International Symposium on

Flying Insects and Robots

Monte Verità, Ascona, Switzerland

August 12-17, 2007

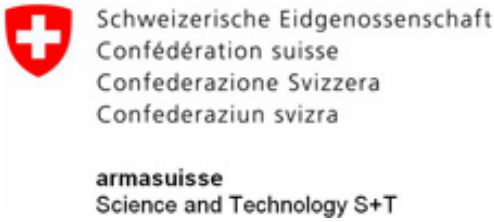
http://fir.epfl.ch

The goal of this symposium is to advance the understanding of the biology, technology, and intelligence of small flying animals and robots by promoting an open discussion at the intersection of neurophysiology, ethology, zoology, micro-engineering, low-Reynolds aerodynamics, and artificial intelligence. Flying insects are marvelous micro-machines that provide sources of inspiration for the realization of intelligent micro-robots capable of autonomous flight.

Organizers

Dario Floreano, Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland
Mandyam V. Srinivasan, The University of Queensland, Brisbane, Australia
Charlie Ellington, University of Cambridge, England
Jean-Christophe Zufferey, EPFL, Switzerland

Co-financed by



Symposium Program

Sunday, August 12

15:00 – 21:00	*--- Arrivals & registrations ---*
19:00 – 19:30	*--- Welcome drink ---*
19:30 – 21:00	*--- Dinner ---*

Monday, August 13 – Airframe & Aerodynamics

07:00 – 08:45	--- *Breakfast* ---
08:45 – 09:00	Welcome
09:00 – 09:45	Ron Fearing – Challenges for 100 Milligram Flapping Flight (p.33)
09:45 – 10:15	Roger Quinn – A Small, Biologically-Inspired Vehicle with Hybrid Air-Land Mobility (p.93)
10:15 – 10:35	Christian Bermes – Aerodynamic Optimization, Dynamic Modeling and Overall Prototype Design for the muFly Autonomous Micro-helicopter (p.9)
10:35 – 11:00	--- *Coffee break* ---
11:00 – 11:30	Kevin Jones – Bio-Inspired Design of Flapping-Wing Vehicles (p.57)
11:30 – 11:50	Floris van Breugel – A Flapping Hovering Micro Air Vehicle (p.15)
11:50 – 12:10	David Lentink – Novel Micro Aircraft Inspired by Insect Flight (p.67)
12:10 – 12:30	Daniel Watman – A System for Controlled Visualisation of Flapping Wings (p.125)
12:30 – 14:00	--- *Lunch* ---
14:00 – 14:20	Peter Schützner – High-speed Analysis of Wing and Body Motions in Flying Drosophila Using Fluorescent Markers (p.103)
14:20 – 14:40	William Dickson – Inertial and Aerodynamic Mechanisms for Passive Wing Rotation (p.27)
14:40 – 15:00	Alain Jaquier – Presentation of Armasuisse, Science and Technology Department
15:00 – 15:15	Claudia Lafranchi – A Short Overview of the History of Monte Verità
15:15 – 16:00	Poster spotlights:
	Samir Bouabdallah – MuFly Project: The First Steps (p.13)
	Umberto Scarfogliero – Bio-inspired Long-jumping and Gliding Robot for Locomotion in Unstructured Terrains (p.101)
	Mirko Kovac – Towards a Self-Deploying Microglider; Gliding Flight and Bioinspired Wing Folding Mechanism (p.61)
	Tobias Seidl – A Planetary Landing Device Inspired by Gliding Cockroaches (p.105)
	Thierry Jardin – Two-dimensional DNS Study of Asymmetric Motions in Hovering Flapping Flight (p.55)
	Laurent Jacquin – Steady Versus Unsteady Aerodynamics of Flapping Wings in Forward Flight: a 2D Study (p.53)
	Kei Senda – Stability of Flapping-of-Wings Flight of Butterfly (p.107)
	Philippe May – Static and Dynamical Biological Observations of Dragonfly's Wings (p.75)
16:00 – 19:30	Coffee // Poster session // Hands-on workshops // Demonstrations // Discussion groups
19:30 – 21:00	--- *Dinner* ---
21:00 – 22:30	Hands-on workshops

Tuesday, August 14 – Sensors & Actuators

07:00 – 09:00	--- *Breakfast* ---
09:00 – 09:45	Michael Dickinson – Sensory Control of Flight in Drosophila (p.25)
09:45 – 10:05	Hansjürgen Dahmen – Insect Inspired Odometry by Flow Measurements using Optical Mouse Chips (p.23)
10:05 – 10:35	Shih-Chii Liu – aVLSI Motion Detection Circuits (p.73)
10:35 – 11:00	--- *Coffee break* ---
11:00 – 11:30	Jacques Duparré – Artificial Compound Eye Imaging Systems by Micro-Optics Technology (p.29)
11:30 – 11:50	Christel-Loic Tisse – Hemispherical Depth Perception for Slow-Flyers using Coaxially Aligned Fisheye Cameras (p.123)
11:50 – 12:10	Jérôme Casas – Insect Flow Sensors as Templates for MEMS Design (p.19)
12:10 – 12:30	Daniel Osmont – Bio-Inspired Structures for the Actuation System of a Flapping Wing Micro Aerial Vehicle (p.85)
12:30 – 14:00	--- *Lunch* ---
14:00 – 14:30	Jean-Daniel Nicoud – Flying Paradise: Purgatory for Simulation, Hell for Engineers (p.81)
14:30 – 15:00	Robin Wootton – Springy Shells, Pliant Plates and Minimal Motors: Abstracting the Insect Thorax to Drive an MAV (p.129)
15:00 – 15:30	Poster spotlights:
	Andrew O. Philippides – Virtual Bee in a Virtual Tunnel: Modelling Angular Speed Detection (p.87)
	Rico Möckel – aVLSI Motion Detection Sensor for Estimation of Optical Flow (p.79)
	Lubin Kerhuel – Yaw Stabilization of an Aerial Robot: Visual Fixation and Ultrafast Vestibulo-ocular Reflex (p.59)
	Andreas Brückner – Compact Color Vision and Increased Sensitivity using Artificial Compound Eyes (p.17)
	Jan Bartussek – A Non-linear Oscillator Model for Control of Flapping Flight (p.7)
	Caroline Soyer – Silicon-based Biomimetic Flying Insect (p.111)
15:30 – 19:30	Coffee // Poster session // Hands-on workshops // Demonstrations // Discussion groups
19:30 – 21:00	--- *Dinner* ---
21:00 – 22:30	Hands-on workshops

Wednesday, August 15 – Control

07:00 – 09:00	*--- Breakfast ---*
09:00 – 09:45	Martin Egelhaaf – Active Vision: Strategies and Neuronal Mechanisms of Spatial Orientation Behaviour in Blowflies (p.31)
09:45 – 10:15	Steven Fry – Free-flight Control in Fruit Flies – A Systems Analysis Approach (p.39)
10:15 – 10:35	Nicola Rohrseitz – Visual Groundspeed Control in Free Flying Fruit Flies (p.99)
10:35 – 11:00	*--- Coffee break ---*
11:00 – 11:20	Jens Peter Lindemann – Cyberfly: Understanding Fly Flight Behaviour by Closed-loop Simulation (p.71)
11:20 – 11:40	Sergi Bermudez i Badia – The Origin and Role of Non-linearities in the Collision Avoidance System of the Locust (p.3)
11:40 – 12:00	James Humbert – Bio-Inspired Visuomotor Convergence (p.51)
12:00 – 12:30	Mandyam Srinivasan – Visual Guidance of Flight in Flying Insects: An Introductory Review and Summary of Recent Progress (p.113)
12:30 – 14:00	*--- Lunch ---*
14:00 – 14:20	Geoffrey Portelli – A Bee in the Corridor: Regulating Lateral OF by Side Control (p.91)
14:20 – 14:40	Andrew D. Straw – Control of Flight in a Simulated Drosophila Model: Successful Centering Depends on Actively Structuring Sensory Input (p.119)
14:40 – 15:15	Poster spotlights:
	Sawyer Fuller – Geometric Analysis of Hassenstein-Reichardt Elemetary Motion Detectors and Application to Control in a Fruit Fly Simulator and a Robot (p.41)
	Vasco Medici – Principles of Multisensory Flight Control in the Fruit Fly – a Reverse Engineering Approach (p.77)
	Chauncey Graetzel – Analysis of Low-level Motor Control in Tethered Flying Drosophila (p.45)
	Emily Baird – A Theory of Ground Height Control in the Honeybee (p.5)
	Antoine Beyeler – Optic-flow-based Altitude and Forward Speed Regulation using Stereotypical Lateral Movements (p.11)
	Hala Rifai – Attitude Stabilization of a Flapping-wing Micro Drone (p.97)
	Finlay Stewart – Modelling Visuomotor Control in Flying Drosophila (p.117)
15:15 – 18:00	Coffee // Poster session // Hands-on workshops // Demonstrations // Discussion groups
19:00 – 20:00	*--- Aperitivo in musica ---*
	Cecilia Baccolo (piano) & Julien Zufferey (violin)
20:00 – 22:30	*--- Social dinner ---*

Thursday, August 16 – Control (continued)

07:00 – 09:00	--- *Breakfast* ---
09:00 – 09:45	Simon Laughlin – Neuronal Efficiency: a Guiding Principle? (p.63)
09:45 – 10:05	Michael Reiser – An Algorithmic Basis for the Visually Mediated Control of Translatory Flight by Drosophila (p.95)
10:05 – 10:35	Fritz-Olaf Lehmann – The Limits of the Visuo-motor System in Flying Fruit Flies Drosophily (p.65)
10:35 – 11:00	--- *Coffee break* ---
11:00 – 11:20	Bart Baddeley – A Probabilistic Framework for the Study of Active Acquisition of Visual Information in Bees (p.1)
11:20 – 11:40	Jochen Zeil – Stealthy Tracking in Satellite Flies (p.131)
11:40 – 12:00	Yoon Sik Shim – A Simple Evolutionary Framework for Generating Robust Flight Maneuver in a Physically Simulated Flapping Wing Robot (p.109)
12:00 – 12:20	Dario Floreano – Evolutionary Swarms of Flying Robots (p.35)
12:20 – 14:00	--- *Lunch* ---
14:00 – 14:30	Poster spotlights:
	Rick Cory – On the Controllability of Agile Fixed-Wing Flight (p.21)
	Wolfgang Stuerzl – View-Reconstruction and Visual Homing in Ground-Nesting Wasps (p.121)
	Severin Leven – A Simple and Robust Fixed-Wing Platform for Outdoor Flying Robot Experiments (p.69)
	Sabine Hauert – Pheromone Based Swarming for Positionless MAVs (p.49)
	Allister Furey – Robust Control of Tethered Airfoils Using Evolutionary Robotics (p.43)
14:30 – 17:00	Coffee // Poster session // Hands-on workshops // Demonstrations // Discussion groups
17:00 – 19:30	Public event: demos brought by the participants and resulting from the hands-on workshops
19:30 – 21:00	--- *Dinner* ---

Friday, August 17 – Systems

07:00 – 09:00	--- *Breakfast* ---
09:00 – 09:45	Nicolas Franceschini – Insects as Pilots: Optic Flow Regulation for Vertical and Horizontal Guidance (p.37)
09:45 – 10:05	William Green – A Hybrid MAV and Biomimetic Sensing for Ingress and Egress of Urban Environments (p.47)
10:05 – 10:25	André Noth – Design of Solar Powered MAVs: Scaling Considerations and Realization (p.83)
10:25 – 10:50	--- *Coffee break* ---
10:50 – 11:10	Jean-Christophe Zufferey – Insect-inspired Autonomous Microflyer (p.133)
11:10 – 11:40	Barbara Webb – An Insect Brain Architecture for Robotics (p.127)
11:40 – 12:00	Wrap up
12:00 – 13:30	--- *Lunch* ---
13:30 – 17:40	Excursion:
	13:30 Departure by foot from Monte Verità
	14:00 Arrival at the port in Ascona, ticket hand-out and departure by boat
	14:30 Arrival at Brissago Islands, guided visit of the botanical garden
	15:45 Free time for coffee, shopping etc.
	16.35 Departure by boat from the Islands
	17:20 Arrival at Ascona port
	17:30 Return by mini-bus to Monte Verità
	17:40 Arrival at Monte Verità
17:40 – …	--- *Departures* ---
19:30 – 21:00	--- *Dinner (for those leaving on Saturday)* ---

Saturday, August 18

07:00 – 09:00	--- *Breakfast (for those leaving on Saturday)* ---
09:00 – 12:00	--- *Departures* ---