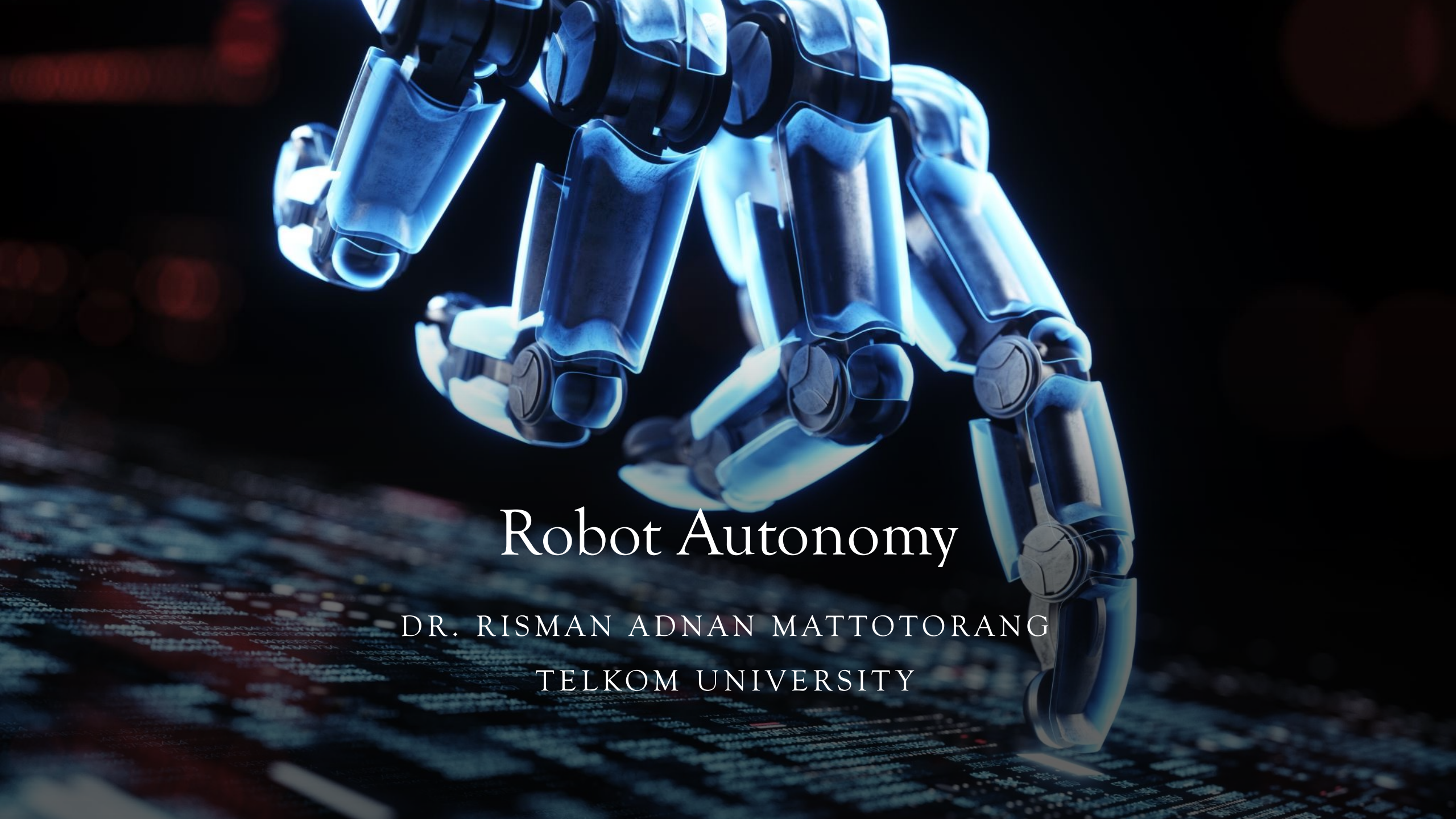

# Robot Autonomy

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TELKOM UNIVERSITY

# About Me

- Dr. Risman Adnan Mattotorang, S.Si, M.Si
- University of Indonesia
- Microsoft Indonesia
- Microsoft Asia Pacific
- Samsung Research Indonesia (SRIN)
- Work on: SW, AI/DI, Cloud, IoT and Robot*

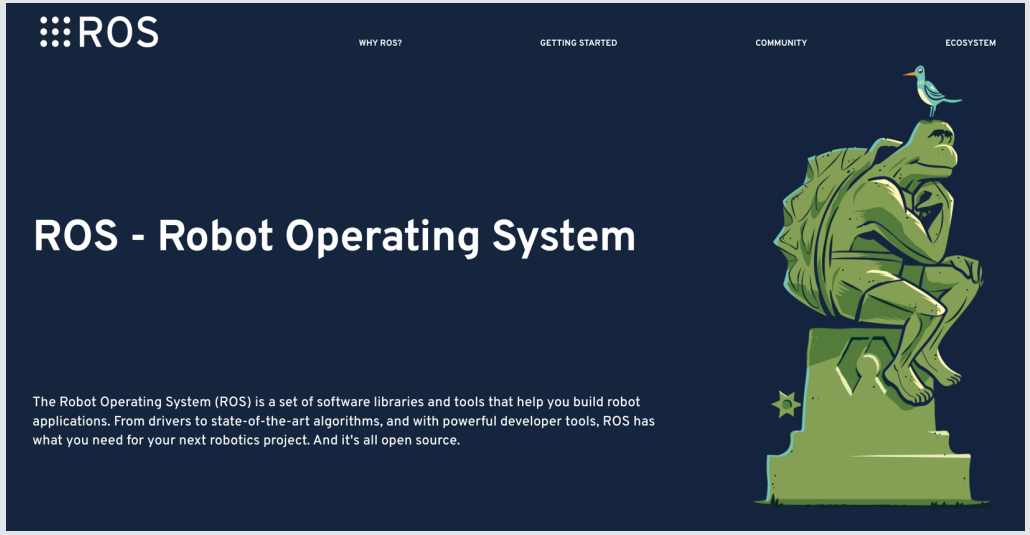
# About This Course

- This course will introduce basic principles for **autonomous robots** with planning, perception, and decision-making capabilities.
- Algorithmic approaches for trajectory optimization; robot motion planning; robot perception, localization, and simultaneous localization and mapping (SLAM); state machines.
- Extensive use of the Robot Operating System (ROS2) for demonstrations and hands-on activities.

# Prerequisites

I assumed you already know:

- Basic Calculus and Linear Algebra
- Probability Theory
- C++/Python Programming Language
- You must be hungry to learn



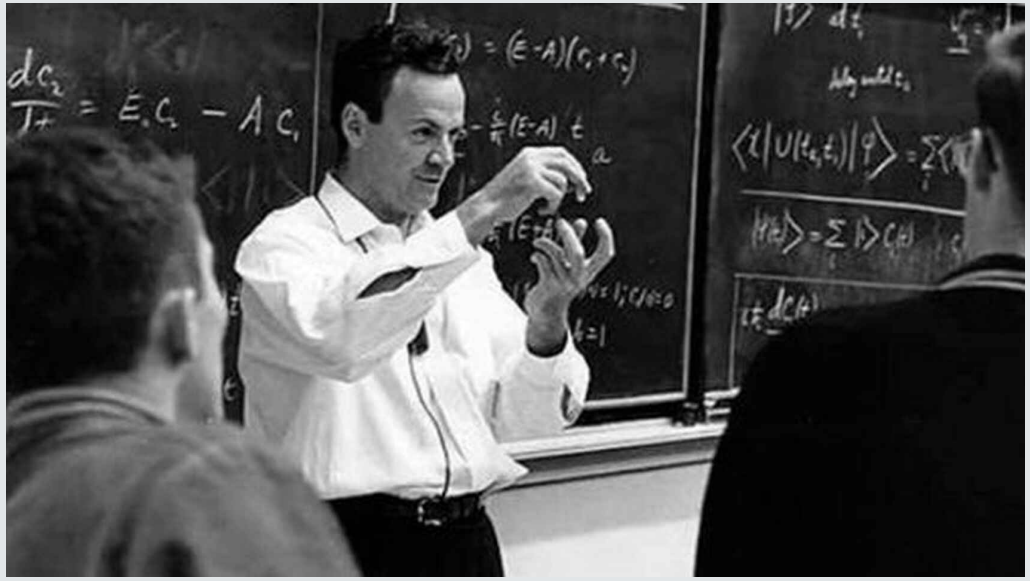
# The FCP Way

The way of “scientists and engineers”:

- **Fundamental:** The math
- **Conceptual:** The Abstraction
- **Practical:** The Skills

This course:

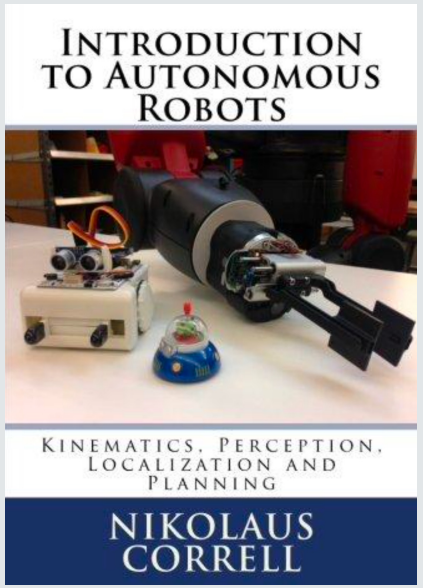
- Fundamental: Textbooks
- Conceptual: Zoom class (Saturday 10.00 -11.30)
- Practical: Hacking ROS2 (TA: Haris)

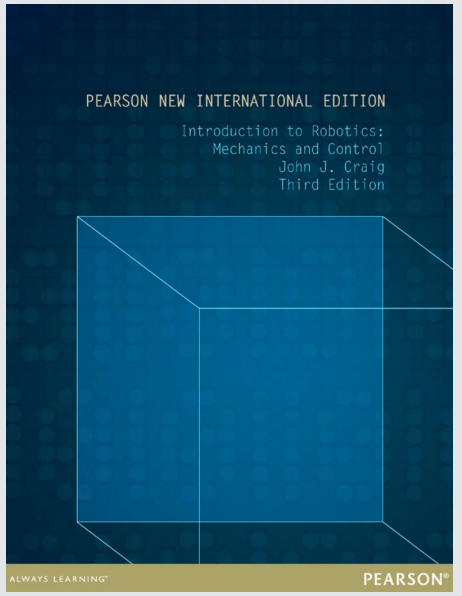


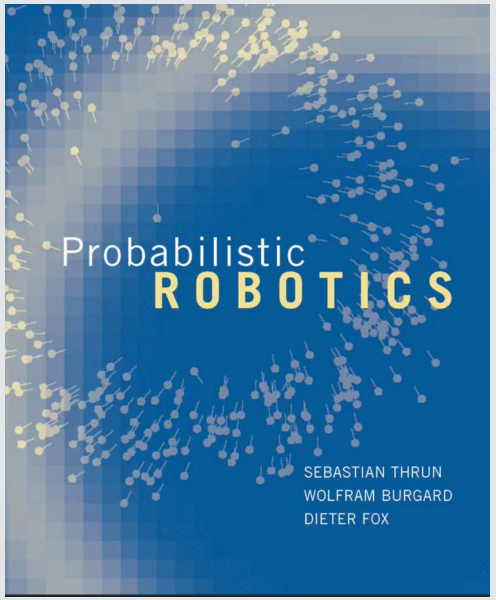
In Memory of Richard Feynman

# Textbooks

ALL COURSE MATERIALS ARE OPEN



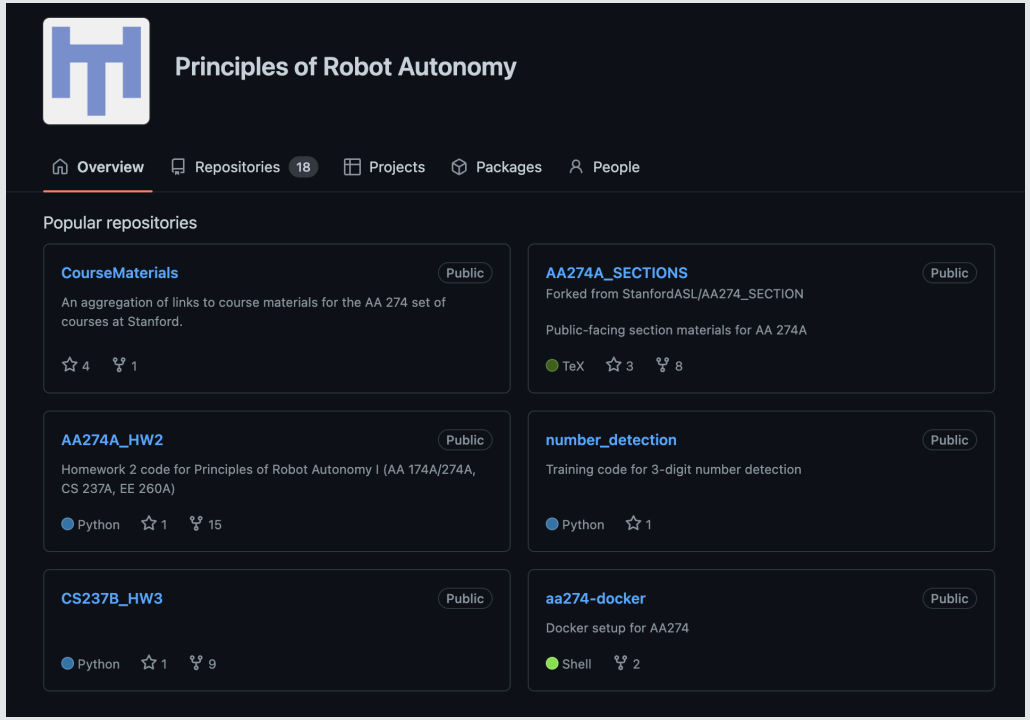

All Materials, Textbooks and Reference Courses Are in Google Drive

# Our Syllabus

- **W1:** Introduction to Robot Kinematics
- **W2:** Robot Operating System (ROS)
- **W3:** Trajectory Optimization and Tracking
- **W4:** Motion Planning – Graph Search
- **W5:** Robotic Sensors and Computer Vision
- **W6:** Image Processing and  Feature Detection
- **W7:** Information Extraction and Visual Recognition
- **W8:** Localization and Filtering Theory
- **W9:** Parametric Filtering (KF, EKF, UKF)
- **W10:** Non-Parametric Filtering
- **W11:** Markov localization and EKF localization
- **W12:** Simultaneous localization and mapping (SLAM)
- **W13:** Multi-Sensor Perception and Sensor Fusion
- **W14:** Stereo Vision and State Machines

# Your Call to Action

1. Make Your Git Repository
2. Refresh Python/C++ Programming
3. Install ROS2
4. Install Webot Simulator
5. Complementary: The Construct




Stanford Robot Autonomy Git