

# Bionics4Education

## Bionic Flower

**FESTO**



### Highlights

- Getting to know the concepts of bionics
- Understanding and applying biological phenomena
- Simple control via mobile devices
- Gain first experiences with programming
- Using a microcontroller
- Getting girls interested in technical topics
- Playfully promoting creativity

### Bionic Flower

The Bionic Flower is a construction kit inspired by the plant world. It opens and closes its petals in response to external influences such as approach or light. These mechanisms of action are simulated with sensors and actuators and can be learned in a playful way by students in class. The bio-inspired design applies the principles from the plant world to technology by means of scientific and technical questions. This rounds off the teaching of curriculum topics in STEM education (Science, Technology, Engineering, and Maths).

### Natural role models

Festo Didactic took the mechanisms of action of water lilies and mimosa plants as a model for the development of the Bionic Flower. These plants have one thing in common: the opening and closing of their leaves due to external stimuli. The effects serve for reproduction and protection against natural enemies.

### Water lilies and mimosa plants

The single standing water lilies have a screw-like structure and open and close their leaves depending on the light intensity determined by the circadian rhythm. In mimosa, on the other hand, the leaves close one after the other in response to mechanical stimuli such as touch or vibration.

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## Bionic Flower

**Bionic Flower – Promotes teamwork**



### **Modular concept**

With the help of the construction kit, students can build a mechanical drive unit and learn how it can react to changes in the environment. The Bionic Flower has 15 paper petals and a mechanism that opens and closes them. It is controlled via WiFi hotspot using mobile devices. Working with the robot flower in teams is recommended.

### **Promoting creativity**

The students can design the petals using their own ideas. Some components can be printed using 3D printing technology or the students can make their own redesigns. This is intended to experiments foster.



Further information:  
→ [www.bionics4education.com](http://www.bionics4education.com)

### **Coding**

The basic functions of the robot flower can be used without programming. Furthermore, the microcontroller can be programmed with the graphic coding interface “Open Roberta”. Experienced students can also program their Bionic Flower in C++. The open source code is available on the internet.

### **Sensors and lighting effects**

The students can experiment with the light and proximity sensors and adapt the control system to various scenarios. With the built-in LEDs, the Bionic Flower can respond to chosen stimuli with selected colors.

### **Online learning environment**

The website has accompanying teaching material, and building instructions for the pupils are also available as a free online download. For additional activities, CAD and download files are available as well.

### **STEM reference**

The project-based approach of the Bionic Flower is an excellent way of conveying bionic thinking and working in the classroom. Topics such as control and regulation, sensor technology, stepper motors, evolutionary principles, light and color, sustainability, reproduction, and distribution can be addressed in class.

### **Promotion of competence**

Above all, working with the bionics learning construction kit promotes the following learner competencies: communication, collaboration, and creativity.

### **Cooperation partners**

The Bionic Flower construction kit was developed in cooperation with Sky Spirit and is a part of the coding environment Open Roberta, an initiative founded by Fraunhofer.

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