Design/Fabrication of Functional Parts for Robotics

COURSE OUTLINE

Course Description

This course introduces students to the design and fabrication of functional parts for robotic systems through a hands-on, project-based approach. Students will learn to translate robotic functionality requirements into practical components using CAD software. The course culminates in 3D printing and testing their designs, allowing students to experience the full cycle from problem identification to functional implementation.

01 Introduction
- Importance of functional part design in robotics
- The design-to-fabrication pipeline: from concept to testing

02 Fundamentals of Robotics Part Design
- Identifying functionality requirements (strength, size, mobility, durability)
- Constraints in robotic systems (space, weight, material, cost)
- Common types of robotic parts (brackets, mounts, gears, housings, mechanisms)
- Brainstorming methods and evaluating potential solutions

03 Utilizing Computer-aided Design (CAD)
- Advantages of using CAD for design
- Translating ideas into digital models
- Best practices for designing parts that are both functional and fabricable

04 Fabrication & Prototyping

- Fabrication methods (manual machining, 3D printing)
- 3D printing for robotics (materials, tolerances, strengths/weaknesses)
- Testing & iteration

05 Practical Project: Design/Fabricate a Functional Part

- Design challenge introduced to students
- Students break into teams, brainstorm ideas, and design solution in CAD
- Sample solution is 3D printed and assembled on robot

06 Questions & Comments