communication channel for enabling network control. This leads to several interesting issues and possibilities that are not typically encountered in traditional wire-based network control. This book will emphasize on and outline some of those issues from the standpoints of both theory and applications with focus on the core theme of control using wireless network and control of the information exchanged over the wireless network. Broadly, the topics covered in this book encompass the following:

- Robust stabilization of wireless network control systems in the presence of delays, packet drop out, fading
- State estimation over wireless network under random measurement delay
- Distributed optimization algorithm for addressing feedback delay and network-throughput tradeoff in wireless control-communication network
- Cyber-physical control over wireless sensor and actuator networks
- Estimation of a dynamical system over a wireless fading channel using Kalman filter
- Control over wireless multi-hop networks based on time-delay and finite spectrum assignment
- Position localization in wireless sensor networks
- Cross-layer optimized-based protocols for control over wireless sensor networks
- Rendezvous problem and consensus protocols for application in control of distributed mobile wireless networks
- Redeployment control of mobile sensors for enhancing wireless network quality and channel capacity
- Design of IEEE 802.15.4-based performance-metrics-optimizing distributed and adaptive algorithms and protocols for wireless control and monitoring applications
- Coordinated control over low-frequency-radio-based ad-hoc underwater wireless communication network

It is my sincere hope that, by providing an overview on important, interesting, and relevant issues related to wireless network-based control, this book, which represents the work of motivated researchers, will provide a great service to the community and create greater interest in this rapidly growing field.

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