

Overview

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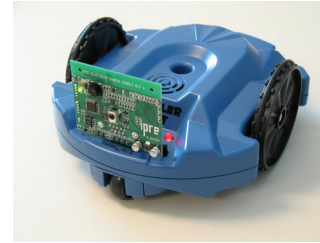
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Motivation

- Increasing demand for autonomous systems:
 - Surveillance, navigation, assistive technology.
- Main challenge:
 - Systems that *learn* and *adapt* in response to uncertain sensing and actuation.
- Probabilistic methods provide a strong mathematical basis.

The Stars...



Module Overview

- Model *uncertainty* in integrated systems.
- Understand the *mathematical basis* of probabilistic state estimation algorithms.
- Apply algorithms to challenging problems:
 - Perception and actuation.
 - Localization and mapping.
 - Learning and representation.
 - Control and coordination.

What it is... and is not...

- Collective learning and investigation.
- Individual initiative and teamwork: need to be able to work alone and with others.
- Analyze and criticize existing techniques.
- Ask questions, discuss and help each other learn.
- *Module organized similar to a seminar. During lectures and labs, behave like postgrad students.*

Content – Subject to change!

- Probabilistic state estimation.
- Gaussian and non-parametric filters.
- Robot motion and perception.
- Localization, mapping and SLAM.

Content – Discussed in two parts...

- **Part I:** material to work on projects.
 - Weeks 1-6.
 - All students.
 - Lectures four-five hours/week.
- **Part II:** understanding mathematical basis.
 - Weeks 7-11.
 - Students taking final exam.
 - Lectures two hours/week.

Timetable is (a bit) confusing!

- Lectures at two different times on Monday!
- Will try to keep Wednesday lecture (noon-1pm) as backup, but have some conference travel coming up.
- Please keep track of announcements on Canvas.
- Please be aware of lab timings. **Lab is a shared space!**

Action Items

- Lab/Project groups:
 - Self organize: choose wisely!
 - Exercises and final project.
 - Proper care for robots and equipment.
 - Understand responsibilities and expectations.
 - Look out for announcements.
- Preparation:
 - Follow up on announcements.
 - Do some background reading.
 - Come prepared to engage.

Other Action Items

- Make sure you have access to resources!
- Look at the website of book:
 - Probabilistic Robotics: Thrun, Burgard and Fox (2005)
<http://www.probablistic-robotics.org/>
 - Other resources made available as needed.
 - Problem solutions, errata, additional resources.
- Review probability, calculus, linear algebra:
 - Textbooks; Gilbert Strang's lectures on linear algebra.

How to do well in the course?

- Complete assignments (lab, reading, writing) on time.
- Read chapters and other material.
- Participate in discussions.