

Institute of Thermomechanics CAS, v. v. i.

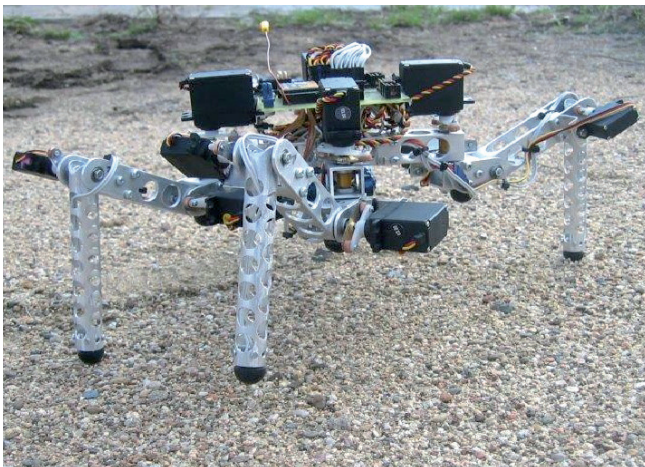
Department of Mechatronics

Technická 2, 616 69 Brno
URL: <http://www.it.cas.cz>
Phone: +420 541 142 891
Fax: +420 541 142 876
E-mail: fuis@fme.vutbr.cz



Overview

The basic job of the Department of Mechatronics staffers is the research and development of mechatronic components and subsystems for controlled dynamic systems, including biomechanical systems. Specifically, the research focuses on the field of robotics, biomechanics and biophysics of heart cells. The institute develops a localization system for the Advée presentation robot, which indicates the position of the robot in an internal environment. The field of biomechanics deals with current problems in clinical practice, namely improving of reliability of ceramic components in joint replacements, which is determined from Weibull's weakest link theory. Furthermore, the institute develops a completely new type of rehabilitation device that is capable of measuring the activity of the patient and on the basis thereof to control the arm brace actuator. The institute also works on computational modeling of the behavior of isolated myocardial cells in order to understand the biophysical actions responsible for the electrical and mechanical activity of heart cells, both in physiological and pathophysiological conditions. In collaboration with the Faculty of Science, Palacký University in Olomouc, it works on numeric modeling of human vocal tract in pronouncing of certain vowels.



Organizational structure

The Department of Mechatronics is a common institute of the Institute of Thermomechanics CAS, Praha 8, Dolejšková 5, and the Faculty of Mechanical Engineering of the Technical University in Brno. The department is part of the D3 section - Dynamics and Vibrations, which is incorporated into the laboratory for modeling of multiphysics problems.

Research plan, projects, grants

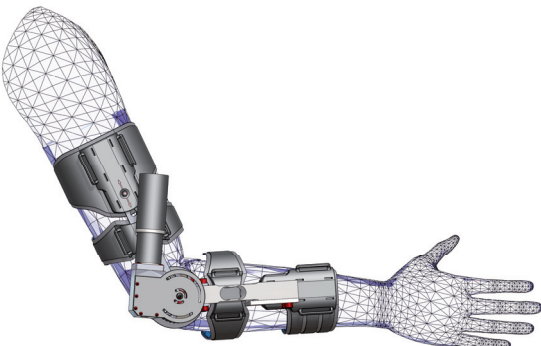
Research in the department is supported by the Research Plan of the Academy of Sciences titled *Complex dynamical systems in thermodynamics, fluid and solid mechanics*, which won by the Institute of Thermomechanics, and the research plan titled *Simulation modeling of mechatronic systems*, which was won by Faculty of Mechanical Engineering. Biomechanical and mechatronic projects of the Czech Grant Agency were also addressed in the institute, in which the department members were applicants or joint applicants.

International cooperation

Cooperation with major institutions – the Faculty of Mechatronics, TU in Warsaw, TU in Gliwice, TU in Izhevsk, Florida Int. University in USA and several technical universities in Germany. Every three years, the department staff are the main organizers of the international conference titled *Engineering Mechanics* and the *Mechatronics, robotics and biomechanics* conference, which is held alternately in the Czech Republic and in Poland. The institute is a co-publisher of the international scientific journal *Engineering Mechanics*.

Cooperation with universities

The branch staffers lecture at the Faculty of Mechanical Engineering in Brno and at the Medical Faculty of Masaryk University in Brno.



Active elbow brace



Advée presentation robot