

# Programming Robots and the Internet of Things (IoT)

## by using Arduino and Raspberry Pi platforms in co-operation with University of California

The course "Programming Robots and the Internet of Things (IoT)" covers embedded systems, the Arduino environment, and the Raspberry Pi platform for building robots and devices that can control the physical world. The students will apply the skills they have learned by designing, building, and testing a microcontroller-based embedded system, producing a unique final hardware and software project.

The course is based on Massive Open Online Courses (MOOCs) from the University of California and is supervised by Prof. Dr. rer. nat. Dipl. Ing. Partsch. After a block event it's possible to join the course environmentally friendly, time-saving and comfortable from home.



<b>Course Title</b>	<b>Programming Robots and the Internet of Things (IoT)</b>
<b>Person in Charge</b>	Prof. Dr. Gerhard Partsch
<b>Type of Course</b>	Combined lecture, seminar and colloquium with the use of supervised Massive Open Online Courses. Environmentally friendly participation via web conferencing from home.
<b>Course Level</b>	Level 1 – introduction course
<b>Prerequisites</b>	No prerequisites required
<b>SWS / Lessons per week</b>	4
<b>Total Semester Hours</b>	60 hrs lecture / 90 hrs independent / 150 hrs total
<b>ECTS (Credits)</b>	5
<b>Course Assessment</b>	E-portfolio and final hardware and software project
<b>Course Language</b>	English
<b>Name of Instructor</b>	Prof. Dr. Gerhard Partsch
<b>Course Objectives</b>	<ul style="list-style-type: none"> <li>The course covers embedded systems, the Arduino environment, and the Raspberry Pi platform for building robots and devices that can control the physical world.</li> </ul>

	<ul style="list-style-type: none"> <li>• The students will apply the skills they have learned by designing, building, and testing a microcontroller-based embedded system, producing a unique final hardware and software project.</li> </ul>
<b>Course Content</b>	<ul style="list-style-type: none"> <li>• Introduction to the Internet of Things and Embedded Systems <ul style="list-style-type: none"> <li>○ What is the Internet of Things (IoT)?</li> <li>○ Embedded Systems</li> <li>○ Hardware and Software</li> <li>○ Networking and the Internet</li> </ul> </li> <li>• The Arduino Platform and C Programming <ul style="list-style-type: none"> <li>○ Arduino Environment</li> <li>○ C Programming</li> <li>○ Arduino Programs</li> <li>○ Debugging Embedded Software</li> </ul> </li> <li>• Interfacing with the Arduino <ul style="list-style-type: none"> <li>○ Basics of Hardware Design and Siring</li> <li>○ Sensors and Actuators</li> <li>○ Software Libraries</li> <li>○ Arduino Shields</li> </ul> </li> <li>• The Raspberry Pi Platform and Python Programming for the Raspberry Pi <ul style="list-style-type: none"> <li>○ Basic Functionality the Raspberry Pi B+ Board</li> <li>○ Basic of Linux and its use</li> <li>○ Basic of the Python Programming Language</li> <li>○ Communicate with Devices through the Pins of the Raspberry Pi</li> </ul> </li> <li>• Interfacing with the Raspberry Pi <ul style="list-style-type: none"> <li>○ Connect the Raspberry Pi to the Internet</li> <li>○ The Networking Socket Interface</li> <li>○ The use of public APIs and SDKs</li> <li>○ Interface with more complicated Sensors and Actuators</li> </ul> </li> </ul>
<b>Teaching Methods</b>	<p>Combined lecture, seminar and colloquium with the use of Massive Open Online Courses (MOOCs).</p> <p>Student-centered approach: Inquiry-based and cooperative Learning</p>
<b>Textbook / Online Course</b>	<p>Massive Open Online Courses (MOOC) from the University of California</p> <ul style="list-style-type: none"> <li>• Introduction to the Internet of Things and Embedded Systems</li> <li>• The Arduino Platform and C Programming</li> <li>• Interfacing with the Arduino</li> <li>• The Raspberry Pi Platform and Python Programming for the Raspberry Pi</li> <li>• Interfacing with the Raspberry Pi</li> </ul>
<b>Miscellaneous</b>	<ul style="list-style-type: none"> <li>• The lecture starts with a block event</li> <li>• After the block event at the beginning of the course it's possible to join the lectures environmentally friendly, time-saving and comfortable from everywhere (e.g. from home) via web conferencing offered for free by Deggendorf Institute of Technology</li> </ul>