

DESIGN OF A LIGHTWEIGHT ROBOTIC ARM



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Betreuende: Franco, Francesco, francof@unina.it



BACHELOR THESIS



MASTER THESIS



ADP



AERO SPACE ENG.



MECH. ENG.

- Robots
- Light weight design
- Metamaterials and composite structures



Motivation

Traditional robotic arms still face challenges in achieving both lightweight and high dynamic precision. Hence, the overall objective is the development of a lightweight robotic arm, to improve operation safety and efficiency. Based on reference robot arm, the student will develop and enhance design with innovative meta-structure, metamaterial, and bio-based composite materials. An optimization analysis, based on a multi-objective design process, will be carried out in view to satisfy structural rigidity, a proper dynamic behavior (natural frequency and vibration dissipation), a lower weight and a green manufacturing process. The thesis will be performed remotely and supervised by UNINA, Naples.

Tasks

- Literature research
- Design and detailed modelling and evaluation of kinematic and dynamic behavior of the optimized robot arm

Desirable:

- Experience in structural design
- CAD/FEM basic knowledge

Start

September 2025



UNIVERSITÀ DEGLI STUDI DI NAPOLI
FEDERICO II

