ELEG4701

Intelligent Interactive Robot Practice

Introduction

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Today's Agenda

- Course Overview
- Introduction to Linux

Prerequisite

- CSCI 1120: Introduction to Computing Using C++

香港中文大學計算機科學與工程學系
Department of Computer Science and Engineering
The Chinese University of Hong Kong

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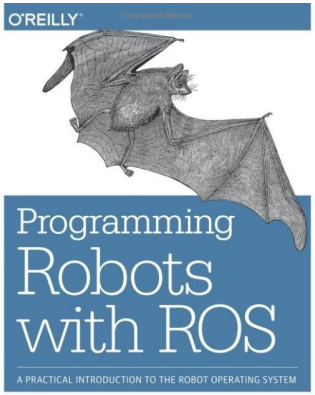
CSCI1120 Introduction to Computing Using C++

Course code	CSCI1120
Course title	Introduction to Computing Using C++ 計算導論(C++語言)
Course description	This course introduces the computer-oriented problem-solving methods and algorithm development; object oriented programming concepts; concepts of abstract data types; simple data structures; illustrative applications. The C++ programming language will be used. 本科介紹面向計算機的問題求解方法及算法開發；面向對象程序設計概念；抽象數據類型概念；簡單數據結構；應用示例。本科使用高級程序設計語言"C++"講授。
Unit(s)	3
Course level	Undergraduate
Semester	1
Grading basis	Graded
Grade Descriptors	A/A-: EXCELLENT – exceptionally good performance and far exceeding expectation in all or most of the course learning outcomes; demonstration of superior understanding of the subject matter, the ability to analyze problems and apply extensive

Robotic Perception and Intelligence

ELEG 4701 Intelligent Interactive Robot Practice (3 units)

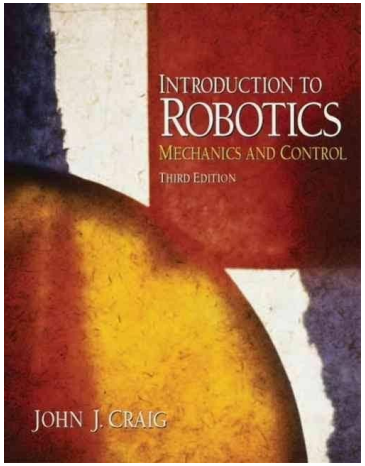
- Hands-on practical course for robotics perception and intelligence

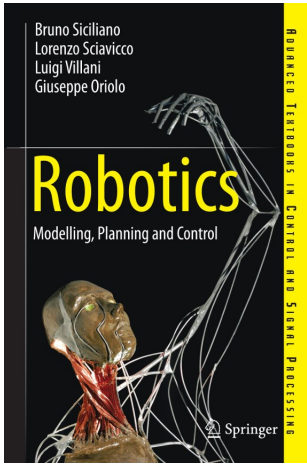


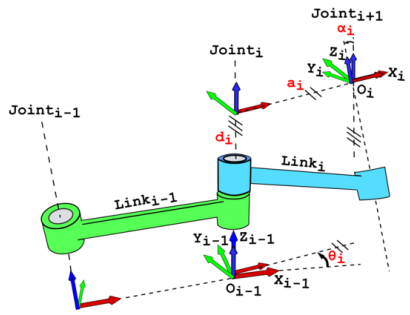
ROS GAZEBO

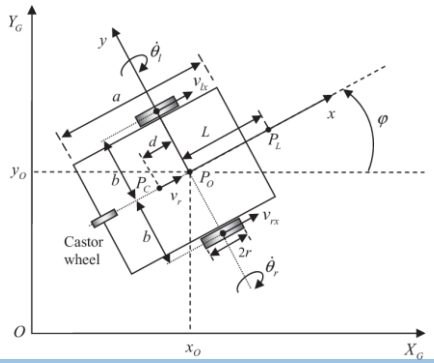
ELEG 3103: Robotic Perception and Intelligence (3 units) (Prof Hongliang Ren)

- Theoretical course for robotics: modelling, control, and perception

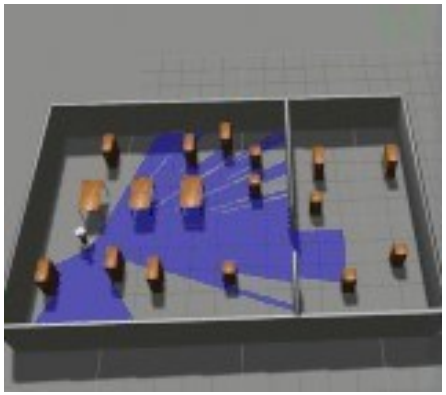


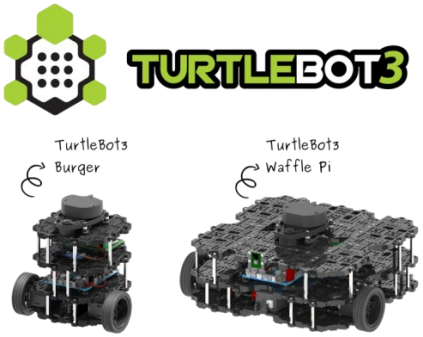






Robot: Sense – Think – Act





knowledge, database

Think

mission commands

Decision-Making

Localization Map Building

"position" global map

Cognition Path Planning

environment model local map

sense-think-act

path

Perception

Information Extraction

raw data

Sensing

Path Execution

Actuator commands

Acting

Execution

Real World Environmen

Sense

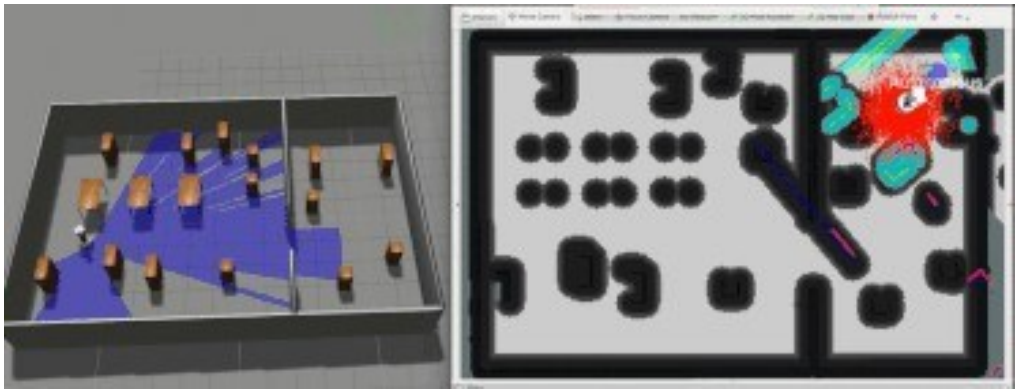
Act

Case Study: Mobile Robot & Robot Arm

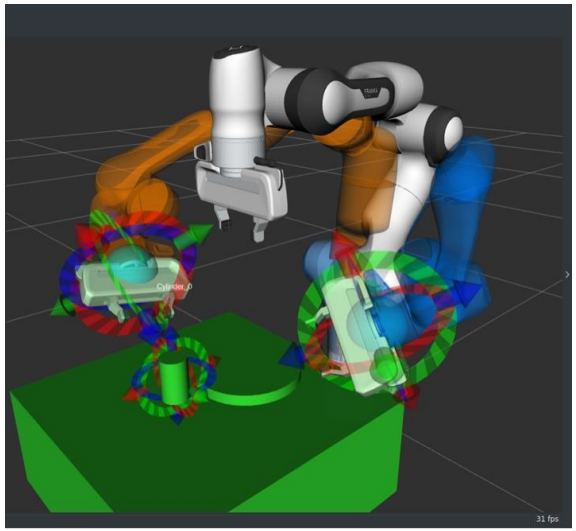
Linux

ROS

Robot Operating System



Mobile Robot Navigation



Robot Arm Manipulation

Timetable

Every Tuesday afternoon – 14:30 – 18:15 @SHB210

• Jan 9:	Lab 1	Intro to VM & Ubuntu & Install WA	-
• Jan 16:	Lab 2	Intro to Python and Practice WA	** Lab sheet 2
• Jan 21:	-	Add/drop on CUSIS	
• Jan 23:	Lab 3	Intro to ROS YM	** Lab sheet 3
• Jan 30:	Lab 4	ROS Topics / Proj. Grouping YM	** Lab sheet 4
• Feb 6:	Lab 5	ROS Service & Client YM	** Lab sheet 5
• Feb 13:	Holiday	-	-
• Feb 20:	Lab 6	ROS Navigation TY	** Lab sheet 6
• Feb 27:	Lab 7	Intro to Sensors TY	** Lab sheet 7
• Mar 5:	Reading Week	-	-
• Mar 12:	Lab 8	Lidar-based Navigation WT	** Lab sheet 8
• Mar 19:	Lab 9	Visual Servoing for Mobile Robots WT	** Lab sheet 9
• Mar 26:	Lab 10	Intro to Robot Arm RJ	** Lab sheet 10
• Apr 2:	Lab 11	Intro to Manipulation RJ	** Lab sheet 11
• Apr 9:	Lab 12	Visual-based Manipulation HYM	** Lab sheet 12
• Apr 16:	Project Demo	Group Project Demo	** Demo
• Apr 23:	Make-up class	(if any)	-

Course Instructor and TAs

Course Instructor: LAI Jiewen (Research Assistant Professor)

- jiewen.lai@cuhk.edu.hk

Teaching Assistants

(They are PhD students. They are responsible for giving you the initial **in-class grade**)

- ZHANG Yameng (1155171880@link.cuhk.edu.hk)
- WANG An (wa09@link.cuhk.edu.hk)
- TIAN Yu (ty1997@link.cuhk.edu.hk)
- TANG Ruijie (ruijie.tang@link.cuhk.edu.hk)
- SHI Wentao (1155201653@link.cuhk.edu.hk)
- HUANG Yiming (yhuangdl@link.cuhk.edu.hk)

Grading

#1. Attendance for each lesson:

12 x 0.33% = **4%**

#2. Completion of **each lab module and performance**:

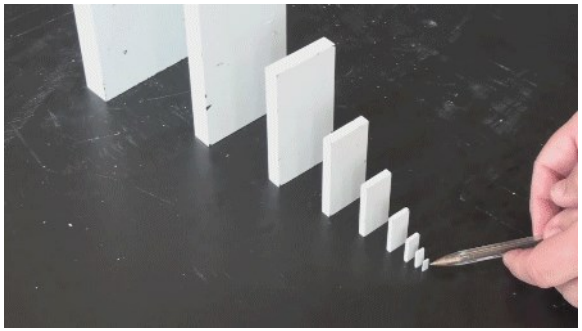
11 x 2% = **22%**

#3. Completion of **Lab Sheet Assignments**:

11 x 4% = **44%**

#4. Final **Group Project**:

1 x 24% = **30%**



Let's do some calculations:

- If you miss a class, you will miss the score #1 (0.33%);
- Then you will not get any score for #2 (2%);
- Of course, you will not complete #3 - Lab sheet (4%).

So, each lesson contributes 6.33% of your total grade

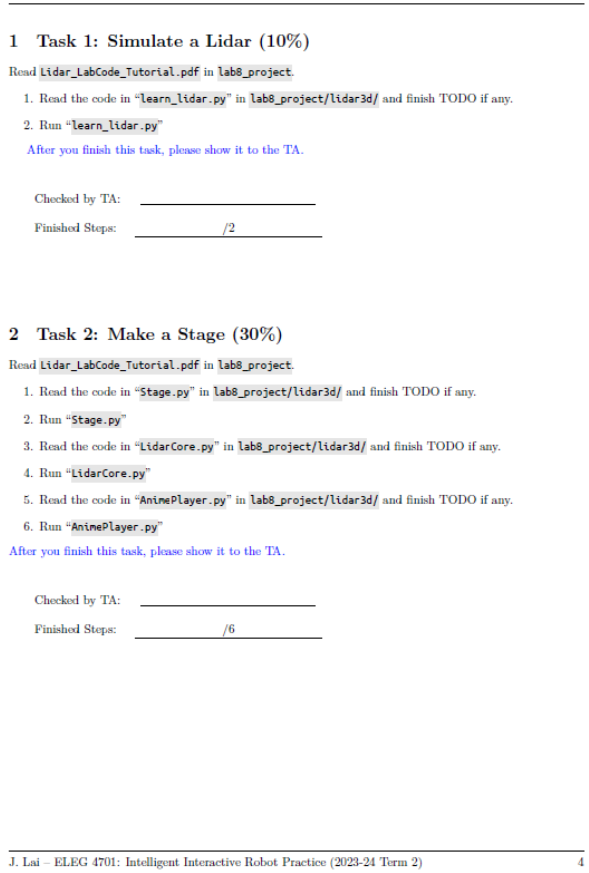
Grading

More about the Lab Sheet…

- A total of **11 Lab Sheets**
- Starting from **Lab 2 to Lab 12**
- Relatively **detailed hints & materials** for you to reproduce the results in the classroom.

Grading mechanism

- Each Task has a certain percentage
- When you finish a task, raise your hand – the TA will check, sign, and grade.
- The lab sheet grade & performance grade depend on:
  - Whether your code **works or not;**
  - **How fast** you can finish the task.



1 Task 1: Simulate a Lidar (10%)

Read `Lidar_LabCode_Tutorial.pdf` in `lab8_project`.

1. Read the code in "`learn_lidar.py`" in `lab8_project/lidar3d/` and finish TODO if any.
2. Run "`learn_lidar.py`"

After you finish this task, please show it to the TA.

Checked by TA: _____

Finished Steps: _____/2

2 Task 2: Make a Stage (30%)

Read `Lidar_LabCode_Tutorial.pdf` in `lab8_project`.

1. Read the code in "`Stage.py`" in `lab8_project/lidar3d/` and finish TODO if any.
2. Run "`Stage.py`"
3. Read the code in "`LidarCore.py`" in `lab8_project/lidar3d/` and finish TODO if any.
4. Run "`LidarCore.py`"
5. Read the code in "`AnimePlayer.py`" in `lab8_project/lidar3d/` and finish TODO if any.
6. Run "`AnimePlayer.py`"

After you finish this task, please show it to the TA.

Checked by TA: _____

Finished Steps: _____/6

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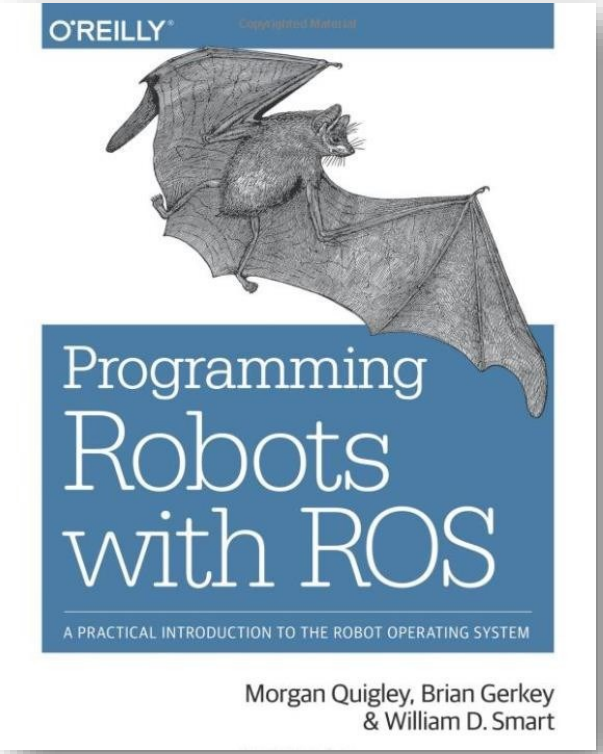
Textbook for Robot Programming with ROS

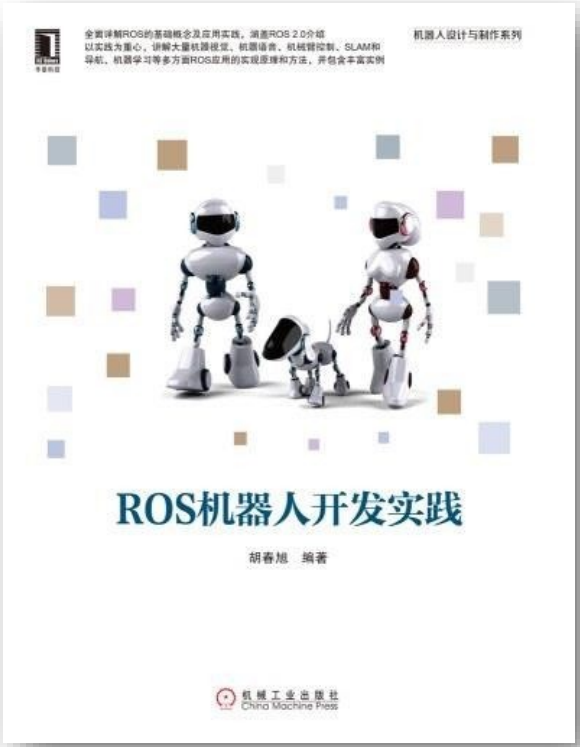
M Quigley, B Gerkey, WD Smart, (2015).

Programming Robots with ROS: A Practical Introduction to the Robot Operation System



胡春旭:**《ROS機器人開發實踐》**

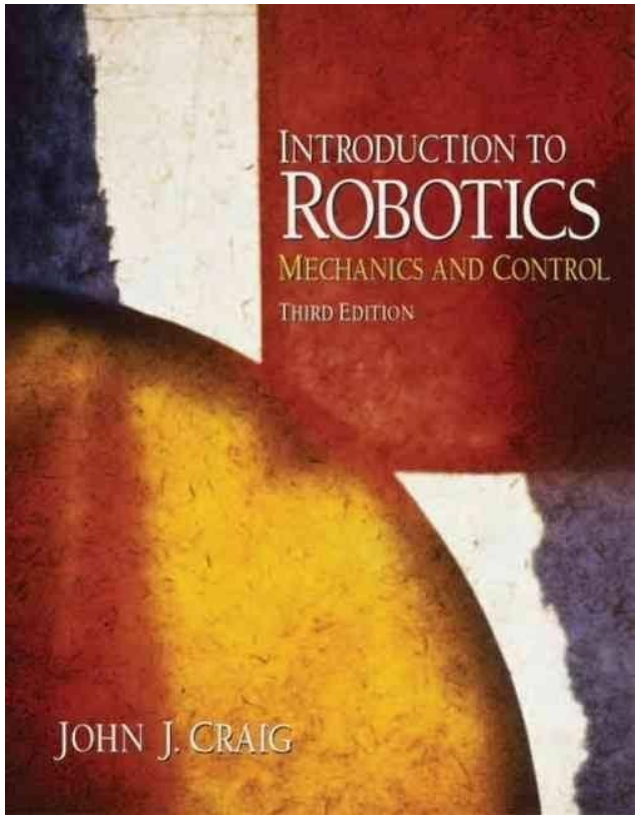
機械工業出版社



Textbook for Robotics Theory

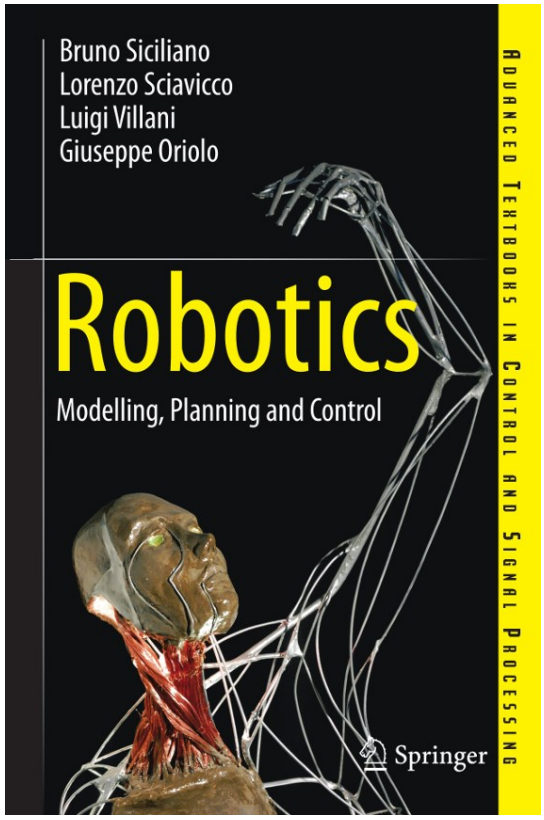
John Craig,

Introduction to Robotics



Bruno Siciliano *et al.*

Robotics: Modelling, Planning and Control



Resource for Robot Programming with ROS

- ROS: https://www.ros.org
- ROS Wiki: https://wiki.ros.org
- ROS Robots: https://robots.ros.org
- Ubuntu Wiki: https://wiki.ubuntu.org.cn
- How-to-learn-robotics: https://github.com/qqfly/how-to-learn-robotics

Seat Plan for Teaching Lab

- You are required to have a **fixed seat** for this course – because you will use the **same lab PC**
  - **Account: ELEG4701**
  - **Passcode: robot**

- **This is to save your PC env setting**

- Put your name in the seat plan, then no swapping will be allowed in the future

- You can choose your spot now