



Ali KhalilianMotamed Bonab

📍 **Work:** Via Alamanni, 13b, San Giuliano Terme - Pisa Istituto di Intelligenza Meccanica, 56017
Ghezzano (Italy)

WORK EXPERIENCE

Research assistant in university

Institute of Mechanical Intelligence, Scuola Superiore Sant'Anna [01/10/2022 – Current]

City: Pisa

Country: Italy

Engineering research scientist

Institute of Mechanical Intelligence, Scuola Superiore Sant'Anna [01/07/2022 – 30/09/2022]

City: Pisa

Country: Italy

Research assistant in university

Human Machine Interaction (HMI) Laboratory, Sabanci University [01/01/2018 – 01/04/2022]

City: Istanbul

Country: Türkiye

Higher education teaching assistant

Sabanci University [01/02/2018 – 01/08/2021]

City: Istanbul

Country: Türkiye

Holding weekly recitations, office hours, and grading homework and project, proctoring and grading exams.

Teaching Assistantship Courses:

1. Introduction to Robotics (Spring 2019-2020, Spring 2020-2021),
2. Analysis and Synthesis of Mechanisms (Fall 2020-2021),
3. System Modeling and Control (Summer 2018-2019, Fall 2019-2020),
4. Mechanics (Fall 2018-2019, Fall 2019-2020, Summer 2019-2020),
5. Control Systems Design (Fall 2018-2019),
6. Academic Communication Sessions (Spring 2018-2019),
7. Linear Algebra (Summer 2017-2018),
8. Finite Element Methods (Spring 2017-2018).

Research engineer

Azerbaijan Smart Structure Development [01/05/2017 – 01/01/2018]

City: Tabriz

Country: Iran

As a member of the R&D sector in ASSD, we are looking to develop, diagnose problems and innovate in devices. We were also looking to improve manufacturing and control methods to reduce production costs. I was trying to submit our knowledge-based company patents.

Engineering assistant

Javid Steel Company [01/07/2014 – 01/06/2015]

City: Bonab

Country: Iran

The assistance of Mortaza Babaei, Head Engineer of Design and Manufacture Part. Designing, Evaluating and Manufacturing of Systems and Machine Components Used in Production Line

Engineering research scientist

Institute of Mechanical Intelligence, Scuola Superiore Sant'Anna [17/04/2023 – Current]

City: Pisa

Country: Italy

1. Design and simulation of an actuation unit for the autonomous vehicle for robotic inspection,
2. Design of a control system for an autonomous vehicle for robotic inspection

EDUCATION AND TRAINING

Doctor of Philosophy

Scuola Superiore Sant'Anna [01/10/2022 – Current]

Address: Pisa (Italy)

Website: <https://www.santannapisa.it/it>

Field(s) of study: Emerging Digital Technologies | Perceptual Robotics

1. Supervisor: Prof. Dr. Antonio Frisoli, Co-Supervisor: Assist. Prof. Dr. Domenico Chiaradia,
2. Main Research Subject: Assistive Robotic, Human-Robot Interaction, Haptics, Multibody Dynamics.

Master of Science

Sabanci University [26/01/2018 – 10/04/2021]

Address: Istanbul (Türkiye)

Website: <https://www.sabanciuniv.edu/en/>

Field(s) of study: Mechatronics Engineering

Final grade: 3.55/4.00

Thesis: Simulation Based Multi-criteria Optimization of Exoskeletons to Reduce Metabolic Cost and Improve Energy Efficiency

Supervisor: Prof. Dr. Volkan Patoglu,

Main Research Subject: Assistive Robotics, Human-Robot Interaction, Haptics, Force Control and Bilateral Teleoperation

Bachelor of Science

University of Tabriz [20/09/2013 – 01/01/2018]

Address: Tabriz (Iran)

Website: <https://tabrizu.ac.ir/en>

Field(s) of study: Mechanical Engineering

Final grade: 15.17/20.00

Thesis: Studying the Stress and Strain of a Gas Turbine Blade

1. Supervisor: Prof. Dr. Mohammad Zehsaz,
2. Final Project Topic: Stress and Strain Analysis, Aerospace Engineering, Mechanical Engineering, Mechanical Design and Analysis

DIGITAL SKILLS

Programming

Python / Git / C++

Dynamics & Control

Simulink / Autolev (MotionGenesis) / MATLAB

Operating System

Linux / Windows

Editing

Microsoft Office / LaTeX / Adobe Premiere / Adobe Illustrator / Adobe Photoshop

Real-Time Control

Quanser Drivers and Toolbox / Maxon Motors Drivers and Motors / Simulink Real-Time Control / TI Launchpad Boards / Beckhoff EtherCAT Control Modules

Design and Analysis

SolidWorks / Catia / Creo / EAGLE / ANSYS Workbench, ANSYS APDL / Computer Aided Design – Autodesk Inventor

Biomechanics

OpenSim / Delsys EMG and IMUs / XSens Motion Analysis System

LANGUAGE SKILLS

Mother tongue(s): **Azerbaijani**

Other language(s):

English

LISTENING C2 READING C2 WRITING C2

SPOKEN PRODUCTION C2 SPOKEN INTERACTION C2

Turkish

LISTENING C1 READING C1 WRITING B2

SPOKEN PRODUCTION C1 SPOKEN INTERACTION C1

Persian

LISTENING C2 READING C2 WRITING C2

SPOKEN PRODUCTION C2 SPOKEN INTERACTION C2

Italian

LISTENING A1 READING A1 WRITING A1

SPOKEN PRODUCTION A1 SPOKEN INTERACTION A1

HONOURS AND AWARDS

Full Scholarship For Ph.D. Program in Emerging Digital Technologies

Telecommunications, Computer Engineering, and Photonics Institute, Scuola Superiore Sant'Anna [01/10/2022]

The merit-based full scholarship in the Emerging Digital Technologies PhD program was awarded, including a monthly stipend, tuition exemption and research funds.

The Scientific and Technological Research Council of Turkey (TUBITAK) Scholarship

The Scientific and Technological Research Council of Turkey (TUBITAK) [01/09/2020]

Full Scholarship For M.Sc. Program in Mechatronics Engineering

Faculty of Engineering and Natural Science Deans Office, Sabanci University [01/01/2018]

The merit-based full scholarship in the Mechatronics Engineering program was awarded, including a monthly stipend, tuition exemption and dormitory.

Ranked First and Awarded Medal of Honor in Tolu-e-Esteghlal-Elmi National Festival

Ministry of Education [01/05/2011]

Proposal Accepted as Best Ideas in Technology Domain

International Congress on Engineering Innovation and Technology Development, University of Tabriz [01/05/2016]

Ranked in Top 2% Among more than 250000 participants of the whole country, University Entrance Exam

NOET, Iran [01/06/2013]

Ranked Second in Provincial Olympiad in Mathematics

Ministry of Education [01/05/2011]

Ranked First in Provincial Olympiad in Computer Science.

Ministry of Education [01/05/2012]

PROJECTS

Design and Evaluating a Novel Elbow Flexible Exoskeleton

[01/10/2022 – Current]

Designed a novel elbow flexible exoskeleton to improve the current state-of-the-art elbow exosuit performance in delivering assistance while ensuring the user safety and comfort.

Design and Development of a Haptic Device for Clenching Force-Feedback

[01/04/2023 – Current]

This project is being developed as a part of the *Social and Human Centered XR* Horizon Europe Project

Link: <https://www.sun-xr-project.eu/>

Design, Optimization and Musculoskeletal Simulation of Elbow-Wrist Exosuit

[01/07/2022 – Current]

Developed an elbow-wrist exosuit model and optimized the anchor point parameters through the model of the exosuit and human arm. The optimized exosuit performance was assessed through modelling and attaching it to a musculoskeletal model of a human arm. The optimized exosuit demonstrated a remarkable impact on the muscular activities of arm muscles while lifting a weight.

Simulation Based Multi-criteria Optimization of Exoskeletons to Reduce Metabolic Cost and Improve Energy Efficiency

[01/01/2018 – 10/04/2021]

Introduced a systematic approach for rigorous and fair comparison of assistive devices based on multi-criteria optimization. Developed a novel musculoskeletal simulation-based multi-criteria optimization framework to simultaneously optimize the exoskeletons power consumption and metabolic cost. Introduced and studied a novel exoskeleton inspired by human anatomy and conducted multi-criteria comparisons between the introduced and commonly used mono-articular exoskeletons.

Human-in-the-loop Control and Experimental Verification of a Tethered Hip Exoskeleton

[01/01/2020 – 01/08/2022]

Conducted human-subject experiments with a tethered hip exoskeleton with self-alignment properties to reduce device interference with the subjects gait cycle. Developed human-in-the-loop controllers based on simulation-based optimizations.

Human Subjects Evaluation of Simulation Based Optimized Profiles on Metabolic Cost of Loaded and Unloaded Walking

[01/01/2020 – 01/08/2022]

Developed human-in-the-loop control strategies based on simulation-based profiles and scaled biological trajectories and tested several experimental hypotheses to verify the effectiveness of the simulation-based optimized profiles using an untethered hip-knee exoskeleton. Studied the effect of assistance profiles on the kinematics, dynamics, and muscular activation of subjects.

Assessing and Multi-criteria Comparison of Haptic Displays Z-width with Electrical Fractional-Order and Integer-Order Damping

[01/01/2019 – Current]

Proposed a new approach to increase the passive impedance range of a haptic display through the use of fractional order damping and its analogue realization. Conducted a multi-criteria comparison between a haptic display with a fractional-order and integer-order additional dynamics.

Developing and Evaluating a Model-Based based Controllers for Ballbot Robot

[01/01/2019 – Current]

Developed a ballbot robot and derived its dynamics and implemented model-based optimal controllers (i.e. LQR, iLQR) in real-time to test the performance of controllers.

Developing and Evaluating a Spherical Haptic Robot, and its Real-Time Implementation

[01/01/2020 – 01/12/2022]

Developed a spherical 3 DoF haptic interface. Derived kinematics and dynamics of the robot. Developed interactive controllers for the robot for educational use.

PUBLICATIONS

[Ali KhalilianMotamed Bonab, Volkan Patoglu, Simulation-Based Multi-criteria Comparison of Monoarticular and Biarticular Exoskeletons during Loaded and Unloaded Walking](#)

[2023]

Plos One

Under Review, Preprint Available

[Ali KhalilianMotamed Bonab, Jafar Keighobadi, Automatic Self-Guidance and Control of Satellites in Orbit, International Conference on Research in Science and Engineering](#)

[2016]

Istanbul University, Istanbul, Turkey

Published in Persian

Ali KhalilianMotamed Bonab, Checking the Number and Ordering of Elements in Modal Analysis of Aircraft Wing (NACA 0012) Finite Element Method, International Congress on Engineering Innovation and Technology Development [2016]

University of Tabriz, Tabriz, Iran

Published in Persian

Ali KhalilianMotamed Bonab, Identifying and Comparing the Method of Multidisciplinary Design Optimization and its Application in Aerospace Vehicles, International Conference of Science and Engineering [2015]

Dubai, UAE

Published in Persian

PATENTS

Firefighter Hexarotor with High-Pressure Capsule and with Controllable Stands and Arms

[01/06/2018]

Inventors: Ali KhalilianMotamed Bonab, Prof. Hasan Biglari,

Title: Firefighter Hexarotor with High-Pressure Capsule and with Controllable Stands and Arms,

Contributions: Designed a novel drone independent from the water source by carrying a custom-designed composite-based fire extinguisher. Developed a novel algorithm and designed a mechanism to change the length of drone arms while keeping the motors provided moment constant to access inaccessible spaces. Proposed new stands for landing the drone in rough terrains.

Registration: State Organization for Registration of Deeds \& Real Estates, Iran, Registration No: 028919

COMMUNICATION AND INTERPERSONAL SKILLS

Ability to adapt to multicultural environments

Good ability to adapt to multicultural environments gained through my studies and research experiences abroad.

Effective communication

The effective communication skill gained by collaborating with different teams through my research experiences.

Good professional interpersonal relationship management

The good professional relationship management ability obtained by working with different undergraduate and graduate students and collaborating with different research teams.

MANAGEMENT AND LEADERSHIP SKILLS

Time management

Gained through research experience and the obligation to meet different deadlines.

Team management

Gained through managing different undergraduate research groups.

Project management

Gained through research experiences and working in different projects simultaneously.

Working under pressure

Gained through simultaneously conducting research, serving as a teaching assistant, and completing coursework during my master's and PhD programs.