

AntunSkuric

PhD in physical human-robot interaction



Personal Info

location:

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website:

askuric.github.io

Online Profiles:



Languages:

Croatian - native

English - proficient

French - proficient

Personal interests:

playing guitar,
reading,

running, hiking, cycling,

I feel passionate about:

hands-on learning,
open-source,

sustainability in technology

Research Interests

- Physical human-robot interaction
- Human-centred robotics
- Polytope evaluation methods
- Optimal control strategies
- Quadratic programming (QP)
- Design and control of mechatronic systems

Education

2020 - 2023

PhD Thesis

PHYSICAL HUMAN-ROBOT INTERACTION

INRIA Bordeaux, AUCTUS team & University of Bordeaux, France

THESIS: A COUPLED VIEW OF THE PHYSICAL ABILITIES OF HUMAN-ROBOT DYAD FOR THE ONLINE QUANTITATIVE EVALUATION OF ASSISTANCE NEEDS

- Exploration of physical capabilities for physical-human robot interaction
- Project LiChIE in collaboration with **Airbus DS** (Defense and Space)
- Under supervision of Vincent Padois and David Daney.

2014 - 2017

M.Sc. in Electrical Engineering

CONTROL THEORY AND MECHATRONICS

University of Zagreb, Faculty of Electrical Engineering and Computing

- Collaboration with **Robert Bosch GmbH**, Stuttgart, Germany
- Under supervision of Jadranko Matusko and Sandor Iles

2011 - 2014

B.Sc. in Electrical Engineering

CONTROL THEORY

University of Zagreb, Faculty of Electrical Engineering and Computing

- GPA: 4.0/5.0 - ranked among the top 10% of my generation

Honors and Awards

2021

IEEE Transactions on Automation Science and Engineering Best Paper Award

IEEE TASE

For the paper: *A Recursive Watermark Method for Hard Real-Time Industrial Control System Cyber-Resilience Enhancement*

2019

1st at the RoboCup 2019 - Humanoid KidSize Soccer League

RoboCup

I had the opportunity to participate at the RoboCup 2019 held in Sidney, Australia as a part of the team **Rhoban**.

2016-2017

Scholarship for Internship in Germany

Zoran Djindjic Foundation (DAAD)

- Awarded by German Academic Exchange Service (DAAD).

2016

1st place in competition Elektroboj

eStudent Zagreb

- Innovation competition founded by international student organisation eStudent.
- First place prize 1000€ and 1 year incubation for **GuitarFriend** project.

2015 - 2016

1st place in PLC+ competition

SIEMENS | EESTEC LC Zagreb

- Regional competition (Croatia, Slovenia and Serbia), organized by Eestec LC Zagreb, sponsored by **SIEMENS**.

- Winner two years in a row: 2015 and 2016.

Open-source projects

I am quite passionate about open-source and enjoy sharing with the community. Here are the projects that I'm particularly proud of:

2021-now

pycapacity: Real-time capable task-space capacity evaluation python module

INRIA Bordeaux, AUCTUS team

A python package providing a framework for the generic task-space capacity calculation for robotic serial manipulators and human musculoskeletal models. For more info about the theoretic and implementation details check the [documentation](#), [paper](#).

2020 - now

SimpleFOCproject: Arduino Compatible Open Source Field Oriented Control (FOC) project

Founder & Project Administrator

A Cross-Platform FOC implementation for BLDC and Stepper motors based on the Arduino IDE and PlatformIO. The goal is to support a wide range different motors, position sensors, drivers and microcontrollers. Project has 50+ contributors and 1500+ community members, ranging from amateurs to professionals and researchers. More info on [GitHub](#) and [Community](#)

2019


Inverted inertia pendulum: My first open-source project

Faculty of Electrical Engineering in Zagreb

Development of inertial force based inverted pendulum as a low-cost, testing platform for optimal control algorithms. Currently used for the Mechatronics class at the University of Zagreb. [Github](#) [YouTube](#) [Thingiverse](#)

Publications

Here is a condensed list of my publications, the full list can be found at Google Scholar.

2025	Simulation Study of the Upper-Limb Isometric Wrench Feasible Set With Glenohumeral Joint Constraints Journal of Biomechanical Engineering N Rezzoug, A Skuric , V Padois, D Daney	paper
2024	Online approach to near time-optimal task-space trajectory planning In submission to: IEEE Transactions on Robotics, May 2024 A Skuric , N Torres Alberto, L Josph, V Padois, D Daney	gitlab , pdf
2023	Pycapacity: a real-time task-space capacity calculation package for robotics and biomechanics Journal of Open-Source Software, 2023 A Skuric , V Padois, D Daney	github pdf
2022	Approximating robot reachable space using convex polytopes HFR 2022 Best paper finalist 15th International Workshop on Human-Friendly Robotics A Skuric , V Padois, D Daney	gitlab , pdf
2022	On-line feasible wrench polytope evaluation based on human musculoskeletal models: an iterative convex hull method Accepted to IEEE ICRA 2022 & IEEE RA-L A Skuric , V Padois, N Rezzoug, D Daney	gitlab , pdf , video
2022	SimpleFOC: A Field Oriented Control (FOC) Library for Controlling Brushless Direct Current (BLDC) and Stepper Motors Journal of Open-Source Software, 2022 A Skuric , H Bank, O Williams, R Unger, D Gonzalez	github , pdf
2021	Common wrench capability evaluation of a human-robot collaborative system 46ème Congrès de la Société de Biomécanique A Skuric , N Rezzoug, D Daney, V Padois	pdf
2021	On-line force capability evaluation based on efficient polytope vertex search IEEE ICRA 2021 A Skuric , V Padois, D Daney	gitlab , pdf , video
2020	A Recursive Watermark Method for Hard Real-Time Industrial Control System Cyber-Resilience Enhancement  IEEE T-ASE Best paper award 2021 IEEE Transactions on Automation Science and Engineering Z Song, A Skuric , K Ji	IEEE Best paper award , pdf

Work Experience

2024 - now	R&D engineer POLLEN ROBOTICS Working on the new version of the Reachy robot. Robot control algorithms, dimensional design and development of low-level motion control.	Bordeaux, France
2020 - 2023	Teaching assistant UNIVERSITY OF BORDEAUX ESNAM ENSC Participated in TP and TD exercises for students in ENSC, ENSAM and ASPIC in Bordeaux (about 150h over the course of 3 years).	Bordeaux, France
2020 - 2023	PhD candidate INRA BORDEAUX AUCTUS TEAM I was fortunate to be able to do my PhD thesis on human-robot physical interaction at the INRIA institute in Bordeaux, at the AUCTUS team.	Bordeaux, France
2020	Freelancer UPWORK SELF-EMPLOYED Fields: Control Engineering, Sensor Fusion for motion tracking and Software development.	
2019	Research Engineer AIO PROJET NUMII® Human pose estimation algorithms based on RGBd cameras, skeletal fusion algorithms, hardware/software/firmware development.	Bordeaux, France
2018-2019	Research Associate FACULTY OF ELECTRICAL ENGINEERING, UNIVERSITY OF ZAGREB Distributed model predictive control (MPC) for building management systems, control algorithms for a reconfigurable three-wheeled vehicle.	Zagreb, Croatia
2017-2018	Graduate Internship - Control Engineering SIEMENS CT Maintenance and enhancements of industrial embedded software, development of a novel watermarking algorithm for hard real-time control.	Princeton, USA
2016-2017	GuitarFriend - Startup co-founder STUDENT START-UP INCUBATOR SPOCK, UNIVERSITY OF ZAGREB GuitarFriend is an innovative device enabling people with hand disabilities to learn and play guitar. The startup was incubated for a year.	Zagreb, Croatia
2016-2017	Student Internship and Masters thesis ROBERT BOSCH GMBH Automating of an adaptable fixing device for cyber-physical production systems - Industry 4.0.	Renningen, Germany

Talks and presentations

I had the opportunity to present my research papers at several international conferences: **ICRA2021**, **ICRA2022**, **HFR2022** or **SB2021-23**; and participating in different scientific events like **JNRH2023**, **CoRL2024** or **Robocup 2023**. I was also invited to present my research and open-source projects on several occasions such as

Jun 2023	PhD thesis presentation for the R4 network Title: Unifying view of physical ability metrics for humans, robots and their collaboration .	Bordeaux, France Video link
Jun 2023	Podcast: "Désassemblons le numérique" A short vulgarisation discussion on human-centered collaborative robotics with G Laisné.	Bordeaux, France Podcast link
Oct 2021	SimpleFOC workshop for Arduino LLC Invited to create a workshop about Field Oriented Control (FOC) and to introduce the SimpleFOC project to the Arduino's R&D department	Presentation
Oct 2021	Invited Talk at GDR robotique GT1-GT6 Session "Exosquelettes pour l'assistance physique : quelles solutions optimales ?" Title: Efficient calculation of human wrench capacity based on human musculoskeletal models.	Paris, France Presentation

Teaching and Organising events

2020-2023	ESNAM Bordeaux Mathematics and Informatics class - TP and TD exercises (150h), under supervision of Jean-Luc Charles and Eric Ducasse	Bordeaux, France
2022	University of Bordeaux, Master ASPIC Embedded Systems class - TP exercises (16h), under supervision of Gregoire Passault	Bordeaux, France
2021	ENSC Bordeaux Human-robot interfaces class - TD exercises (10h), under supervision of Jean-Marc Salotti	Bordeaux, France
Jul 2023	Student organisation member at JNRH2023 Organised activities for student participants at the conference with V. Batto .	Bordeaux, France

Technical skills

Programming languages

- Python
- C/C++
- Rust (from recently)
- Matlab / Simulink
- Robot operating system (ROS1/2)
- Embedded (Arduino/stm32/esp32...)
- HTML/CSS/JavaScript/SQL/php
- Java
- PLC programming
- Anaconda/Mamba
- Git - collaborative development

Hands-on experience

- Robotics (mostly manipulators)
- Motor/Motion control
- Embedded Systems
- Biomechanical model manipulation
- Control system design
- Mechatronic design
- System identification
- Sensor Fusion
- PCB design
- CAD | 3D printing | CNC
- Industrial Automation (my student days)
- User Applications