Industial Robotics

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Overview

- Introduction
- Course logistics
Applications of Advanced Robotics Technology
Applications
Applications
Applications
Industrial robots

- The largest commercial application of robotics technology
- Year of 2014
  - Estimated installation = 1.5 million units
  - 171,000 new installations
  - Estimated annual turnover of the robotics industry = $32 billion
Development over 50+ years

Unimate (GM factory, 1961)
Tesla Robots
Statistics of Worldwide Industrial Robot Use

- Estimated annual robot installations (2015)
  - 1000 units
Statistics of Worldwide Industrial Robot Use

- Number of multipurpose industrial robots (all types) per 10,000 employees in the automotive and in manufacturing industries (2014)
• Estimated worldwide annual shipments of industrial robots in main application areas (2014)
Statistics of Worldwide Industrial Robot Use

- Estimated worldwide annual shipments of industrial robots in main industrial branches
Latest Technology Industrial Robots
Industrial robots

- Foundations for robot motion planning and control
- The origin of robotics science
- Many unsolved problems
Scope of this course

• Theory
  • Robot geometry, transformation, forward and inverse kinematics

• Practice
  • Robot Studio – program ABB robot for your project tasks
  • Selected topics
    • Typical Industrial Robot Applications
    • Safe Human–Robot Collaboration
    • Robot Teaching and Programming
Connection to Other RBE Courses

- RBE 550: Motion Planning
- RBE 4815: Industrial Robotics
- RBE 501: Robot Dynamics
- RBE 500: Foundation of Robotics
- RBE 502: Robot Control
Course logistics
Primary Instructor

- Jane Li (zli11@wpi.edu)
- Research website
- Office hour
  - 85 Prescott 223C
  - 2:00-3:00pm, Wednesday & Friday
- Responsibility
  - Cover most of the lectures (except for Robot Studio)
  - Co-advice course projects
Instructor

- Craig Putnam (cbputnam@wpi.edu)
- Research website
  - https://www.wpi.edu/people/faculty/cbputnam
- Office hour
  - 85 Prescott 208
  - TBD
- Responsibility
  - Cover the tutorial for Robot Studio
  - Advice course projects
Our TA

• TA – Office Hours: by appointment
  • Adam Gatehouse (ajgatehouse@wpi.edu) – sitting in the lectures
  • Ryan Mocadlo (mocad@wpi.edu)

• Responsibility
  • Grading course work
  • Manage labs
  • Technical assistants for your final course projects

• Friday – Introduction to labs (hosted by TA)
Course information on Canvas

• Course syllabus

• Course schedule (link)

• Course relevant discussion
Reference Books
Grading

- Homework 10%
- In-class quiz 5%
- Exams 20%
- Project 40%
  - Progress reports (5%); Final report (15%); Final presentation (15%);
  - Peer evaluations (2.5%); Presentation evaluations (2.5%)
- Laboratory Participation and Completion 10%
- Laboratory Reports 15%
In-class quiz

• Quiz every lecture!
  • The beginning of the course

• Study for quiz
  • Review previous lecture slides
  • Do assignments

• Make sure your hand-writing is readable
In-class participation

• Participation matters!

• Attending lectures
  • Count your attendance by quiz submission

• Ask and answer valuable questions in class and on Canvas
  • TA will take notes in class and count Q&A on piazza

• Help each other in projects
  • Teammates will evaluate each other)
Important Dates

- Mar 19: Teams formed
- Mar 26: Project Proposal Due
- Apr 2: Progress Report #1 Due
- Apr 9: Exam #1
- Apr 16: Progress Report #2 Due
- Apr 23: Exam #2
- Apr 24, 26, 27: Final Presentations
- May 1: Final Report Due (@ noon)
Course work submission

- Policies applied to all the submission for this course

- Submission on Canvas
  - File name = use [LastName]_[FirstName]_[submission content]
  - Multi-file submission: include all document in a Single zip file
  - Single-file submission: submit file directly
  - Team work - submit only one copy, include the names of all teammates.
Course work submission

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Lab and course project team

• Please form teams of 3 – 5 class members before **March 19**

• Teams will be used for the lab and course project

• All team members should be present for each lab
  • Consider this when booking the lab time slots for your team
Introduction to lab and course projects

• The proposal for the project is due on March 26.

• Lecture on Mar 16 (this Friday)
  • Introduction to labs and course projects
  • Guideline for choosing your final project topics
  • Orientation to lab resources
Important!

- Submitted before **noon** of the due date.
  - Do not count late submission

- Check **Course Schedule** frequently for most up-to-date submission date

- Check **your grade** frequently. Before the end of the course, you can
  - Attend **office hour** if you need help
  - Ask for **extra work** if you want to make up for your low grade

- Keep in touch with instructor, TA, project team
  - Make sure you teammates know what you are working, because **they will evaluate you in the end**.
Assignment 1 – Choose your teammates

- Network with your classmates
- Understand their project experience and skill set
- Form your team
- Discuss potential course project topics
End