

Stefano Angeli

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WORK EXPERIENCE

February 2022 – present

Research Fellow

Research Center "E. Piaggio" - Pisa, Italy

- Research Grant: *"Study and development of robotics handtools and control algorithms for advanced industrial manipulators"*.
- Scientific Sector: Systems and control engineering
- Objective: The objective of this research is to develop and design pneumatic grasping tools capable of throwing objects beyond the robot's kinematic workspace in order to maximize process efficiency. The entire system has been tested in ROS on the Franka Emika robot. This research has been carried out within the DARKO (Dynamic Agile Production Robot That Learn and Optimise Knowledge and Operations) European Project framework.
[DARKO European Project Website](#)
- Supervisors: Prof. Antonio Bicchi, Prof. Paolo Salaris.

December 2021 – January 2022

Research Collaborator

Research Center "E. Piaggio" - Pisa, Italy

- Research Topic: Study and implementation of throwing strategies for collaborative robots within the DARKO (Dynamic Agile Production Robot That Learn and Optimise Knowledge and Operations) European Project framework.
[DARKO European Project Website](#)
- Business or Sector: Robotics Research

EDUCATION AND TRAINING

2016 – 2021

Master's degree in Robotics and Automation Engineering

Università di Pisa, 110/110.

- Thesis Title: *"Study and development of optimal control strategies to enhance capabilities of a collaborative robot in throwing objects"*
- Thesis Description: The dissertation aimed to find a throwing strategy for the collaborative robot UR10e to throw an object with a limited mass. The throwing trajectory planning was solved with nonlinear constrained optimization methods by using the MATLAB optimization toolbox.
- Supervisors: Prof. Antonio Bicchi, Prof. Paolo Salaris, Eng. Alessandro Palleschi.

2011 – 2016

Bachelors's degree in Biomedical Engineering

Università di Pisa, 101/110.

- Thesis Title: *"Finite element method (FEM) analysis of the extrusion process of hydrogels"*
- Thesis Description: The dissertation aimed to model the extrusion process of a polypeptide hydrogel produced at University of Manchester. The extrusion process has been modelled by using the COMSOL multiphysics simulation software.
- Supervisors: Prof. Giovanni Vozzi, Eng. Carmelo De Maria.

2006 – 2011

Italian Secondary School Diploma

Liceo Scientifico "Enrico Fermi", Massa(MS),Italy, 87/100.

PROJECT EXPERIENCE

- 2023 **DARKO Project Integration Milestone**
Arena 2036, Stuttgart, 11-17 June 2023
- During the integration week, I programmed the Franka Emika robot in ROS equipped with antropomorphic gripper mounted on a mobile platform to perform pick and place tasks for moving objects such as small items like gaskets, screws, and bolts from a shelf towards a fixed box placed on a conveyor belt. My specific focus was on planning and control, working collaboratively with other partners to ensure integration between other areas like perception and human-robot interaction.
- 2022 **Demo Maker Faire Rome - The European Edition**
Rome, 10-14 October 2022
- As part of the European project DARKO, I programmed the Franka Emika robot with the MoveIt C++ interface in ROS equipped with an anthropomorphic gripper for pick and throw tasks using a pneumatic hand-tool equipped with a suction cup. The project involved creating a demonstration of the robot's capabilities, which included picking objects from a shelf by using a vacuum action and throwing them towards a target outside the robot's kinematic workspace.
- 2020 **Implementation of dynamic controllers on the Franka robot and optimal adaptive control**
Research Center "E. Piaggio", Prof. Antonio Bicchi, Prof. Paolo Salaris, Robot Control.
- Implementation and testing of dynamics controllers (Proportional Derivative, Computed torque and Backstepping control) with the robot-control framework (*Ros Control*) of ROS on the Franka Emika robot.
From joint position and velocity measurements, nonlinear model-based dynamic control techniques have been applied to follow references by using joint torque command interface.
 - Study on optimal trajectories for the estimation of the robot parameters for kinematic and dynamic adaptive control.
Studied a potential method for finding persistently exciting trajectories for parameter identification in the case of an RR planar manipulator. The method is based on an optimization for maximizing the smallest singular value of the convolution integral of the regressor.
- 2019 **Study and characterization of the directivity index for linear and volumetric arrays**
Università di Pisa, Prof. Andrea Caiti, Underwater system.
- Spherical hydrophones with omnidirectional beam pattern were assembled to create linear and volumetric arrays with several geometries to maximize the Directivity Index (DI) of the entire array using the Antenna Toolbox of MATLAB.
- 2017 **Analysis of the inverse differential kinematics and dynamics of a 4 DOF translational parallel robot manipulator**
Università di Pisa, Prof. Marco Gabiccini, Robot Mechanics.
- Starting from the kinematics and dynamics model of the *Tripteron*, a 3 DOF translational parallel manipulator, inverse differential kinematics and dynamics of the 4 DOF *Quadrupteron* translational parallel manipulator were studied and implemented using the Wolfram Mathematica software.

PERSONAL SKILLS

Mother tongue	Italian
Language	English – B2 Levels: A1/A2: Basic user - B1/B2: Independent user - C1/C2: Proficient user <u>Common European Framework of Reference for Languages</u>
Additional Experience	English Certificate B2 Level (86/100) - <i>Centro Linguistico Interdipartimentale (CLI)</i> , 2022, Università di Pisa.

PROCEEDINGS OF NATIONAL MEETINGS

De Maria C, Chiesa I, **Angeli S**, De Acutis A, Montemurro F, Mattei G, Smith AM, Saiani A, Vozzi G. *Characterization and biofabrication of a pH-sensible hydrogel*. V Congress of the National Group of Bioengineering, Napoli, 20-22 June 2016.

JOB-RELATED SKILLS

- | | |
|-------------------------------------|-------------------------------|
| • C++ | • Windows, Linux |
| • ROS (Robot Operating System) | • COMSOL Multiphysics |
| • Franka Emika Panda | • Wolfram Mathematica |
| • UR10e | • Microsoft Office |
| • MoveIt(Motion Planning Framework) | • Element Finite Analysis |
| • MATLAB/Simulink | • Object Oriented Programming |
| • Git | • PTC Creo Parametric |
| • LaTeX | |

SOFT SKILLS

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|-------------------|----------------|
| • Problem Solving | • Teamwork |
| • Communication | • Autonomy |
| • Flexibility | • Adaptability |

ADDITIONAL INFORMATION

Driving licence B

PRIVACY

Personal data I hereby authorize the use of my personal data in accordance to the GDPR 679/16 - "European regulation on the protection of personal data".

Date July 4, 2023

Signature