Lab class: Autonomous robotics
General information

Institut für Neuroinformatik

March 7-11, 2022

1 Dates and places

Preliminary meeting March 03, 2022, 10:15–11:00am,
Zoom

Lab class March 7-11, 2022, whole day 10:00am–open end,
Zoom

Deadline for reports and source code March 25, 2022, midnight,
via the course e-learning page

2 Overview of the lab class

The lab class consists of seven problems that require programming a small robot to navigate different environments. You will be working with a simulated e-puck robot,[1] in the Webots simulation environment.[2] The programming language is python.[3]
You will work collaboratively in teams of two people. Your group is expected to work independently and solve problems on its own but there will be a tutor available to answer questions if you get stuck. You are also allowed and encouraged to talk amongst groups and discuss approaches on a conceptual level. Once you have solved a problem, you will present it to a tutor individually. The tutor will go through the code with you, ask questions along the way and check whether your program solves the problem. Both members of a team will have to understand the code and be ready to answer questions

[1] `http://www.e-puck.org`
[2] `https://cyberbotics.com/`
[3] `https://www.python.org/`

about it. If your program does not work or something is missing, you will have to correct it. Otherwise, if everything is okay, the tutor will approve your solution. Only solutions approved by a tutor are accepted for grading (see section 6).
You will write two short reports about your work in the lab course. The final grade is composed of your programming work and your reports. While the programming part of the lab course is teamwork, writing the report is *not* teamwork—we expect entirely individual documents with individual text from each participant. Plots and figures created in the practical part of the lab class may be shared, but further illustrations must be done individually. Please refer to our guidelines when preparing the reports. You will hand in both the reports and the source code of your programs. In case you record any videos of your robots in action, we would love to see those as well, but they are not required.

3 Attendance

Each day will start with a short Zoom briefing session, where each group schedules an individual Zoom meeting with a tutor. Attendance at each morning briefing and one individual meeting on all of the dates of the lab class are required to pass. If you cannot be present at any of those meetings, please contact Jan Tekülve *beforehand* to plan how you can regain the lost time. When you finish your work on a given day notify a tutor and report to them about your current progress.

4 Preparation

To complete all problems within the week, you need to be prepared for the practical work. There will not be enough time to start reading while you solve the problems. We have prepared background material for the lab class, which contains the theoretical background and in-depth explanation of the underlying problems. We expect you to read and understand the material before the lab class. Please plan enough time for going through this material. If you have questions about it, feel free to contact us even before the lab class starts. There will also be ample opportunity to ask questions about the background material during the lab class.

5 Working from home

For the duration of the lab class, you will work from home using Webots on your own computer.[4] We will provide an instant-messaging environment, *Element*,[5] where tutors and students can interact with each other. For communication with your partner, you are free to use any software, but we recommend Zoom because it will be used in the individual tutor meetings. Besides the mandatory meeting each day, you can schedule additional tutor meetings in *Element* during the regular work hours.
For each task, we provide a webots world-file and a template controller on the course homepage. Please refrain from changing the organizational structure of the template code. This ensures a traceable code evaluation later and avoids issues that may arise when you have to modify code that you reuse from previous experiments. Using the separate folders provided by the template allows you to preserve the code as it was when you solved the problem. Just copy the parts you want to reuse in the folder for the next experiment.

6 Grading and reports

The lab course is structured into two blocks. The first block is comprised of problems A, B, 1.1, 1.2, and 1.3, the second block is comprised of problems 2.1 and 2.2. For each of the two blocks, you will receive a grade between 0 and 100 percent. You have to pass both blocks with a grade of at least 50 percent to pass the lab course. The final grade of the lab course is determined by the mean grade of the two blocks.
The grade for each block is also composed of two parts: (1) solving the practical programming part of the lab course will earn you up to 30 percent (of that block); (2) writing a report about that work will earn you up to 70 percent (of that block).
Overall this means that you will have to solve all practical programming work and write two reports. The first focuses on your solution to problem 1.3 but should also cover the methods from 1.1 and 1.2 (odometry and sensors). The second report focuses on your solution to problem 2.2 but should also cover the methods from 2.1 (target approach).
If you cheat by copying program code from another group or previous years, or if you copy text from another participant (even from within your group), or other sources without proper citation, you will *fail the entire lab class.*

[4] See the *Software Information* document to set-up webots and python.

[5] `https://element.io/`, RUB students please visit `https://www.it-services.ruhr-uni-bochum.de/services/issi/element.html.de`

All reports have to be handed in two weeks after the lab class ends, at the latest: March 25, 2022, midnight. This is a hard deadline and will not be extended. If you hand in a report too late, you will receive zero points for that report.
For students of the study program 'Angewandte Informatik', we usually do not hand out certificates (German: Scheine) for the lab class. Instead, the grades will be forwarded to the examination office (German: Prüfungsamt) directly. For students of other programs, we can hand out certificates on demand. These can either have the achieved grade printed on them or simply state that you have passed the lab class. For the latter kind, you have to achieve at least 50 percent overall. Please inform us beforehand if you need a certificate and what kind you need.

7 Contact information

- General questions about the lab class:
  Jan Tekülve
  jan.tekuelve@ini.rub.de

- Responsible for the lab class:
  Prof. Dr. Gregor Schöner
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- Tutors
  - Sophie Aerdker (sophie.aerdker@ini.rub.de)
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  - Jan Tekülve (see above)