# Salamandra robotica II, the only robot able to swim, crawl and walk (w/ video)

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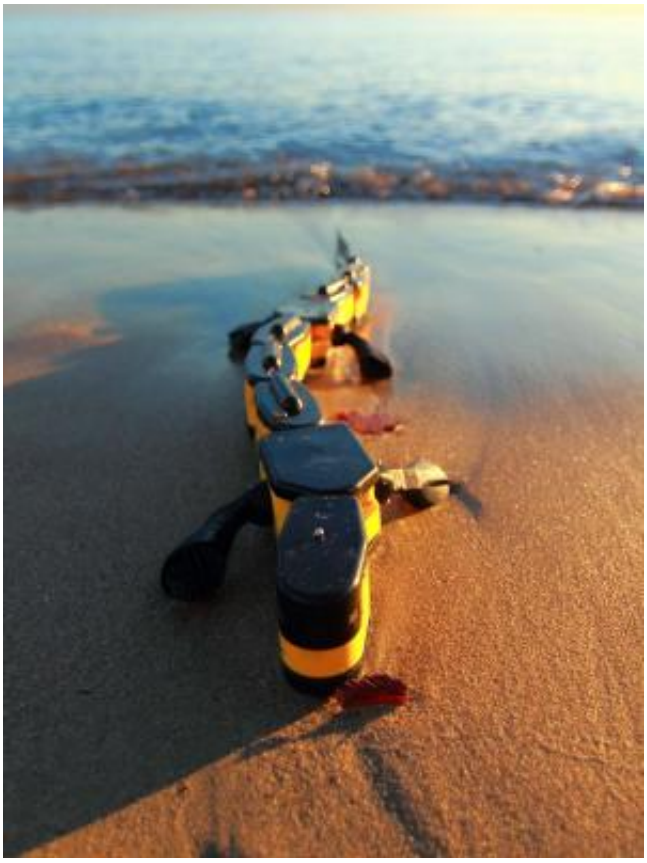

Credit: Kostas Karakasiliotis, Biorobotics Laboratory, EPFL

Salamandra robotica II is a last generation amphibious robot developed by the Biorobotics Laboratory at EPFL (École Polytechnique Fédérale de Lausanne). It is the guest of honor at the booth of Syrobo, the founder of Innorobo, which is the largest European exhibition of service robotics,

and takes place in Lyon from 19 to 21 March 2013. Among the many robots inspired by natural designs, the Salamandra robotica II is the only one able to swim, crawl and walk—all by combining robotics, evolution and neurobiology.

A salamander's locomotion is controlled by neural circuits distributed along its spinal cord. When it chooses whether to swim or walk, its decision depends on the intensity of the electrical signals sent from the brain to the spinal cord circuits. Salamandra robotica II is able to move by using a digital model of the salamander's medullary neural network. A remote computer triggers electrical signals that mimic those coming from a real salamander's brain. Finally, the signals control the walking and swimming modes, as well as the speed and direction of the robot's movement.

Credit: Kostas Karakasiliotis, Biorobotics Laboratory, EPFL

This amphibious robot was developed by Professor Auke Ijspeert's team at EPFL in collaboration with Jean-Marie Cabelguen from the University of Bordeaux /INSERM. Unsurprisingly, it has evolved much faster that the animal it was modeled upon. Salamandra robotica II is now much more robust, faster and more powerful than the 2007 prototype.

It is a valuable tool for better understanding of locomotion systems and their associated pathologies. In addition, it paves the way for a new generation of amphibious robots that are capable of changing their speed, direction or locomotion mode by the transmission of simple commands from a remote station. This feature could prove to be particularly useful in a range of fields, e.g. search and rescue operations.

**More information:** biorob.epfl.ch/salamandra

Research paper: Crespi, A.; Karakasiliotis, K.; Guignard, A.; Ijspeert, A. J., "Salamandra Robotica II: An Amphibious Robot to Study Salamander-Like Swimming and Walking Gaits," *Robotics, IEEE Transactions* on , vol.PP, no.99, pp.1,13, doi: 10.1109/TRO.2012.2234311 Available online at URL: ieeexplore.ieee.org/stamp/stam … 074&isnumber=4359257

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