CS65K Robotics

Modelling, Planning and Control

Term Project

WELCOME TO CPSC 65K

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Motivations

A Term Project is the most essential part of this course. We set up the requirement for a term project in every one of our courses because of the following reasons:

- An 8-Week course needs to have a core project experience. 8-week courses go very fast. Therefore, it is impossible to post too many projects. A good term project will help students to put all the knowledge they learn from this course into use.
- Term projects are usually good showcases in job interview activities.
- The starting date for the term project is the first day of the class. The due date is the last day of the class. Students have enough time to work on it.

Project Ideas

SECTION 1

Project Ideas

Any project related to robots will be acceptable. Here are the candidate projects. You may pick anyone from the following (but not limited to).

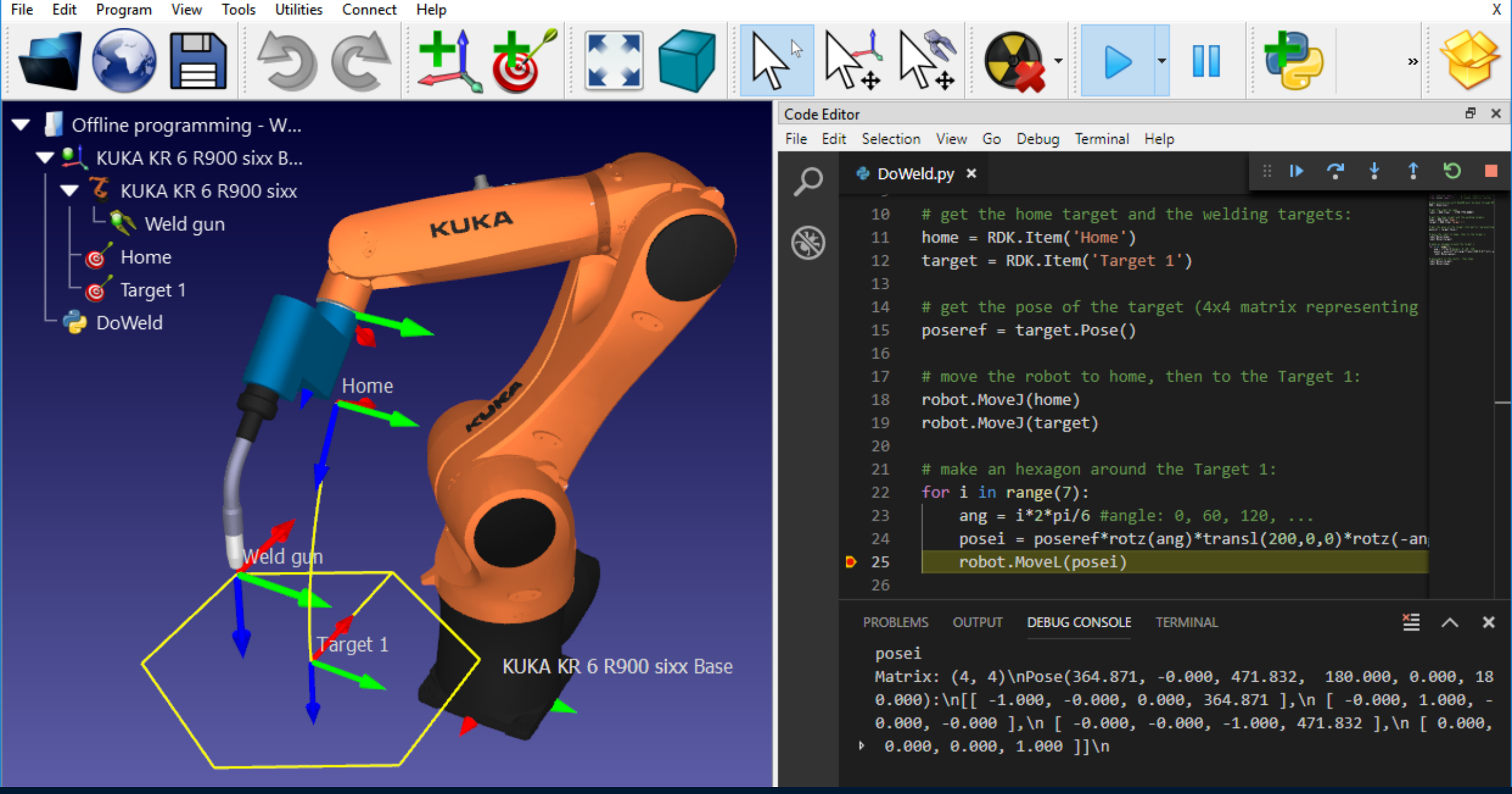
1. A complete mathematical/python model for a robot.
2. A robot assembly project.
3. A creative idea project for a brand-new application for robotics will be acceptable as a term project.

Robots built for other courses or other purposes won't be accepted.
Playing pre-assembled robots won't be accepted.

Python/Mathematical Modeling of a Robot System

A complete mathematical/python model for a robot:

1. Schematics for your robot design (Data flow and control flow)
2. Equations for each block design
3. Python code for each block design


File Edit Program View Tools Utilities Connect Help
Offline programming - W...
KUKA KR 6 R900 sixx B...
KUKA KR 6 R900 sixx
Weld gun
Home
Target 1
DoWeld
KUKA
Home
Weld gun
Target 1
KUKA KR 6 R900 sixx Base
Code Editor
File Edit Selection View Go Debug Terminal Help
DoWeld.py
10 # get the home target and the welding targets:
11 home = RDK.Item('Home')
12 target = RDK.Item('Target 1')
13
14 # get the pose of the target (4x4 matrix representing
15 poseref = target.Pose()
16
17 # move the robot to home, then to the Target 1:
18 robot.MoveJ(home)
19 robot.MoveJ(target)
20
21 # make an hexagon around the Target 1:
22 for i in range(7):
23 ang = i*2*pi/6 #angle: 0, 60, 120, ...
24 posei = poseref*rotz(ang)*transl(200,0,0)*rotz(-an
25 robot.MoveL(posei)
26
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
posei
Matrix: (4, 4)\nPose(364.871, -0.000, 471.832, 180.000, 0.000, 18
0.000):\n[[-1.000, -0.000, 0.000, 364.871],\n [-0.000, 1.000, -
0.000, -0.000],\n [-0.000, -0.000, -1.000, 471.832],\n [0.000,
0.000, 0.000, 1.000]]\n

Assembly and Manipulation of a Robot

If you are able to get the materials to build a new robot (you must budget the shipping time), you are welcome to assemble to build a new robot on your own:

1. document down each individual step
2. demonstrate your robot operations after the assembly. (videos preferred)
3. derive a control model if possible. provide code that controls your robot.

A creative Robot idea project

1. **Brand-new** idea. The project idea must be brand-new. No existing product or products. For example, the robot vacuum cleaner is not brand new. A grammar correcting pen is a brand-new idea.
2. What are the technologies needed to make this happen? These technologies may not exist. You need to provide a conceptual design and the technology needed in each design box.
3. Use python or other tools to provide visualization about this new robot idea.

No Pre-assembled Robots. No Reused Project.

- Robots built for other courses or other purposes won't be accepted.
- Playing around pre-assembled robots won't be accepted.

Schedule

SECTION 1

Schedule

1. The project can start at any time after the course starts.
2. In week 3, you will be required to submit a **100-point** worth project proposal.
3. In week 8, your project will be due, you will be required to submit all your deliverables before the end of the course. Late submission may not be graded. The final project submission is of **500-point** worth.

Project Proposal

Mauris enim leo, rhoncus sed, vestibulum sit amet, cursu

Date of Submission


23% YES
35%
39%

Deliverables

SECTION 1

Deliverables - Proposal

- In week 3, a proposal should be submitted. In the proposal, you should include the following items:
  1. project title and idea
  2. project deliverables
  3. tools
  4. materials
  5. schedule

Deliverables – Final Report

- In week 8, a final report should be submitted.
  1. A final report in .docx or .pdf
  2. A presentation made by the student in
     - a PowerPoint,
     - google slides or
     - a YouTube link.
  3. All the technical files (program files, design schematics, etc.)
- All materials can be grouped into a directory and be compressed to a .zip file. The YouTube video link is good enough. Do NOT send the whole video presentation file over to us.

Grading

SECTION 1

All Grading by the Grader is Final

- Grade is final and not negotiable.
- All grading on project are subjective. It is impossible to stay completely neutral and objective.
- We try to be fair but can never promise to be always accurate.
- Non-the-less, we will try our best to be in favor of students. As long as you demonstrate your efforts, you will get a good grade.

Grading Policy

The total base point for the term project is 500 pts. A maximum of 100 pts will be awarded to you as a bonus point.

The project will be judged based on the following factors:

1. Originality
2. Creativity
3. Completeness
4. Technical Difficulty
5. Presentation


SPECIAL
BONUS