

Report EUROMECH 375
"Biology and Technology of Walking"
Technische Universität München
March 23 - 25, 1998

Colloquium and Science

The colloquium was opened at March 23, 1998, at 9.00 a.m. by a welcome from the local chairman Prof. Pfeiffer, who at the same time spoke as a representative of EUROMECH. He focussed his welcome speech more on technical aspects, whereas Prof. Cruse, University Bielefeld, addressed more his biological colleagues. The vice-president of the Technical University München, Prof. Heinzl, welcomed all participants in the name of the president and the University.

The scientific program focussed on

- design and control of walking machines,
- autonomous and intelligent walking,
- biological walking of bipeds quadrupeds and multilegged animals,
- control concepts in biological walking.

The 12 sessions with altogether 40 lectures were oriented within these topics. Remarkably, there have been no no-show-ups, all lectures were given.

Bringing together scientists from the technical and the biological side proved to be very fruitful and promising. Engineers try to find intelligent solutions with respect to optimal design, to optimal actuators and to optimal control and are nevertheless limited to the type of functionalities which are realized in technical components. Biology is overwhelming with regard to control,

sensors, actuators, but all the principles behind them are at least partly still cloudy.

Design and control of walking machines included many new and interesting aspects of all types of walking machines, also with special focus on the tube crawler developed in München with the money of the Koerber-prize. Machines with two, four, six legs, applications in forests (Finland) and in servicing Germany), some nice ideas with respect to bio-robotics and one-legged solutions were discussed. By the way, discussions always were vivacious, possibly due to the interdisciplinary effect.

From biology came findings in walking kinematics, in design (spider leg) and above all in biological control. The biological solutions with regard to kinematics, statics and dynamics obviously are technically realizeable, though it might not be reasonable in many cases. Anyway, biological solutions are better optimized, mechanical components are excellently utilized. On the control side most biological realization can only roughly be transferred to technology. The high degree of adaptivity, self-learning processes, even repairing processes cannot be achieved by engineering. Nevertheless, some principles and structures are helpful for technical design: multilayer control concepts, as little hierarchy as possible, finite state aspects, flexibility with respect to unexpected environment and the like.

From this the scientific outcome was excellent, and all participants pointed out to have a repetition in a couple of years.

Organisation

Altogether 65 participants from 14 countries took part in the EUROMECH 375 Colloquium. Among them were 17 members of EUROMECH, 4 students, 3 colleagues from the US and 8 participants from eastern countries. From these 21 participants have been financially supported.

The Technical University München provided the lecture hall, rooms and the accompanying infrastructure. The preparation, planning, organization of the colloquium were mostly done by the staff of Lehrstuhl B für Mechanik, TU München. With this regard, we thank very much indeed Mrs. Margrit Blöchl, Dipl.-Ing. Josef Steuer and Dipl.-Ing. Henning Bork.

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Hamburg. Without this support the colloquium could not have been carried through, and moreover, the 8 eastern colleagues would not have been supported.

The social program was small. A dinner in the city of Munich and a visit to the new faculty building nevertheless were highly appreciated by the participants and offered many opportunities for closer contacts.

Garching, July 20, 1998

Prof.Dr.rer.nat.Holk Cruse

Prof.Dr.-Ing.Friedrich Pfeiffer