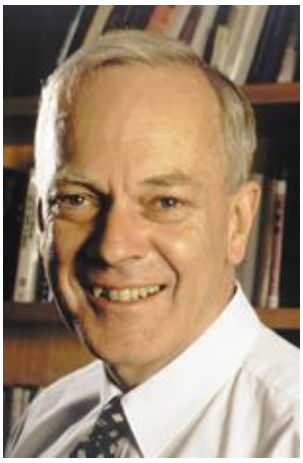
Preface

The Intellectual Legacy of Brian D.O. Anderson

Dedicated to Brian D.O. Anderson on the Occasion of His 70th Birthday



Remarkable individuals are deserving of special recognition and those who have been both influential through their own work and generous in their support and guidance of others are more praiseworthy still. Brian Anderson is one such individual, whose impact has been felt through the extent and heft of his signature exceptional works and, indeed, through the inspiration he has given to those he has worked with. The cheerful event of Brian's seventieth birthday provides a small subset of his collaborators the opportunity to mark this milestone for him with research papers dedicated to his legacy across a broad expanse of Systems Theory. Necessarily, these papers form a smattering of subjects from the realm of Brian's expansive technical influence. But the breadth of topics provides some indication of the scope of his impact. Their form, rigor, thoroughness and focus on fundamental problems is indicative of the tenor of Brian's own work. That his colleagues chose to present such works in these special issues is testament to their appreciation of these characteristics pervading Brian's publications. We have all learnt much from him and seek to expand and continue his heritage.

Brian Anderson's science has been at the mathematical end of Electrical Engineering and has moved from Circuit Theory, notably Circuit Synthesis methods based on state-space methods, to Optimal Control and Optimal Estimation, to System Identification and Adaptive Control, and onwards to Robust and Nonlinear Control. The common threads of this research have been rigor, the thoroughness of his studies, the fact that his research was constantly informed by the engineering applications, and perhaps most importantly the reliance on the universality of the mathematical fundamentals. Thus, for example, Spectral Factorization provided a link between circuit synthesis and optimal control via the Riccati equation, and optimal state estimation naturally led to the parameter estimation of System Identification, which in turn connected seamlessly to Adaptive Control.

Loosely, the papers in these two issues mirror this coverage in a fragmentary fashion. The papers by Morse and by Dehghani deal with the demands of adaptive control; the former to explicate through a simple example the intrinsic challenge of adaptive control, and the latter to characterize a set of requirements permitting safe adaptation. The papers by Bitmead and by Lanzon, Song, Patra and Petersen deal with robustness of systems, but through their explicit reliance on frequency response characterizations draw immediate ties backwards to circuit theory concepts of positive real functions, albeit now in a control context. This theme of control system robustness and its de-

pendence on system structure is further explored in the papers by Abel, Dasgupta and Kuhl and by Kanno, Hara and Anai, which is extended to design issues in both. System identification is explored in the papers by Gevers, Bombois, Hildebrand and Solari and by Deistler, Filler and Funovits, the former with respect to experiment design when the model is to be used for control and the latter to handling the structural issues associated with economic time series with many related measurements, both subjects of Brian's recent investigations. The two papers by Gough, Guta, James and Nurdin and by Kosut push beyond Brian's œuvre into the realm of Quantum Systems. The presence of these papers indicates how transcendent the ideas of optimal estimation can be in the evolution of new areas.

In addition to characterizing Brian Anderson's scientific footprint in a piecemeal and inadequate manner, the authors also provide a snapshot of some of Brian's influence as a leader and engenderer of leadership in others. This is at least as important a legacy as his scientific one, even if it is not truly separable, which after all is really the point.

The Guest Editors offer hearty congratulations to Brian Anderson on this occasion. They also take this opportunity to express their gratitude to the contributing authors and to the editorial staff of the journal for their good humor and assistance in this rewarding duty.

Guest Editors:

Prof. Robert R. Bitmead
Department of Mechanical & Aerospace Engineering
University of California, San Diego
9500 Gilman Drive
La Jolla, CA 92093-0411, USA

Prof. Soura Dasgupta
Department of Electrical & Computer Engineering
University of Iowa
4016 Seamens Center
Iowa City, IA 52242, USA

Prof. Michel Gevers
CESAME
Université Catholique de Louvain
Bâtiment EULER, 4 av. Georges Lemaitre
1348 Louvain-la-Neuve, Belgium

Prof. David J. Hill
School of Electrical & Information Engineering
University of Sydney, NSW 2006
Australia

Prof. Matthew R. James
Centre for Quantum Computation & Communication Technology
School of Engineering
Australian National University
Canberra, ACT 0200, Australia