

**SOFTWARE-ENABLED
CONTROL**

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SOFTWARE-ENABLED CONTROL

Information Technology
for Dynamical Systems

Edited by

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CONTENTS

CONTRIBUTORS	xiii
PREFACE	xix
I INTRODUCTION	1
1 THE SEC VISION	3
<i>Helen Gill and John Bay</i>	
1.1 The Legacy of Control Techniques /	3
1.2 The Legacy of Control Software /	4
1.3 A New Perspective on Software and Control /	4
1.4 Software Enabled Control Focus Areas /	5
1.5 The DARPA Software Enabled Control Program /	7
2 TRENDS AND TECHNOLOGIES FOR UNMANNED AERIAL VEHICLES	9
<i>Dale W. Van Cleave</i>	
2.1 Introduction /	9
2.2 UAV Background /	9
2.3 The Promise of UAVs /	14
2.4 Support for Development /	18

2.5	Difficulties /	19
2.6	Achieving Some Success /	21
2.7	UAV Development Considerations /	22
2.8	Looking Forward /	23
	References /	25

3	PREVIEWING THE SOFTWARE-ENABLED CONTROL RESEARCH PORTFOLIO	27
----------	---	-----------

Tariq Samad and Gary Balas

3.1	Introduction /	27
3.2	Part II: Software Architecture for Real-Time Control /	29
3.3	Part III: Online Modeling and Control /	31
3.4	Part IV: Hybrid Dynamical Systems /	33
3.5	Conclusion /	35

II	SOFTWARE ARCHITECTURES FOR REAL-TIME CONTROL	37
-----------	---	-----------

4	OPEN CONTROL PLATFORM: A SOFTWARE PLATFORM SUPPORTING ADVANCES IN UAV CONTROL TECHNOLOGY	39
----------	---	-----------

James L. Paunicka, Brian R. Mendel, and David E. Corman

4.1	Introduction /	40
4.2	OCP Goals and Background /	41
4.3	OCP Overview /	43
4.4	OCP Features /	44
4.5	Optimizations in Support of Real-Time Performance /	51
4.6	Current State of the OCP /	56
4.7	OCP Performance /	58
4.8	Future OCP Directions /	59
4.9	Summary /	60
	References /	61

5	A PROTOTYPE OPEN CONTROL PLATFORM FOR RECONFIGURABLE CONTROL SYSTEMS	63
----------	---	-----------

*L. Wills, S. Kannan, S. Sander, M. Guler, B. Heck,
J. V. R. Prasad, D. Schrage, and G. Vachtsevanos*

5.1	Introduction /	64
-----	----------------	----

5.2	Current Practice in Control System Configurations / 65	
5.3	Open-Control Platform Design / 69	
5.4	A Prototype Open Control Platform / 77	
5.5	Ongoing Work and Open Issues / 79	
	References / 82	
6	REAL-TIME ADAPTIVE RESOURCE MANAGEMENT FOR MULTIMODEL CONTROL	85
	<i>Mukul Agrawal, Darren Cofer, and Tariq Samad</i>	
6.1	Introduction / 86	
6.2	The Problem Space / 87	
6.3	Resource Optimization / 88	
6.4	Anytime Task Scheduling / 89	
6.5	UAV Route Optimization / 91	
6.6	Application of Active Multimodel Architecture / 95	
6.7	Multiresolution Optimization / 97	
6.8	Simulation Framework / 100	
6.9	Conclusion / 102	
	References / 103	
7	HETEROGENEOUS MODELING AND DESIGN OF CONTROL SYSTEMS	105
	<i>Xiaojun Liu, Jie Liu, Johan Eker, and Edward A. Lee</i>	
7.1	Introduction / 106	
7.2	Software Complexity in Control Systems / 107	
7.3	The Ptolemy II Model Structure / 109	
7.4	Concurrent Models of Computation for Control Systems / 112	
7.5	Modal Models / 114	
7.6	Application: Inverted Pendulum Controller / 116	
7.7	Conclusion / 119	
	References / 120	
8	EMBEDDED CONTROL SYSTEMS DEVELOPMENT WITH GIOTTO	123
	<i>Thomas A. Henzinger, Benjamin Horowitz, and Christoph Meyer Kirsch</i>	
8.1	Introduction / 124	
8.2	The Giotto Programming Language / 127	

8.3	A Distributed Hard Real-Time Control Problem / 131
8.4	A Giotto Program / 133
8.5	Semiautomatic Compilation with Annotated Giotto / 136
8.6	Summary and Related Work 139
	Appendix: A Giotto Program with Annotations / 141
	References / 144

III ONLINE MODELING AND CONTROL 147

9 ONLINE CONTROL CUSTOMIZATION VIA OPTIMIZATION-BASED CONTROL 149

Richard M. Murray, John Hauser, Ali Jadbabaie, Mark B. Milam, Nicolas Petit, William B. Dunbar, and Ryan Franz

9.1	Introduction / 150
9.2	Mathematical Preliminaries / 152
9.3	Optimization-Based Control / 155
9.4	Real-Time Trajectory Generation and Differential Flatness / 160
9.5	Implementation on the Caltech Ducted Fan / 163
9.6	Summary and Conclusion / 172
	References / 173

10 MODEL PREDICTIVE NEURAL CONTROL FOR AGGRESSIVE HELICOPTER MANEUVERS 175

Eric A. Wan, Alexander A. Bogdanov, Richard Kiebertz, Antonio Baptista, Magnus Carlsson, Yinglong Zhang, and Mike Zulauf

10.1	Introduction / 176
10.2	MPC Control / 177
10.3	MPNC / 180
10.4	Experimental Results / 189
10.5	Conclusion / 198
	References / 198

11 ACTIVE MODEL ESTIMATION FOR COMPLEX AUTONOMOUS SYSTEMS 201

Mark E. Campbell, Eelco Scholte, and Shelby Brunke

11.1	Introduction / 202
------	--------------------

11.2	Preliminaries: Joint and Dual Estimation /	204
11.3	Robust Nonlinear Stochastic Estimation /	205
11.4	Nonlinear Bounded Set Estimation /	211
11.5	Simulation Results: F-15-like Simulation /	217
11.6	Conclusion /	222
	References /	223
12	AN INTELLIGENT METHODOLOGY FOR REAL-TIME ADAPTIVE MODE TRANSITIONING AND LIMIT AVOIDANCE OF UNMANNED AERIAL VEHICLES	225
	<i>George Vachtsevanos, Freeman Rufus, J. V. R. Prasad, Ilkay Yavrucuk, Daniel Schrage, Bonnie Heck, and Linda Wills</i>	
12.1	Introduction /	226
12.2	Real-Time Adaptation of Mode Transition Controllers /	229
12.3	Hover to Forward Flight Example /	235
12.4	Limit Detection and Limit Avoidance /	238
12.5	Adaptive Limit Detection /	239
12.6	Automatic Limit Avoidance for UAVs /	247
12.7	Performance Assessment and Implementation Issues /	249
12.8	Conclusion /	249
	References /	250
13	IMPLEMENTATION OF ONLINE CONTROL CUSTOMIZATION WITHIN THE OPEN CONTROL PLATFORM	253
	<i>Raktim Bhattacharya and Gary J. Balas</i>	
13.1	Introduction /	254
13.2	What is the OCP? /	255
13.3	F-16 Aircraft Model /	256
13.4	Integration of Matlab with OCP /	257
13.5	Simulink to OCP Components /	266
13.6	Asynchronous Systems and Simulink Models /	268
13.7	Conclusion /	269
	References /	270

IV HYBRID DYNAMICAL SYSTEMS 271

14 HYBRID SYSTEMS: REVIEW AND RECENT PROGRESS 272

Panos J. Antsaklis and Xenofon D. Koutsoukos

- 14.1 Hybrid System Models / 274
- 14.2 Approaches to the Analysis and Design of Hybrid Systems / 277
- 14.3 Hybrid Automata / 278
- 14.4 Stability and Design of Hybrid Systems / 285
- 14.5 Supervisory Control of Hybrid Systems / 289
- 14.6 Conclusion / 295
- References / 295

15 A MANEUVER-BASED HYBRID CONTROL ARCHITECTURE FOR AUTONOMOUS VEHICLE MOTION PLANNING 299

Emilio Frazzoli, Munther A. Dahleh, and Eric Feron

- 15.1 Introduction / 300
- 15.2 System Dynamics / 302
- 15.3 Problem Formulation / 303
- 15.4 Maneuver Automaton / 305
- 15.5 Motion Planning in the Maneuver Space / 312
- 15.6 Example: Three-Degree-of-Freedom Helicopter / 315
- 15.7 Conclusion / 321
- References / 321

16 MULTIMODAL CONTROL OF CONSTRAINED NONLINEAR SYSTEMS 325

T. John Koo, George J. Pappas, and Shankar Sastry

- 16.1 Introduction / 325
- 16.2 Formulation of Multimodal Control Problem / 327
- 16.3 A Mode Switching Condition / 330
- 16.4 Mode Sequence Synthesis / 332
- 16.5 Multimodal Control of a Helicopter-Based UAV / 334
- 16.6 Hybrid and Embedded System Models / 339
- 16.7 Conclusion / 342
- References / 344

17	TOWARDS FAULT-ADAPTIVE CONTROL OF COMPLEX DYNAMICAL SYSTEMS	347
	<i>Gabor Karsai, Gautam Biswas, Sriram Narasimhan, Tal Pasternak, Sherif Abdelwahed, Tivadar Szemethy, Gabor Peceli, Gyula Simon, and Tamas Kovacsazy</i>	
17.1	Introduction / 348	
17.2	FACT Architecture / 349	
17.3	Modeling Hybrid Systems and Controllers / 351	
17.4	The Hybrid Observer / 355	
17.5	Approaches to Fault Detection and Isolation / 356	
17.6	Controller Selection / 364	
17.7	Conclusion and Future Work / 365	
	References / 366	
18	COMPUTATIONAL TOOLS FOR THE VERIFICATION OF HYBRID SYSTEMS	369
	<i>Claire J. Tomlin, Stephen P. Boyd, Ian Mitchell, Alexandre Bayen, Mikael Johansson, and Lin Xiao</i>	
18.1	Introduction / 370	
18.2	Hybrid System Model / 370	
18.3	Exact Reach Set Computation Using Level Sets / 372	
18.4	Overapproximations of Reachable Sets / 386	
18.5	Summary / 390	
	References / 390	
V	CONCLUSIONS	393
19	THE OUTLOOK FOR SOFTWARE-ENABLED CONTROL	395
	<i>Tariq Samad and Gary Balas</i>	
19.1	Next-Generation Computing Platforms for Real- Time Control / 396	
19.2	Increasing Autonomy and Performance / 397	
19.3	High-Confidence Control / 399	
19.4	Multivehicle Coordination and Cooperation / 400	
19.5	Integration of Planning and Control / 402	
19.6	Design and Deployment Tools / 403	
19.7	Final Words / 404	
	INDEX	407
	ABOUT THE EDITORS	419

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PREFACE

This edited volume is the product of a research initiative undertaken by the U.S. Defense Advanced Research Projects Agency (DARPA) and the U.S. Air Force Research Laboratory (AFRL) to exploit recent developments in software and computing technologies for applications to control systems in general, and autonomous aircraft in particular. Control, in this context, should not be interpreted in some narrow sense. Here it encompasses algorithms for inner-loop regulation as well as supervisory and mission-level optimization, modeling and estimation of vehicle dynamics and environmental influences, real-time computing platforms and software design tools, and much else besides.

The “Software Enabled Control” program is ongoing and the chapters in this volume do not document the culmination of the research. But with some years of effort completed by a number of multidisciplinary teams there is much to report: A number of innovations have resulted and been validated through some combination of theoretical analyses, simulation experiments, and laboratory demonstrations. In the near future, many of the developments detailed in this book are planned to be further evaluated through flight testing.

The SEC program was envisioned and initiated at DARPA by Dr. Helen Gill and Dr. David Tennenhouse and has subsequently benefited from the support and leadership provided by Dr. Shankar Sastry and Dr. John Bay. At the U.S. Air Force Research Laboratory, Ray Bortner, Bill Koenig, Reed Morgan, and Dale Van Cleave have been instrumental in overseeing the program and its constituent projects. Todd Carr, Jessica Greenhalgh,

Nikki Morris, and Carmen Whitson have ably fulfilled a variety of coordination and administration responsibilities. We speak for the SEC research community in expressing our gratitude to these individuals, and to several others who were involved in advisory capacities, for creating and supporting this practically important and intellectually exciting program.

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Minneapolis, Minnesota
October, 2002