GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|
| Subject name and code | Basics of Robotics - laboratory, PG_00047592 | | |
| Field of study | Automatic Control, Cybernetics and Robotics | | |
| Date of commencement of studies | October 2021 | Academic year of realisation of subject | 2023/2024 |
| Education level | first-cycle studies | Subject group | Obligatory subject group in the field of study<br>Subject group related to scientific research in the field of study |
| Mode of study | Full-time studies | Mode of delivery | at the university |
| Year of study | 3 | Language of instruction | Polish |
| Semester of study | 5 | ECTS credits | 1.0 |
| Learning profile | general academic profile | Assessment form | assessment |
| Conducting unit | Department of Automatic Control -> Faculty of Electronics, Telecommunications and Informatics | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr inż. Piotr Fiertek | |
| | Teachers | dr inż. Marek Tatara<br>dr inż. Piotr Fiertek | |

**Lesson types and methods of instruction**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 0.0 | 0.0 | 15.0 | 0.0 | 0.0 | 15 |

E-learning hours included: 0.0

**Learning activity and number of study hours**

| Learning activity | Participation in didactic classes included in study plan | Participation in consultation hours | Self-study | SUM |
|---|---|---|---|---|
| Number of study hours | 15 | 1.0 | 9.0 | 25 |

**Subject objectives**

Students do exercises related to issues described during the lecture: programming of industrial robots from Kawasaki (FA06E, RS03N) and Mitsubishi (RV-12SDL), getting acquainted with image processing algorithms.

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [K6_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study | The student got acquainted with the simulation environments and robot programming techniques of Kawasaki and Mitsubishi. The student learned to program robots from Kawasaki and Mitsubishi. The student learned the basic techniques of image processing. The student familiarized himself with the methodology of calibration of industrial robots. The student got acquainted with the method of robot communication with external devices. | [SU1] Assessment of task fulfilment |
| [K6_U05] can plan and conduct experiments related to the field of study, including computer simulations and measurements; interpret obtained results and draw conclusions | The student is able to conduct research and experiment in a simulation environment. He draws conclusions from the obtained results, repeats experiments until an acceptable result is obtained. | [SU1] Assessment of task fulfilment |

<table>
<tr><td>Subject contents</td><td>Laboratory exercises are a practical illustration of the issues presented in the lecture.<br><br>1. Learning of the simulation environment for Kawasaki robots - K-Roset.<br><br>2. Learning of the simulation environment for Mitsubishi robots - RT Toolbox2.<br><br>3. Implementation of a selected task in the field of image processing based on the Adaptive Vision Studio Lite program by Future Processing Sp. with o ...<br><br>4. Calibration of the robot at the station equipped with the Kawasaki RS03N robot. Drawing drawing by a robot.<br><br>5. Cooperation with the environment - at the station equipped with Kawasaki FA06E robot and the model of the conveyor line. The task of moving blocks.<br><br>6. Mitsubishi robot station - implementation of tasks related to moving the blocks.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>The Denavit-Hartenberg"s notation.</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Practical exercises, all tasks must be completed at a minimum of 50%</td><td>50.0%</td><td>100.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. Fiertek P., Tatara M.: Podstawy Robotyki - Laboratorium. Skrypt Politechniki Gdańskiej: 2017.<br><br>2. Craig J.: Wprowadzenie do robotyki. Mechanika i sterowanie. Wydawnictwo Naukowo-Techniczne. Warszawa: 1993.<br><br>3. Spong. M. W., Vidyasagar M.: Dynamika i sterowanie robotów. Wydawnictwa Naukowo-Techniczne. Warszawa: 1997.</td></tr>
<tr><td>Supplementary literature</td><td>1. Morecki A., Knapczyk. J.: Podstawy robotyki. Teoria i elementy manipulatorów i robotów. Wydawnictwa Naukowo-Techniczne. Warszawa: 1999.<br><br>2. Honczarenko J.: Roboty przemysłowe. Budowa i zastosowanie. Wydawnictwa Naukowo-Techniczne. Warszawa: 2004.</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:<br>Podstawy robotyki - laboratorium - 2023/24 - Moodle ID: 32655<br>https://enauczanie.pg.edu.pl/moodle/course/view.php?id=32655</td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>Programming a robot moving blocks in accordance with the task imposed by the teacher (changing the order of blocks, tower setting, etc.), drawing a drawing on a piece of paper using a robot equipped with a pen, developing an image processing algorithm to perform the task - eg reading the hour in the image showing the picture of the clock, searching for objects that meet the given criteria (size, shape, etc.).</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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