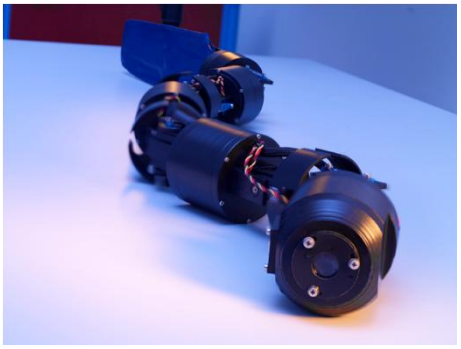
MEHEN

An Undulating Swimming Robot



Structure of snake-like robot "MEHEN"

"MEHEN" Version 2 during tests in open water

Environmental Monitoring Using Minimal Invasive Locomotion Strategies

The snake-like robot MEHEN is a prototype for an environmental monitoring platform which uses locomotion strategies based on undulating patterns.

Especially in sandy underwater environments, shallow water areas near the coast, or on missions that go through areas covered with reed, conventional screw propellers are not the ideal propulsion solution. Besides the noise these systems generate in contrast to the very silent undulating locomotion, these systems get easily stuck by reed or other free-floating biological material. That is why snake-like robot systems are the ideal platform for monitoring in areas which would be disturbed by screw-propelled systems, e.g. national parks.

The MEHEN robot consists of seven active joints, each actuated by Hitec High Torque Servos. The system is powered by three NiMH battery packs operating at 6V having an overall capacity of 16 Ah. This enables the system to have very long operational times. The AVR microcontroller in the head of the snake implements the control of the servo motors according to the programmed undulation mode. Velocity, direction, and amplitude of the movements are sent by an operator via a 35 MHz remote control.

The robot-snake can be equipped with further sensors for measuring the water quality which can be integrated into the artificial skin for monitoring purposes. In order to gain visual information of the operational environment of the MEHEN robot, the head of the system can be equipped with a camera.

Currently, an improved version of the snake-robot system is developed. The improvements focus on a more modular design that enables easier maintenance and adjustment of the size of the robot.

Each joint module will be a highly compact system, so that with more than 20 modules, a still reasonable length of under 200 cm will be achieved. Each of these modules will be self-sufficient with respect to energy and low-level control. Furthermore, all compressible parts (e.g. no air beneath the neoprene of the skin) will be removed from the system. This leads to a constant buoyancy over a higher depth range.

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