**Information on the team project “Tic-Tac-Toe”**

Rules for the project

The project part of the course will be done by a team of four students and must be finished within the specified timeframe.   
 The idea with the project work is to use the knowledge from various sources and labs to go beyond what has been done in labs, especially, adding a human-robot interface (HRI). The assignment is, in a small team project, to design, implement, and test a described below function on a modern industrial robotic manipulator (ABB IRB1600).

Learning goals

* *Independently plan and execute a smaller team project within a given timeframe using a project management model,*
* *Independently plan a motion and implement it on an industrial robot according to a given scenario,*
* *Give an oral and written presentation of the project results,*
* *Demonstrate the ability to work in projects, as well as reflect and evaluate the efforts in the project as well as possible social benefits and ethical aspects of the results.*

Grading

The project work results in grades either “Fail” or “Pass”. Grade “Pass” requires that the oral and written presentation, including the personal reflection report, are evaluated as performed with high quality. The project work includes planning, implementing, researching, and evaluating a project carried out on an industrial robot working in the assigned team.

***For the project, you need***

* To write a project plan for your team following the suggested template.
* To split the tasks, assign responsibilities, and work together in a project team and on solving the project task.
* To write a project report (one project report per team). All group members assess and approve the team report before submission.
* To make an oral PowerPoint (or similar) presentation of your team project, preferably with a live demonstration, approx. 30-50 minutes.
* To log your activities; basically, to write about what you work on in the project.   
  This is needed later for your reflection report.
* To write an individual reflection report. Attach your logbook to support your reflection report.
* The expected period of the project is from November 29 to December 10, 2021.
* All group members need to document their activity and constructively participate in the project.

Project Description

The **Tic-Tac-Toe project** consists of programming an industrial robot as a tool for playing a Tic-tac-toe (krestiki-noliki) game, see e.g. <https://en.wikipedia.org/wiki/Tic-tac-toe>, using marked cubes.

By assigning via a GUI a specific location on a 3 x 3 gaming board with a specified location, the user should be able to initiate a move in the game. Two users should be able to complete the game.

Requirements

1. The cubes marked with “X” are stacked on top of each other at a specified position.
2. The cubes marked with “O” are stacked on top of each other at a specified position.
3. By a command, initiated via a GUI, one cube with a specific mark, alternating between “X” and “O”, should be placed on the board at the chosen by the user location.
4. The solution must be implemented in ABB IRB1600 using available hardware and software.
5. The implemented GUI must have a start button.
6. The implemented GUI must have a stop button.
7. The implemented GUI must be able to identify and indicate when the game is finished either because all 9 places are filled or because one of the players has won the game.

The teachers must approve all deviations from the listed requirements, if any, preferably during the initialization phase.

Important dates for the project

|  |  |
| --- | --- |
| November 29 | Initial project discussion |
| November 30 | Submit project plan following the given template |
| December 3 | Project progress update. Project status meeting |
| December 6 | Project progress update. Project status meeting |
| December 9 | Oral presentation with a demonstration |
| December 10 | Submit the team project report |
| December 10 | Submit personal reflection reports by each team member |

Project Resources

* ABB IRB1600 industrial robot equipped with a gripper, cubes…
* ABB RobotStudio

Specific information regarding the hardware and software

Please check with Danil Dmitievich Kulminskiy ([kulminskiy.dd@talantiuspeh.ru](mailto:kulminskiy.dd@talantiuspeh.ru))