科目ナンバリング	U-LAS70 10002 SE50						
授業科目名<英訳>	ILAS Seminar-E2 :Will humanoid robots really replace humans? An introduction to the problems of dexterous robotic manipulation（ヒューマノイドロボットは本当に人間の代わりになりますか？ 器用なロボット操作の問題点に関する入門編） ILAS Seminar-E2 :Will humanoid robots really replace humans? An introduction to the problems of dexterous robotic manipulation			担当者所属職名・氏名	工学研究科　講師　AMAR, Julien Samuel		
群	少人数群	単位数	2単位	週コマ数	1コマ	授業形態	ゼミナール（対面授業科目）
開講年度・開講期	2026・前期	受講定員(1回生定員)	15 (15) 人	配当学年	主として1回生	対象学生	全学向
曜時限	火5	教室	共北11			使用言語	英語
キーワード	Robotic Manipulation / Robotic Control / Robotic Manipulators / Industrial Robots						

[授業の概要・目的]

In the future, one of your co-workers might be a humanoid robot. But how can robots complete the same tasks as humans? More precisely, how can a robot achieve the same dexterity as we do for manipulation tasks, and what are the challenges involved for robots to pick and manipulate objects?
In this class, we will explore the underlying physics (working principles and control schemes) for robotic manipulators. This seminar course is based on my own researches in robotic manipulation, so we will also cover recent research evolutions in robotic manipulation.

[到達目標]

- Understand the issues and challenges surrounding robotic manipulation.
- Be able to describe mathematically the kinematics and dynamics of robotic manipulators grasping objects.

[授業計画と内容]

1. What does “ Robotic Manipulation ” means? (Week 1)
2. Linear algebra as the language of robotics (Week 2-3)
3. 3D rigid motion (Week 4)
4. Modeling robot links and joints (Week 5)
5. Forward and inverse kinematics (Week 6-7)
6. Jacobian matrix and singularity problems for manipulators (Week 8-9)
7. Mathematical formalisms for robotic manipulators (Week 10-11)
8. An introduction to manipulators equations of motion (Week 12)
9. Control strategies for manipulators (Week 13)
10. Manipulation problems using Grasp Maps (Week 14)
11. Feedback (Week 15)

LAS.Seminar.B2 Will humanoid robots really replace humans? An introduction to the problems of deterministic isometric manipulation [ヒューマノイドロボットは本当に人間の代わりになるか？決定論的等長操作の問題点の導入] 1単位 Q1

[履修要件]

Students should be familiar with high-school level mathematics (algebra and calculus), and with basic mechanics.

[成績評価の方法・観点]

The students will be graded based on participation (20%) as well as a final report covering the contents of the class. (80%)

[教科書]

使用しない
No textbook, handouts will be provided

[授業外学修（予習・復習）等]

Some homework to complete what has been seen in class.

[その他（オフィスアワー等）]

[主要授業科目（学部・学科名）]