Welcome to
CSE P590a Robotics

Instructor Dieter Fox

Teaching Assistants
Zoey Chen
Aaron Walsman
Organization

- **Lectures**: Wed 6:00 – 9:00
  (will also put Zoom recordings on Canvas)

- **Office hours**
  - Dieter: Tue 12-1pm
  - Aaron: tbd
  - Zoey: tbd

- **Tasks**
  - 3 homeworks w/ Python programming, covering Gaussians, particle filters, RRT planning, and deep learning

- **Readings**: Papers and chapters from *Probabilistic Robotics*
Organization

- **Late policy**
  You are allowed to use 6 late days throughout the quarter. After this, assignments turned in late will incur a penalty of 10%, for each day. Please plan ahead and don't expect more.

- **Academic Honesty Policy**
  While we encourage students to discuss homeworks, each student must write up their own solution. It’s fine to use a source for generic algorithms (with attribution), but it is not allowed to copy solutions to the problems. Additionally, students may not post their code online. If we determine that a student posted their code online, they will get an automatic 50% reduction on the entire assignment (math + code) and if they copy code for the problems from another student or from online, they will get an automatic 0% for the entire assignment (and possibly reported to the college). While we can’t check for the use of tools such as ChatGPT, we strongly encourage you to develop your own solution and be honest about how you used such a tool in case you did.
High-level View on Robot Systems

World model

Sensor data

Control system

Actions
Industrial Robotics Today
Minerva  (CMU + Univ. Bonn, 1998)
DARPA Urban Challenge 2007
Self-Driving Cars
Robots in Warehouses (Kiva@Amazon)
Amazon Prime Air
Amazon Prime Air
DARPA Robotics Challenge 2015
Drilling Hole
Boston Dynamics BigDog (2008)
Boston Dynamics Spot
Boston Dynamics Atlas
Boston Dynamics Handle
Industrial Pick and Place
Service Robots
Humanoids and Teleop
Simulation
Current Trends / Topics

- Self-driving cars, sidewalk delivery robots, warehouses, manufacturing sites, ...
- Drones
- Industrial pick and place
- Manipulation of everyday objects
- Complex household tasks (cooking, cleaning, ...)

- Object detection, 3D mapping, tracking
- Cobots, human robot interaction
- Deep learning for perception, control, imitation learning, recognition, LLMs for planning
Goal of this course

• Provide an overview of fundamental problems / techniques in robotics

• Understanding of estimation and decision making in dynamical systems
  • Probabilistic modeling and filtering
  • Deterministic and non-deterministic planning
  • Learning for perception and modeling
# Course Outline

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