Robotique industrielle (MCTR920_GICMMI)

Composante
Polytech
Annecy-
Chambéry

En bref

- **Méthodes d'enseignement:** En présence
- **Forme d'enseignement :** Cours magistral
- **Ouvert aux étudiants en échange:** Oui

Présentation

Description

The class will focus on direct and inverse kinematics problem, Denavit-Hartenberg representation, Euler and RPY angles, homogeneous transformations, Manipulator Jacobian, differential relationships, force and moment analysis.

Objectifs

The objective of this course concerns Industrial Robotics and the ability to choose a robot according to the expected tasks and industrial context. It will also cover the various models needed to understand the operation of an industrial robot (typical architectures, characteristic quantities, modeling and model inversion), its behavior, the description of end-effector motion in space, and the minimum knowledge required to design and size the actuators that make up the robot.

Assesment (The grading scale is provided for reference and is subject to slight modification.)

At the end of this lecture, you are excepted to :
Know the various stakeholders in the field, as well as the components and architectures of industrial robots..
Be able to select the appropriate robot for a given application.

Know and define the transformation matrices of a rigid body.
Be able to calculate the position and orientation of an object in different spatial reference frames.

Know how to parameterize an industrial robot according to the DHKK convention.

Be able to compute the forward geometric model of an industrial robot using Python.

Be able to compute the inverse geometric model of an industrial robot using the geometric method.
Be able to compute the inverse geometric model of an industrial robot using Paul’s method.

Be able to establish the Jacobian matrix of a robot and determine its singularitiesm

10% #20% #30% #40%

Grade

Heures d'enseignement

CM	Cours Magistral	36h
TP	Travaux Pratiques	4h

Pré-requis obligatoires

MATH501_PACY
MATH620_MIMC
Python programming language

Plan du cours

1. Historical Context, Types, Applications and Basic Concepts in Robotics
2. Structure and Components of Roobot Manipulators
3. Spatial Representations of Rigid Bodies
4. Forward Kinematics of Robot Manipulators
5. Inverse Kinematics of Robot Manipulators
6. Differential Kinematics

Compétences visées

Mastering engineering methods and tools: identifying, modeling and solving even unfamiliar and incompletely defined problems, using IT tools,
Mastering engineering methods to model and design robotized industrial production systems
Taking into account the challenges and needs of a company
Mobilizing the resources of a scientific and technical field related to a specialty

Bibliographie

[1] Siciliano B. Robotics : modelling, planning and control. Springer 2009.
[2] Spong M, Hutchinson S, Vidyasagar M. Robot Modeling and Control. wiley ed. 2005.

Compétences acquises

Macro-compétence	Micro-compétences

Infos pratiques

Lieux

Annecy-le-Vieux (74)