Lab class: Autonomous robotics
General information

Institut für Neuroinformatik

September 9, 2019

1 Dates and places

Preliminary meeting September 9, 2019, 10:15–11:00am,
seminar room (NB 3/57)

Lab class September 23-27, 2019, whole day 10:00am–open end,
robotics lab (NB 02/77)

Deadline for reports and source code October 13, 2019, midnight,
by email to Mathis Richter

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 an actual physical e-puck robot,[1] not a simulation. The programming language is Matlab.[2]
You will work collaboratively in teams of two people (three people if need be). 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 as a group. The tutor will go through the code with you, ask questions along the way and check whether your program solves the problem. All members of a team will have to understand the code and

[1] `http://www.e-puck.org`
[2] `http://mathworks.com/products/matlab/`

be ready to answer questions about it. If your program does not work or something is missing, you will have to correct it. Otherwise, if everything is okay, you get a signature.
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 team work, writing the report is *not* team work—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

Attendance at the preliminary meeting and all of the dates of the lab class is required to pass. If you cannot be present the entire time (e.g., because of an exam), please contact Mathis Richter *beforehand* to plan how you can regain the lost time.

4 Preparation

In order 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 Work in the robotics lab

For the duration of the lab class, you will receive a temporary account for a (Linux) computer in the robotics lab. We will assign computers and hand out user names and passwords on the first day of the lab class. You are required to use our computers for solving the robotic problems as they have been

prepared for you to work with the hardware. Working on your own computer is not an option; neither is using an alternative programming framework such as 'Freemat'.
To organize your code, please create a separate folder for each problem. This is to avoid issues that may arise when you have to modify code that you reuse from previous experiments. Using a separate folder for each 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.
Feel free to also use our computers to work on your reports. We have LaTeX environments set up on every computer that you may use with the template we provide for the report.
Please do not turn off the computers but only log out of your account to free the computer for other users.

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 in order 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 from previous years, or if you copy text from another participant (even from within your group), or from other sources without proper citation, you will *fail the entire lab class.*
All reports have to be handed in two weeks after the lab class ends, at the latest: October 13, 2019, 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:
  Mathis Richter
  mathis.richter@ini.rub.de, 0234 32 27976, NB 02/75

- Responsible for the lab class:
  Prof. Dr. Gregor Schöner
  gregor.schoener@ini.rub.de, 0234 32 27965, NB 3/31

- Tutors
  - Raul Grieben (raul.grieben@ini.rub.de, NB 02/74)
  - Cora Hummert (cora.hummert@ini.rub.de, NB 02/74)
  - Rachid Ramadan (rachid.ramadan@ini.rub.de, NB 02/76)
  - Mathis Richter (see above)
  - Jan Tekülve (jan.tekuelve@ini.rub.de, NB 02/71)