“Walking machines and their biological inspirations”,  
by Prof. Teresa Zielinska, 15:00~15:45

The lecture will introduce advanced topics in the biological locomotion mechanisms and their utilization in the world of technology. The information needed for the development of simple walking machines will be provided. The following problems will be discussed: classification of on-land animals from the point of view of locomotion, basic features of animal gaits, biological fundamentals of motion control, biologically inspired walking machines, design solutions (leg structures), gait synthesis (gait diagrams, generation of leg-end trajectories), control systems (hardware and software), postural stabilization in animals and walking machines, force control in walking machines. The discussion of biologically inspired robots is planned with the aim of stimulating the ideas for novel solutions concerning robots with increased or dedicated (to specific environment) mobility.

“Formal Approach to Robot Programming”,  
by Prof. Cezary Zielinski, 16:05~16:50

The lecture will introduce different views of robot programming and on that basis it will explain the benefits of the formal approach to the development of robotics software. Subsequently the formal approach will be formulated. Robot programming methods strongly depend on the structures of the robot control systems, so this lecture also deals with structuring robot control systems. The control system is decomposed into distinct agents of which functionality and behavior will also be discussed in the lecture. The control system can be classified into two tiers - the upper tier is defined by the flow of information between the agents and the lower tier is defined by formal specification of each agent's behavior (influence on the environment, gathering sensor readings, production and consumption of the information for/from the other agents). The formal considerations will be illustrated by one of the examples of utilization of this approach. Moreover, the structure of the MRROC++ robot programming framework, which stems from this formalization, will be discussed.

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