45th CDC Workshops

WORKSHOP	ROOM	MORNING SESSION	AFTERNOON SESSION
New Developments in Point-Stabilization, Trajectory-Tracking, Path-Following, and Formation Control of Autonomous Vehicles	Manchester A	8:40-12:30	13:30 – 17:35
Model Predictive Control for Fast Nonlinear Systems: Existing Approaches, Challenges and Applications	Manchester B	8:40 – 12:30	13:45 – 17:00
High-Confidence Embedded Systems	Manchester C	9:15 – 12:00	13:30 – 17:00
Hybrid Systems Biology	Manchester D	8:30 – 12:00	14:00 – 17:30
Modeling, Optimization and Software in Air Traffic Management	Manchester E	8:30 – 12:00	13:00 – 17:30
Robust Hybrid Systems: Theory and Applications	Manchester F	8:30 – 12:00	13:15 – 17:30

45th CDC Workshop 1

New Developments in Point-Stabilization, Trajectory-Tracking, Path-Following, and Formation Control of Autonomous Vehicles

Manchester A

Organizers

Pedro Aguiar

Institute for Systems and Robotics, Instituto Superior technico, Portugal.

Antonio M. Pascoal

Institute for Systems and Robotics, Instituto Superior Technico, Portugal

João P. Hespanha

Center for Control, Dynamical Systems, and Computation, University of California, Santa Barbara, USA

Schedule

08:40 - 08:45 Opening

08:45 - 09:30 **P. Morin** (INRIA)Trajectory tracking for nonholonomic and underactuated vehicles by the transverse function approach

09:30 - 10:15 **N. McClamroch** (The University of Michigan) Nonlinear Control Strategies for Aircraft Path Following

10:15 - 10:30 Break

10:30 - 11:15 **J. Hauser** (University of Colorado) Nonlinear Regulation for Motorcycle Maneuvering

11:15 - 12:00 **K. Morgansen**, (University of Washington) Geometric Methods for Modeling and Control of Shape-Actuated Underwater Vehicles

12:00 - 12:30 **A. Pedro Aguiar** (Institute for Systems and Robotics,IST) New Developments in Point- Stabilization and Path-Following

12:30 - 01:30 Lunch break

01:30 - 02:15 **K. Pettersen**, (Norwegian University of Science and Technology) Path following and formation control of autonomous marine vehicles

02:15 - 03:00 **A. Pascoal** (Institute for Systems and Robotics, IST) Coordinated path- following of multiple underactuated autonomous vehicles with communication constraints

03:00 - 03:15 Break

03:15 - 04:00 **I. Kaminer** (Naval Postgraduate School) Coordinated Control of Multiple UAVs for Time-Critical Applications

04:00 - 04:45 **F. Bullo** (UC Santa Barbara) Motion coordination for multi-agent networks

04:45 - 05:30 **J. Hespanha** (UC Santa Barbara)Motion coordination of a large number of vehicles

05:30 - 05:35 Closing

45th CDC Workshop 2

Model Predictive Control for Fast Nonlinear Systems: Existing Approaches, Challenges and Applications

Manchester B

Organizer

Rold Findeisen

University of Stuttgart

Germany

Schedule

08:40-08:45	Welcome + Overview
08:45-09:30	Introduction and overview to NMPC for fast nonlinear systems
09:30-10:30	A review of fast efficient numerical solutions methods for NMPC
10:30-11:00	Coffee Break
11:00-11:45	Real-time NMPC and moving horizon state estimation using the continuation method and GMRES including mechatronic examples
11:45-12:30	A new real-time framework for NMPC of Continuous-Time systems with applications to chemical processes and manufacturing systems
12:30-13:45	Lunch Break
13:45-14:45	The parameterized approach for fast NMPC
14:45-15:30	Nonlinear MPC applied to vehicle dynamics control
15:30-16:00	Coffee Break
16:00-16:45	NMPC for fast automotive applications
16:45-17:00	Wrap up, summary and outlook

45th CDC Workshop 3

High-Confidence Embedded Systems

Manchester C

Organizers

Erik Klavins
University of Washington

Richard Murray
California Institute of Technology

Schedule

9:15-9:30	*Verification and Validation in Engineered Systems: Key Challenges* Eric Klavins
9:30-10:00	*Embedded Systems Verification and the DARPA Grand Challenge* Richard Murray
10:00-10:30	*Long Lived Systems via Model-Based Autonomy* Brian Williams
10:30-11:00	*Coffee Break*
11:00-11:30	*Hybrid Systems Verification* Claire Tomlin
11:30-12:00	*System Level Control of the KIVA Automated Material Handling Systems* Raffaello D'Andrea
12:00-1:30	*Lunch*
1:30-2:00	*Formal Methods for Embedded Systems* Paulo Tabuada
2:00-2:30	*Robustness for Embedded Systems* George Pappas
2:30-3:00	*Embedded Communication Protocols* Eric Klavins
3:00-3:30	*Coffee Break*
3:30-4:00	*Sum of Squares Optimization in the Analysis and Synthesis of Control Systems* Pablo Parrilo
4:00-4:30	*Robustness and Fragility in Engineered Systems* John Doyle
4:30-5:00	*Panel Discussion* **Group**

45th CDC Workshop 4

Hybrid Systems Biology

Manchester D

Organizers

Giancarlo Ferrari-Trecate

Dip. di Informatica e Sistemistica,

University of Pavia

John Lygeros

Automatic Control
Laboratory, ETH Zurich

Schedule

8:30 - 9:15	**J. Lygeros** (ETH, Zürich): "An overview of the use of hybrid models in biochemical networks"
9:15 - 10:00	**M. Chavez** (University of Stuttgart) **& E. Sontag** (Rutgers University): "Piecewise linear systems and asynchronous methods for robustness analysis of Boolean models of gene/protein networks"
10:00 - 10:45	**C. Tomlin** (U.C. Berkeley & Stanford University): "Using hybrid system analysis to help decode protein regulatory networks"
10:45 - 11:15	Break
11:15 - 12:00	**J. Hespanha** (U.C. Santa Barbara): "Stochastic hybrid models of biochemical processes"
12:00 - 14:00	Lunch
14:00 - 14:45	**Z. Lygerou** (University of Patras): "Stochastic hybrid models for DNA replication"
14:45 - 15:30	**G. Batt** (Boston University): "Validation of genetic regulatory network models"
15:30 - 16:00	Break
16:00 - 16:45	**G. Ferrari-Trecate** (University of Pavia): "Data-driven hybrid modeling of genetic regulatory networks"
16:45 - 17:30	**C. Belta** (Boston University): "Automatic tuning of synthetic gene networks"

45th CDC Workshop 5

Modeling, Optimization and Software in Air Traffic Management

Manchester E

Organizer

Banavar Sridhar

NASA Ames Research Center

Schedule

8:30 – 8:45	Introduction (**Banavar Sridhar**)
8:45 – 9:45	Overview (**Banavar Sridhar**)
9:45 – 10:45	Linear Models (30 mins **PK Menon**, 30 mins. **Alex Bayen**)
10:45 – 11:00	Coffee Break
11:00 – 12:00	Separation assurance (**Claire Tomlin**)
12:00 – 13:00	Lunch Break
13:00 – 14:00	FACET (**Kapil Sheth**)
14:00 – 14:45	CARAT# (**PK Menon**)
14:45 – 15:30	Berkeley Eulerian Toolbox (**Alex Bayen**)
15:30 – 15:45	Coffee Break
15:45 – 16:45	Panel Discussion (led by **Dave Knorr**)
16:45 –17:30	NASA Research Announcements (**Banavar Sridhar**)

45th CDC Workshop 6

Robust Hybrid Systems: Theory and Applications

Manchester F

Organizers

Andrew R. Teel
University of California
Santa Barbara, USA

Ricardo G. Sanfelice
University of California
Santa Barbara, USA

Schedule

8:30 - 10:20	Module 1: Modeling and Solutions to Hybrid Systems.
10:20 - 10:35	Coffee break.
10:35 - 12:00	Module 2: Engineering Motivation for the General Model.
12:00 - 1:15	Lunch break.
1:15 - 3:30	Module 3: Stability Analysis.
3:30 - 3:45	Coffee break.
3:45 - 5:30	Module 4: Hybrid Control.