ZiF WORKSHOP

Moving the Senses: From Motion Sensing to Animals in Motion

Convenors:  Prof. Dr. Volker Dürr (Bielefeld, GER)
Prof. Dr. Martin Egelhaaf (Bielefeld, GER)
Dr. Roland Kern (Bielefeld, GER)
Dr. Jens Peter Lindemann (Bielefeld, GER)

30 September – 2 October 2015

IN COOPERATION WITH:

ABSTRACT

A key feature of intelligent adaptive behaviour in animals and man is the ability to move through the environment, and to interact with objects in a context-dependent, controlled manner. Controlling one’s own movement jointly requires the reliable perception of self-movement on the one hand, and acquisition of spatial information about the ambient environment on the other. Efficient and robust processing and interpretation of the perceived motion cues is necessary to eventually guide appropriate and often fast decision-making. While some behavioural tasks of animals and man may only require rapid control strategies for context-dependent adjustment of speed, direction and/or distance to environmental structures, others may involve complex navigation skills, requiring inference of the agent’s own location with respect to a currently invisible goal location. Though recent neuroscientific research has made substantial progress in understanding each of the various aspects mentioned above, it is the integration of the different aspects that poses a great challenge until today. In order to advance the concept of integrating the many aspects of motion perception in adaptive and versatile control of animal motion, the proposed workshop will bring together distinguished and internationally renowned researchers that have addressed different aspects using complementary methodological approaches in different model systems. The participants will have sufficient time for discussions to identify issues that need to be resolved in order to merge the different approaches into an integrated view of sensory control of animal motion behaviour. The workshop will be organised as a set of four topic sessions (i) detection and neural encoding of motion information, (ii) mechanisms of neural processing of motion information, (iii) sensory control of locomotion behaviour, and (iv) motion-strategies for navigation.
**WEDNESDAY, SEPTEMBER 30**

from 15:00 on Arrival – Coffee / Tea & Cake

16:00 Welcome Addresses

---

**Part I: Motion Sensing: Detection, Encoding and Processing of Motion**

16:15 Session 1: **Motion Detection, Encoding and Perception**
Chair: Marion Sillies (Göttingen, GER)

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker &amp; Location</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>16:15</td>
<td>Keynote: Alexander Borst (Martinsried, GER)</td>
<td><em>Neural circuits for elementary motion detection</em></td>
</tr>
<tr>
<td>17:10</td>
<td>Simon Laughlin (Cambridge, GBR)</td>
<td><em>An insect sensor moves neuroscience</em></td>
</tr>
<tr>
<td>17:40</td>
<td>Matti Weckström (Oulu, FIN)</td>
<td><em>Optomotor performance of the American cockroach in the dark and in the light</em></td>
</tr>
<tr>
<td>18:10</td>
<td>David O’Carroll (Lund, SWE)</td>
<td><em>Insect feature detection: an alternative pathway for studying the challenges and neural mechanisms of local motion analysis</em></td>
</tr>
<tr>
<td>18:40</td>
<td>Johannes Zanker (London, GBR)</td>
<td><em>A brief A to Z of motion illusions – from arts to zebras (and insects)</em></td>
</tr>
</tbody>
</table>

19:15 - Dinner at ZiF – (open end)

---

**THURSDAY, OCTOBER 1**

09:00 **Session 2: Motion Processing**
Chair: Jan Grewe (Tübingen, GER)

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker &amp; Location</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00</td>
<td>Keynote: Michael Dickinson (Pasadena, USA)</td>
<td><em>Visual motor behaviors in flying Drosophila: Peeking inside the black box</em></td>
</tr>
<tr>
<td>10:00</td>
<td>Fabrizio Gabbiani (Houston, USA)</td>
<td><em>Mechanisms of visual object segmentation in a looming-sensitive neuron</em></td>
</tr>
<tr>
<td>10:30</td>
<td>Holger Krapp (London, GBR)</td>
<td><em>Optic flow processing for reflex control</em></td>
</tr>
</tbody>
</table>

11:00 – 11:30 - Posters & Coffee / Tea -
11:30 – 11:50  Paloma Gonzalez-Bellido (Cambridge, GBR):  
*The time available for motion processing dictates the attack strategy of predatory flies*

12:00 – 12:20  Karin Nordström (Uppsala, SWE):  
*Hoverfly higher order visual mechanisms and behavioral discrimination tuned to natural spatial statistics*

---

12:30  - Lunch -

---

13:30  General Discussion "Motion Sensing: Uniting Detection, Encoding and Processing"  
Chair: Martin Egelhaaf (Bielefeld, GER)

---

14:30 – 15:00  - Coffee / Tea -

---

**Part II: Animals in Motion: Behavioural Relevance of Motion Sensing**

15:00  Session 3: *Sensory Control of Behaviour*  
Chair: Emily Baird (Lund, SWE)

---

15:00 – 15:20  Mandyam Srinivasan (Brisbane, AUS):  
*Vision and navigation in bees and birds, and applications to flying machines*

15:30 – 15:50  Roland Strauss (Mainz, GER):  
*Memories in Drosophila visual orientation*

16:00 – 16:20  Volker Dürr (Bielefeld, GER):  
*On the role of motion in insect touch*

---

16:30 – 17:30  - Posters & Coffee / Tea -

---

17:30 – 17:50  Mike Land (Brighton, GBR):  
*Multi-tasking and anticipation in visuo-motor behaviour*

18:00 – 18:20  Jutta Kretzberg (Oldenburg, GER):  
*Sensory control of local bend movement in the leech*

18:30 – 18:50  Hermann Wagner (Aachen, GER):  
*Out of Tübingen: From motion in flies to motion in owls*

---

19:00  Close

---

20:00  - Dinner – (see separate transport information in the conference folder)
FRIDAY, OCTOBER 2

09:00       Session 4a: Spatial Navigation
            Chair: Wolfgang Stürzl (München, GER)

09:00 – 09:45       Keynote: William Warren (Providence, USA):
                     From cognitive maps to cognitive graphs

10:00 – 10:20       Thomas Collett (Brighton, GBR):
                     Learning flights in bumblebees: acquiring and changing memories

10:30 – 11:00       - Coffee / Tea -

11:00 – 11:20       Natalie Hempel de Ibarra (Exeter, GBR):
                     Learning flights in bumblebees: memories of nest and feeder

11:30 – 11:50       Andrew Philippides (Brighton, GBR):
                     Visual navigation in ants: how active vision might shape necessary computation

12:00       - Lunch -

13:00       Session 4b: Spatial Navigation (continued)

13:00 – 13:20       Marc Ernst (Bielefeld, GER):
                     Multisensory integration in Human navigation

13:30 – 13:50       Hanspeter Mallot (Tübingen, GER):
                     What is a place? Towards a psychophysics of navigational space

14:00       - Coffee / Tea -

14:30       Closing Session
            Chair: N.N.

14:30 – 15:15       Position paper: Martin Egelhaaf (Bielefeld, GER)
                     Moving the eyes: From motion sensing to navigation in cluttered environments. Results and open questions

15:15 – 16:30       General Discussion: “Animals in Motion: Integration of Concepts”

17:00       Close

19:00       Dinner at a restaurant downtown (self-pay)