

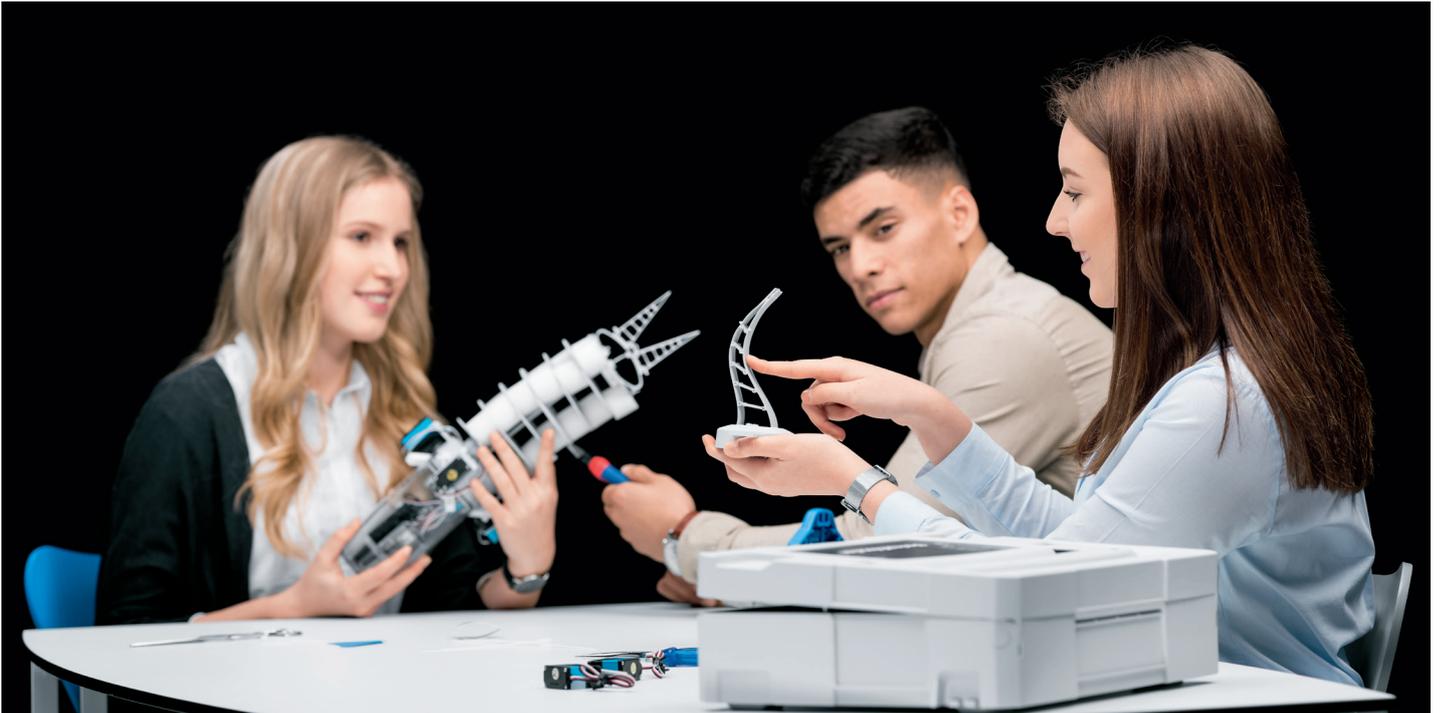
Bionics4Education

Educational kit with an innovative learning environment



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Bionics fills people of all ages with enthusiasm, it arouses curiosity and interest – and it facilitates learning. Festo, a learning enterprise and automation specialist, unites the field of bionics with education by means of a new, motivating didactical concept: Bionics4Education is oriented towards young people aged 14 to 18 and sets out to make creative worlds of technology readily accessible to them.

Thanks to this innovative modular system and the accompanying digital learning environment, theory rapidly becomes practice for young people: at school or at home, they learn to experiment with simple work materials, to think in a problem-oriented way and to work together as a team. These bionic methods enable the youngsters to set about performing their tasks effortlessly and in an uncomplicated way.

The didactical and learning strategies of the educational kit are based on the multifaceted learning effects provided by the Bionic Learning Network team. During the development phases of countless bionics projects, the experts have gained valuable experience over the course of many years, which can now be passed on in a targeted way through Bionics4Education.

An integral education concept

Bionics4Education unites analogue and digital learning in didactical form: it is both a practically oriented educational kit and an accompanying digital learning environment. The teaching material is designed for use in either school education or in vocational training. The modular system was developed by an interdisciplinary team of engineers, designers, computer scientists and biologists from the Bionic Learning Network – in cooperation with Festo Didactic, the world-leading service provider in the field of technical education. Students from external universities were also involved in this project.

An innovative educational kit

The learning kit contains the materials and components required for three different bionics projects: the Bionic Fish; the Bionic Chameleon Gripper; and the Bionic Elephant's Trunk, an adaptive gripper with Fin Ray Effect®. The basic equipment comprises servo motors, electronic components, and functional and connecting elements, so that the students can start building straight away. Their task is to combine the supplied components with materials and objects they select themselves, in an appropriate and creative way. Suitable elements are for example cable fasteners, small sandbags, cardboard and foam material. The young people learn to create highly individual, reusable model variants and to control them via an interface such as PC or smartphone.



The digital learning environment

The intelligent modular system is supplemented by a digital learning environment with information material, tutorial videos and animations: helpful hints and practical instructions for the bionically inspired animal robots, along with biological background information, can be called up at www.bionics4education.com. Insights into the working methods of the Bionic Learning Network team are also provided. The content relating to the bionic projects can be used in interdisciplinary applications. Depending on the learning objective, the emphasis can be placed on creativity, motivation, cooperation, innovation, lateral thinking or problem-solving skills – for the individual learner or in an interdisciplinary team.

Open-source knowledge

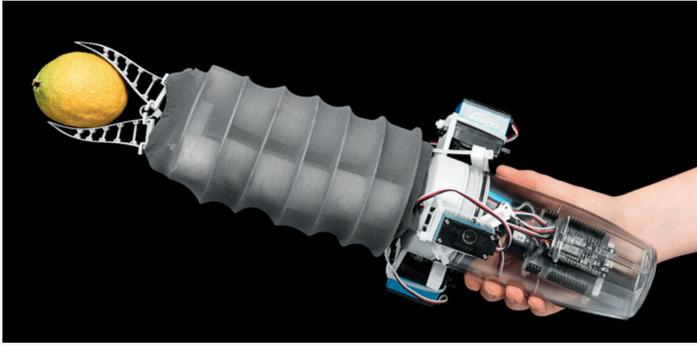
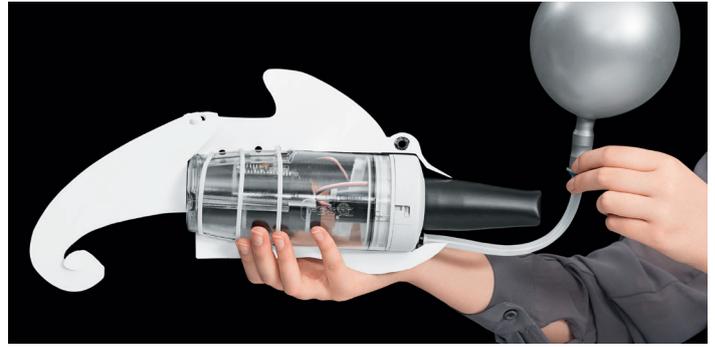
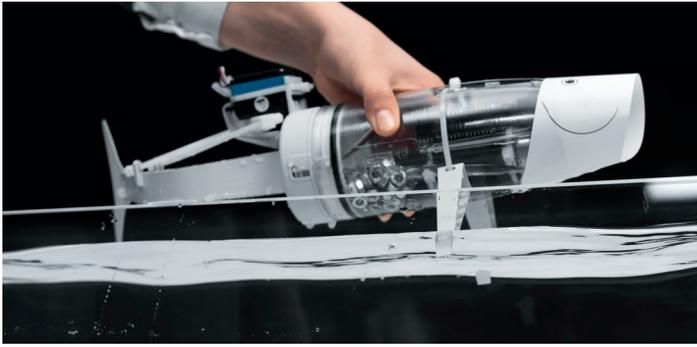
Bionics4Education is based on open educational resources: the entire didactic and information material can be accessed free of charge by lecturers, teachers, training instructors, students or other interested parties. Even the software codes and CAD drawings are provided for free download. Entire components can be generated on one's own 3D printer. School classes, working groups or individual researchers can either launch into bionics with the ready-made kit or organise everything from scratch themselves. Feedback for the further development of this didactic concept is welcomed at all times.

Enthusiasm for MINT subjects

By its very nature, bionic learning content is interdisciplinary. Bionics4Education can therefore be integrated into the subjects of biology, physics, computer science and technology in everyday school routine, at project days or at individual events. The integral educational concept also serves as orientation for the so-called MINT professions (mathematics, computer science, natural sciences, technology): interest and enthusiasm generated among school pupils at an early age make it easier for them to choose suitable training or study courses. Bionics4Education can also make a valuable contribution to existing MINT education programmes.

Commitment to education

Securing quality and sustainability for educational systems and enabling knowledge transfer is a declared corporate objective of Festo. This is the motivation for the support of numerous programmes – such as the vocational world championship “WorldSkills“, the “First® Lego® League” competition or the “Festo Education Fund”, which fosters tomorrow's technological generation. The corporate responsibility of the learning enterprise also extends to the action field of “Technical Education”: from school, through vocational academies to universities, young people are provided with qualification and training and are made fit for their professional routine in dynamic, complex working environments.



Project initiator

Dr. Wilfried Stoll
Managing Partner, Festo Holding GmbH

Project coordination

Dr. Elias Knubben
Dr. Reinhard Pittschellis
Simone Schmid

Project team

Festo AG & Co. KG:
Alwine Deutz, Nadine Kärcher, Madlen Loser, Timo Pohlner,
Lisa Raisch, Timo Schwarzer

Festo Didactic SE:
Christopher Giunco, Corinne Haley, Dr. Michael Hepp,
Sem Schade, Markus Schmid, Patti Yocius

State Academy of Fine Arts Stuttgart:
David Gebka, Robin Kuhnle

Pilot schools:
Bertha-Benz School, Sigmaringen
Dietrich Bonhoeffer Secondary School, Filderstadt
Comprehensive School, Neuffen

Technical equipment

Transparent corpus
Battery compartment
1 tail fin (large)
2 tail fins (small)
1 watertight servo motor
3 additional servo motors
Electronic board
Pin shield for microcontroller
Connecting elements
2 sealing rings
Cables for electronics
Silicone cap
Tubing

Festo AG & Co. KG

Ruiter Straße 82
73734 Esslingen
Germany
Telephone +49 711 347 0
Fax +49 711 347 2155
cc@festo.com

Festo Didactic SE

Rechbergstraße 3
73770 Denkendorf
Germany
Telephone +49 711 3467 0
Fax +49 711 347 54 88500
did@festo.com

www.festo.com/bionics
www.bionics4education.com
www.festo-didactic.com