*Curriculum vitae*


# Daniel Roozbahani

Nationality: Finnish
Phone: +1(610) 499 1392
Email


**Academic and Professional Profiles:**

| | | |
|---|---|---|
| Widener University | ResearchGate | SEMANTIC SCHOLAR |
| Google Scholar | ACADEMIA | IEEE Xplore |
| ACM DL | ORCID | Scopus |
| Web of Science | LinkedIn | Website |

## Academic Career and Education

**September 2021 – onward**: Assistant Professor in Robotics Engineering (Tenure Track)
**Widener University, PA – USA**

**June 2023 – onward**: Director of Widener's ARTEMIS Lab (Laboratory of AI & Robotics Technology for Biomedical Engineering, Machine Intelligence, and Simulation)

**2020 – 2021**: Docent in Robotics, Machine Automation and Mechatronics
**LUT University, Finland**

**2015 – 2019**: Post–Doctoral Researcher in Robotics, Mechatronics & Control
***Lappeenranta University of Technology*, Finland (30 months)**
**Wichita State University, KS – USA (6 months)**

- Research on Human Brain based Control
- Impact Modelling during Car Crash
- Aircraft Crash Test and Simulation

**BRP–Rotax, Rotax Academy, Gunskirchen – Austria (12 months)**

- Design and Development of Mobile Robots for CNC Machine Operation

**2011 – 2015**: Doctoral of Science in Robotics and Machine Automation
**Lappeenranta University of Technology, Finland**

- Overall grade: 4.61 0ut 0f 5 – With distinction
- Thesis title: Novel Control, Haptic and Calibration Methods for Tele–operated Electrohydraulic Servo Systems
- ISBN: 978–952–265–824–1, ISBN(PDF): 978–952–265–825–8, ISSN: 1456–4491.
- Supervisor: Prof. Heikki Handroos, Opponents: Prof. Jean–Charles Maré (National Institute of Toulouse Applied Sciences (INSA), France and Prof. Takao Nishiumi (National Defense Academy), Japan

**2009 – 2011**: M.Sc. in Mechatronics
**Lappeenranta University of Technology, Finland**

- Overall grade: 4.68 0ut 0f 5 – With distinction
- Thesis title: Novel Force Control Methods in a Tele–operation System of a Hydraulic Slider, Thesis Grade: 5 out of 5, Thesis supervisor: Prof. Heikki Handroos

**1998 – 2002**: B.Sc. in Mechatronics
**Ferdowsi University of Mashhad**
Thesis: Remote Control of Passenger Vehicles and Mobile Machines – Grade:19.5 from 20
Note: This degree also consisted of 40 Cr of major courses passed in Amir Kabir industrial university (Polytechnic Institute).

**1997 – 1998**: Pre–University Course Certificate in Mathematics
**Khatamol Anbia College, Karaj**
GPA: 18.38 out of 20

**1994 – 1997**: High school Diplomas in Mathematics
**Rajaie High School, Karaj**
GPA: 17.54 out of 20

## Honors and Awards

**2023**: Promoted Senior member in Institute of Electrical and Electronics Engineers (IEEE)
**2023 – 2023**: Best Presentation Award at the prestigious ICPDPMDC 2023: 17th International Conference on Product Development Process, Manufacturing, and Design Considerations held in New York, US
**2016 – 2019** – Winner of the CIMO – FIRST Lecturing fund for 4 consecutive years since 2016
**2015 – 2018** – Ranked between the best lecturers of the year by grades of 4.3, 4.8, 4.2 and 4.5 out of 5
**2017** – Northern European Engineering Impact Award Winner, TIERA Robot, London UK
**2016** – Best paper award at 3rd International Conference Dynamics and Vibroacoustics of Machines – Paper title: Intelligent Mapping of Stresses in a Hydraulic Crane
**2014** – Doctoral graduate with distinction, Mechanical Engineering, Lappeenranta University of Technology, Finland, Overall grade 4.61 0ut 0f 5
**2011** – MSc graduate with distinction, Mechanical Engineering, Lappeenranta University of Technology, Finland, Overall grade 4.68 0ut 0f 5
**2010** – Work experience, qualification and education has assessed by the Australian government authorized office (Engineering Australia) and praised by title of Professional Engineer
**2002** – Ranked 220th among 4000 participants in the field of Aerospace engineering in the National University Entrance Exam for Master programs
**1998** – Ranked 832nd among 400,000 participants in the "National University Entrance Exam"

## Teaching record

**RE202 – Object Oriented Programming in Robotics (C++)** – 3 Cr – Spring semesters – Widener – (2024 – )
**RE607 – Mobile Robotics** – 3 Cr – Fall semesters – Widener – (2023 – )
**RE303 – Programmable Logic Controller Lab** – 1 Cr – Summer – Widener – (2023 – )
**RE404 – Mechatronics Laboratory** – 3 Cr – Spring semesters – Widener – (2023 – )
**RE302 – Mechanics of Robotic Systems** – 3 Cr – Springs – Widener – (2023 – )
**RE 406 – Robotic Vision** – Under Graduate Level – 3 Cr – Springs – Widener – (2022 – )
**RE 603 – Robotic Vision** – 3 Cr – Grad – Springs – Widener – (2022 – )
**RE 403 – Introduction to Mechatronics** – 3 Cr – Springs – (2021 – ) - Link
**RE 401 – Control of Robotic Systems** – 3 Cr – Falls – Widener – (2021 – )
**RE 402 – Professional Seminar** – 1 Credit – Falls – Widener – (2021 – ) - Link
**BK60A1400 – Advanced Robotics** – 3 Cr – Intensive Course – Invited Guest Professor – SPSPU
**BK60A1700 – Control and Design of Robot Systems** – 5 Cr – Post Grad – LUT – (2020 – 2021)
**BK60A6600 – Robotics** – 5 Cr – Bachelor level course in Robotics – LUT – (2020)
**BK60A1500 – Lab Course in Motion Control and Mechatronics** – 5 Cr – Springs – Post Grad – LUT (2017 – 2021)
**BK60A1001 – Control of Mechatronic Machines** – 5 Cr – Falls – Post Grad – LUT (2016 – 2021)
**BK60A1600 – Advances in Robotics** – 1 Cr – Intensive course – Falls – Post Grad – LUT (2014 – 2018)
**BK10A4600 – Control of Mechatronic Machines** – Online course – 5 Cr – Falls – LUT
**BK60A1000 – Control of Mechatronic Machines** – 6 Cr – Falls – Post Grad – LUT (2016 – 2017)
**BK60A1200 – Programing in Control and Mechatronics** – 6 Cr – Springs – LUT (2014 – 2016)
**BK60A1001 – Servo Control** – 6 Cr – Falls – Post Grad – LUT (2012 – 2015)
**BK30A0600 – Laser Based Products and Production Technology** – 5 Cr – Springs – Seminars – LUT (2012 – 2013)

## Member of editorial boards or reviewer at journals or conferences

**2024 - present:** MDPI Process Journal – Reviewer – Impact Factor: 2.8, Link
**2024 - present:** MDPI Actuators Journal - Reviewer – Impact Factor: 2.2, Link
**2024 - present:** MDPI Machines Journal - Reviewer – Impact Factor: 2.1, Link
**2024 - present:** MDPI Signals Journal - Reviewer – Cite Score: 3.2, Link
**2024 - present:** Advances in Materials and Processing Technologies – IF: 2.2, Guest Editor - Link
**2023 - present:** MDPI Journal of Micromachines - reviewer – Impact Factor: 3.0, Link

**2019 - present:** International symposium on Fluid Power and Motion Control (FPMC) - reviewer
**2023:** Maryland Industrial Partnerships Program - 2022-23, Proposals reviewer - Link
**2023 - present:** Sage Journal of Advances in Mechanical Engineering - reviewer – Impact Factor: 1.9, Link
**2023 - present:** Advances in Materials and Processing Technologies – Impact Factor: 2.2, Reviewer - Link
**2022:** Pennsylvania Manufacturing Fellows Initiative 2022-23 Proposals reviewer – USA - Link
**2018:** FPNI10 Conference reviewer – Russia
**2018:** Bath/ASME symposium on fluid power and motion control – UK - Link
**2016:** FPNI9 Conference reviewer – Brazil
**2016 – Present:** ASME Computational and Nonlinear Dynamics – Reviewer - Impact Factor: 2.0, Link
**2014 – Present:** IEEE Journal of Sensors - reviewer – Impact Factor: 4.3, Link
**2014:** 2nd Int Conference on Dynamics and Vibroacoustics of Machines reviewer – Russia
**2014:** FPNI8 Conference reviewer – Finland

## Work Experiences

**2021 – Present**: Widener University – Department of Robotics Engineering (USA) - Link
Job title: Assistant Professor (Tenure Track)
Type of Activity: Research, Project Management, Teaching, Supervision, Publication, Fund application

**2010 – 2021**: Lappeenranta University of Technology – Laboratory of Intelligent Machines (FI) - Link
Job title: Associate Professor, Post-Doc, Project Manager, Lecturer, Research Scientist
Type of Activity: Research, Project Management, Teaching, Supervision, Publication, Fund application

**2018 – 2019**: BRP – ROTAX (Austria) - Link
Job title: Project Manager
Type of Activity: Technical management of the BRP–ROTAX project of development of an autonomous robot for 24/7 manufacturing

**2017 – 2017**: Wichita State University – Department of Mechanical Engineering (USA) - Link
Job title: Research Fellow
Type of Activity: Research, Joint publication, Joint fund application

**2013 – 2017**: LUT – Laboratory of Laser Processing (Finland) - Link
Job title: Project Manager
Type of Activity: Project management of the FP7 APPOLO project in the field of Real–time laser process monitoring

**2010 – 2012**: LUT – Centre of Computational Engineering and Integrated Design – (Finland)
Job title: Researcher
Type of Activity: High–tech Research institute

**2008 – 2009**: GSI (Gostaresh Steel Industries)
Job title: Utility Manager
Type of Activity: Steel Industry

**2006 – 2008**: BMW - Link
Job title: Service Manager
Type of Activity: Automobile sales & services

**2005 – 2006**: STES Co. (Sharif Technology & Engineering Services Group)
Job title: Head of technical team
Type of Activity: Technology & Engineering Services

**2003 – 2005**: KIA Motors / Citroen (SAIPA) – Link, Link
Job title: Automotive Engineer / Workshop Manager
Type of Activity: Aftersales service

**2002 – 2003**: DatisKar
Job title: QC Engineer
Type of Activity: HVAC, Boiler, Air Conditioning, Industrial Machines in the field of fluid mechanics and heat transfer

## Administrative Responsibilities

- Member of the Awards and Financial Aids Committee @ Widener University - School of Engineering since 2021.
- Member of the AI, Pedagogy, and the Curriculum Committee @ Widener University since 2023.
- Member of the Academic Affairs Committee @ Widener University since 2024.
- Head of the application review team for new degree student in–takes at mechanical engineering department @ LUT (2015-2016)

## Invited as Keynote Speaker

2018 – Keynote speaker at Cognitive and Collaborative Robotics – Future of Robotics in Finland Seminar, IEEE Finland – Tampere University of Technology – Finland – Link, Link

2018 – Keynote speaker at ATEX FORUM – Industrial Safety Seminar 2018 – ATEX Denmark – Aarhus University, Denmark - Link

2015 – Keynote speaker at 15th Nordic Laser Materials Processing Conference – NOLAMP15, Finland - Link

## Memberships

- **IEEE** – Senior Member, Institute of Electrical and Electronics Engineers, Membership #.: 92729820
- **ASME** – Member, American Society of Mechanical Engineers, Membership #.: 000100698131
- **Biomedical Engineering Society (BMES)** – Member, Biomedical Engineering Society
- **Vertical Flight Society (VFS)** – Membership ID: 32385
- **Australian Professional Mechanical Engineers** - ASCO 2126–11, Membership ID:  3651204

## Language Skills

English, Finnish, Persian

## Invention Patents and Disclosures

FI20165689A - Method and equipment for controlling laser engraving, Finland, Mika Ruutiainen, Daniel Roozbahani, Antti Salminen, Worldwide applications, (2018-03-17) - Link

WO2019020865A1 - Powder removal and recycling, Inventors: Pasi Piispa, Sebastian Mathews, Daniel Roozbahani, Antti Salminen (2019-01-31) - Link

FI20175699A1 - Powder removal and recycling Application, Inventors: Daniel Roozbahani, Antti Salminen, Pasi Piispa, Sebastian Mathews (2019-01-25)

FI20165691A - Direct real-time monitoring of laser processing, Finland, Pekka Marttinen, Daniel Roozbahani, Antti Salminen, Worldwide applications, Application filed by Lappeenrannan Teknillinen Yliopisto, 2018-03-17 - Link

## Summary of Academic and Industrial Projects

**Widener's Provost Office Research Funds – 4 Grants**

2022, 2023, 2024

**Widener's Faculty Development Projects - 3 Grants**

2022, 2023, 2024

**Widener's ARTEMIS Lab**

**Period:** Started @ January 2023

**Funding agency:** Widener's School of Eng. Deans' Office
**Funding:** 106 K$
**Position in the project:** Project manager
**Project Idea:** To design and develop a state–of–the–art universal laboratory on AI & Robotics Technology for Biomedical Engineering, Machine Intelligence, and Simulation.

## CENTAUR Mobile Robot Project

**Project title:** CENTAUR - Intelligent Ground Mobile Robot for Construction and Urban Monitoring
**Researcher(s):** James M Crew Jr., Elizabeth M Williams
**Research concept:** This project is a design and development of a 6-wheel drive mobile robot platform that features a robotic arm as well as a robotic head operated through a VR headset. The robot will be able to operate remotely, giving the vehicle the capability to perform tasks in settings unsafe for humans. Vehicles like this can be utilized in fields such as inspection, search and rescue, and is able to maneuver in all kinds of terrains due to the robot's versatility. The vehicle will be able to operate anywhere on a 5G network from the control station and will have various sensors to give the vehicle and operator additional information about its surroundings. A robot with the capabilities of this project can be utilized in countless applications and vehicles with similar concepts are already being used by the US Military, various police departments and SWAT teams, as well as NASA.

## Skywalker project

**Project title:** Skywalker II - Design and Development of a Fully Autonomous Intelligent Drone
**Researcher(s):** Connor J Lalonde, Anthony M Boccuti, Rachel A Gabaree, Jaina L Smashey, James S Ravagni
**Research concept:** This project explores the development of a cutting-edge autonomous hexa-copter (Skywalker) featuring integrated power generation for extended range designed to achieve the operational longevity of multi-rotor drones via novel power management and autonomy. The core of this research is a fully autonomous Hexa-Copter, capable of conducting flight, navigation, and landing, featuring a compact combustion engine paired with a generator for in-flight battery recharge. Efforts are concentrated on refining the energy efficiency and power management of the onboard combustion engine generator for peak performance. Additionally, the developed battery management method in this study employs a dual Lithium Polymer (LiPo) battery system, innovatively configured to ensure continuous operation: while one battery supplies power, the other undergoes rapid recharging via the onboard combustion engine-driven generator. This dynamic power system is orchestrated by a proprietary optimization algorithm designed to maximize charging efficiency and battery capacity. The algorithm prioritizes swift energy restoration, ensuring minimal downtime and sustained flight endurance. The charging strategy is fine-tuned to exploit the periods when the drone is under less operational demand, thereby enhancing the overall energy economy of the system. This approach represents a significant advancement in power management for autonomous UAVs, enabling prolonged missions and reliable performance in a variety of conditions. The drone is equipped with an image-processing and pattern-recognition platform for ground awareness and autonomous operation, which enhances maneuverability and stability, as well as a user-centric interface for operator management. The Skywalker II offers superior charging and intelligent control, with specifications such as a maximum takeoff weight of 160 lbs and a flight radius of over 20,000 ft, more than triple that of the best product currently available in the market by DJI (AGRAS T40). Proposed adaptations aim to extend the non-stop flight duration for UAVs, addressing the existing major challenge of limited flight duration of UAVs and the innovative solutions developed based on the results of this project could transform the drone industry.

## NeurOracle Project

**Project title:** NeurOracle - AI-Driven Innovations in Biomedicine for Neurological Disease Forecasting
**Researcher(s):** Shaylyn H Westmoreland
**Research concept:** The NeurOracle project aims to develop an AI-based platform for the early diagnosis of Multiple Sclerosis (MS) by leveraging image processing and analysis of neuroimaging databases. Multiple Sclerosis (MS) pose significant challenges in healthcare, and early detection plays a crucial role in improving patient outcomes and enabling timely interventions. By harnessing the power of artificial intelligence, the NeurOracle project seeks to provide a cutting-edge solution that enhances the accuracy and efficiency of diagnosis, ultimately leading to improved patient care. The NeurOracle project aims to address the limitations and challenges associated with the diagnosis of Multiple Sclerosis (MS). By leveraging image processing techniques and analyzing vast neuroimaging databases, the project seeks to develop an AI-based platform that can identify early structural deficits and biomarkers associated with Multiple Sclerosis (MS). This platform has the potential to revolutionize the way Multiple Sclerosis (MS) are diagnosed, providing healthcare providers with a powerful tool to improve patient outcomes.

## CardioForecaster Project

**Project title:** CardioForecaster - Intelligent Biomedical Imaging for Future Cardiovascular Disease Risk Assessment
**Researcher(s):** Krysta L Bernold, Mathieu L Colon, Kylie G Herbert, Valerie S Balas, James Evangelisto III

**Research concept:** This project proposes an innovative approach, aiming to develop an AI-driven platform for forecasting cardiovascular disease. The system leverages two key components: a trained AI algorithm and a deformable 3D simulation of the human heart and cardiovascular system. The AI algorithm is trained on pre-processed, segmented, and sliced CT scans of de-identified myocardial infarction patients obtained from the SegMed medical image database. During training, the algorithm focuses on identifying blockages in the Left Anterior Descending (LAD) artery, which is the most commonly affected site in heart attacks [2]. Python is utilized for image processing and segmentation, preparing the data for optimal AI training. Following training, the algorithm undergoes validation, troubleshooting, and testing to ensure accuracy and reliability. Phase two of the project revolves around constructing a simulation platform of blood flow within a detailed 3D model of the heart and cardiovascular system, with specific emphasis on LAD artery blockages using platforms such as Autodesk Inventor, 3D MAX, and ANSYS Fluent software. Blood is modeled as a non-Newtonian fluid, reflecting its complex properties to enable analysis of blood flow dynamics to analyze the consequences of arterial blockages on heart function on each specific patient. The platform allows for replicating specific blockages observed in patient CT scans to provide a tool for validating the accuracy of the AI-based diagnostic algorithm.

### Thor's Hammer

**Project title:** Thor's Hammer- Enhancing Motion Capture for Improved Throwing Records Compared to Olympic Record Holder

**Researcher(s):** Ada Pach, Alexander W Kristeller (Alumni)

**Research concept:** This research project is concentrated on using a motion capture camera platform to create a multibody model of Widener's hammer thrower Alex Kristeller (PB - 64.7m / 212.5ft) movement during the throw to improve his national record by comparing his movements to the movements of the world record holder in hammer throwing, Yuriy Sedykh (WR - 86.74m / 284.58ft), multibody dynamic model extracted from his hammer throwing videos using machine vision.

### GreenBallast

**Period:** Started @ January 2021

**Funding agency:** Business Finland

**Funding:** 495 K€

**Position in the project:** Project manager

**Project Idea:** In this project our team is designing and developing a novel solution for the issue of ballast water in ships which transfer their ballast from different places in the world to other parts of the globe.

### TIERA II

**Period:** Started @ June 2020

**Funding agency:** Business Finland

**Funding:** 620 K€

**Position in the project:** Project manager

**Project Idea:** The main idea in this project is to address and solve the main challenges in front of achieving the concept of "Fully Automated Robot–based Manufacturing" and to develop collaborative robotic factories for 24/7 manufacturing. The plan is to address and solve the current issues with an industrial level Cobotic based manufacturing to build the fully functional and safe cobotics factory. - Link

### RoboCamp

**Period:** 2019 - 2021

**Funding agency:** European Union

**Funding:** 371 K€

**Position in the project:** Sub - Project manager

**Project Idea:** The goal of the project was to create competitiveness for companies by studying their traditional manufacturing methods to design and offer new innovative ways to apply robotics and automation into their manufacturing processes. Link, Link

### OneDrop

**Period:** Started @ April 2019

**Funding agency:** South–East Finland–Russia CBC

**Funding:** 1.3 M€

**Position in the project:** Project manager

**Project Idea:** The objective of this project is to study, design and develop a mobile water purification plant based on a novel methodology. Via this project, we are trying to design and develop a novel mobile water purification system to provide a powerful tool for environmentally responsible authorities. - Link, Link, Link, Link, Link

### UltraSimmi

**Period:** Started @ January 2019
**Funding agency:** LUT Investment
**Funding:** 650 K€
**Position in the project:** Project manager
**Project Idea:** The main objective of the project is to design and develop a state–of–the–art Universal Laboratory on Virtual Reality, Real – time Simulation and Human Machine Interactions

### People for tHe eurOpean bioENergy mIX (PHOENIX)

**Period:** Started @ November 2017
**Funding agency:** H2020–EU.1.3.3. – Stimulating innovation by means of cross–fertilization of knowledge
**Funding:** 1.4 M€
**Position in the project:** Sub – Project manager
**Project Idea:** The development and adoption of renewable and sustainable forms of energy has become a major priority for Europe and is an important theme in H2020. Research into new, energy–related technologies to reduce Europe's reliance on non–renewable fossil fuels is a critical need and requires more newly qualified people in areas such as renewable–energy infrastructure management, new energy materials and methods, as well as smart buildings and transport. Link, Link

### New Art of Reason "Newarea"

**Period:** 1.9.2016–31.8.2019
**Funding agency:** TEKES
**Funding:** 237 K€
**Position in the project:** Project manager
**Project Idea:** Advanced manufacturing using 3D printing

### TIERA I

**Period:** Started @ March 2016, Ended @ September 2018
**Funding agency:** LUT Investment
**Funding:** 250 K€
**Position in the project:** Project manager
**Project Idea:** Design and development of a special mobile robot that can sense, navigate, and monitor its surroundings and conduct repairs and assembly tasks in inhospitable areas.

### APPOLO (Hub of Application Laboratories for Equipment Assessment in Laser Based Manufacturing)

**Period:** Started @ September 2013, Ended @ September 2017
**Funding agency:** European Union 7th framework project
**Funding:** 14 M€
**Position in the project:** Sub – Project manager
**Project Idea:** The APPOLO project seeks to establish and coordinate connections between the end–users, which have demand on laser technologies for (micro)fabrication, knowledge accumulated in the application laboratories of research institutes and universities and the laser equipment manufacturers (preferable SMEs: for integration, lasers, beam control and guiding, software, etc.), Link, Link, Link

### SIM Platform

**Period:** Started @ September 2016, ongoing
**Funding agency:** LUT Platforms
**Funding:** 3 M€
**Position in the project:** Sub – Project manager
**Project Idea:** SIM platform takes simulator–driven design and manufacturing methodologies to the next level, enables community–based real–time simulation for energy efficient solutions, gives visibility and accessibility to multiple actors throughout the product and production system life cycle, Extends the simulator aided design from a single machine to entire production systems, Represents real–world functionality. Offers development and test opportunities for the internet of things (IoT) and the use of smart materials, for example, Results in a more rapid innovation process, reduced development costs, and improved product and production process sustainability, serves as a tool to analyze the business potentials of the forthcoming solutions, creates new ways to increase customer value.

### Novel Methods in Heavy Duty Robots and Manipulators

**Period:** Started @ September 2011, September 2015
**Funding agency:** Finnish Academy
**Funding:** 400 K€
**Position in the project:** Project researcher – Doctoral candidate
**Project Idea:** To design, develop and experiment novel methods in heavy duty robots and manipulators

### Shadegan Steel Plant

**Period:** Started @ September 2007
**Funding agency:** IMIDRO
**Funding:** 4 B€
**Position in the project:** Project Utilities Engineer
**Project Idea:** Heavy duty cranes, Chemical plants, Oxygen plant, Compressed air plant

### BMW Aftersales Center

**Period:** Started @ September 2006, Ended @ September 2008
**Funding agency:** BMW
**Funding:** 1 M€
**Position in the project:** Project Manager
**Project Idea:** 1) Diagnosis shop and main warehouse design and development including: Designation of all Mechanical and electrical systems, Layout and equipment choosing as the project manager based on BMW standards. 2) BMW General Service shop and employee facilities design and development

### Engine Test Cell

**Period:** Started @ June 2005, Ended @ October 2006
**Funding agency:** National Oil Company
**Funding:** 800 K€
**Position in the project:** Project coordinator
**Project Idea:** Installation of an engine test cells in Oil Industry Institute to test new engines performance and emission, cooperation with CP Engineering Co. as equipment supplier

## Books and reports

- Novel control, haptic and calibration methods for teleoperated electrohydraulic servo systems, Daniel Roozbahani, Lappeenranta 2015, 82p., Acta Universitatis Lappeenrantaensis 650, Diss. Lappeenranta University of Technology, ISBN 978–952–265–824–1, ISBN 978–952–265–825–8 (PDF), ISSN–L 1456–4491, ISSN 1456–4491, Link

- Novel force control methods in a teleoperation system of a hydraulic slider, Roozbahani, Daniel (2011), Avaa tiedosto nbnfi–fe201111075801.pdf (5.062Mt) Lataukset: Roozbahani, Daniel 2011, Diplomityöt [5410], Link

## Supervision of Doctoral, Master and Bachelor Thesis's and Dissertations

**@ Widener University:**

**Graduate Level Thesis Supervisions:** 4 completed

**Undergraduate Level Senior Project Supervision:** 3 teams (15 researchers) completed

**@ LUT University:**

**Graduate Level Thesis Supervisions:** 45 completed

**Undergraduate Level Thesis Supervisions:** 5 completed

**Internship Supervisions:** 15 completed

**Doctoral Thesis Supervisions:** 2

## Doctoral students

- **Dmitrii Motorin**, double degree/joint supervision doctoral student, Energy Systems/Mechanical Engineering, Heikki Handroos, Daniel Roozbahani, Vladimir Zabrovsky, Started from 2019, OneDrop Project
- **Alina Byzova**, Doctoral student, Energy Systems/Mechanical Engineering, Heikki Handroos Daniel Roozbahani, Started from 2019, OneDrop Project

## Master students

### 2023

- **Anthony H Dugan**, Development of a Pan and Tilt Robotic Head Equipped with Dual Cameras and Ear-form Microphones to Simulate Human's Head Movement, Vision and Hearing as Communicating with a Set of VR Glasses as the Master – To be completed on May 2023

### 2022

- **Anton Matsuganov**, Design and development of an actuated Lidar platform to create environmental surveillance maps for construction application
- **Yonas Taye Benti**, Design and development of a laser projection platform as assistant for mapping the utilities during construction projects
- **Tuomas Syyrilä**, Development of a collaborative robot manufacturing workstation

### 2020

- **Mikael Paalanen**, Development of Press Pneumatics
- **Aleksandra Loskutova**, Development of a Control Platform for a Robotic Gripper Utilizing EMG Signals of Human's Muscles
- **Valeriya Surkina**, Development a Virtual Reality Training for CNC Milling Machine Operators
- **Veronika Kudriavtseva**, Development of a network of Virtual Reality headsets with a shared environment for an industrial application utilizing Unity platform
- **Oscar Moradi**, Improvement of the Measuring Accuracy of Measuring Scanner by Isolation of Circumstantial factors
- **Jussi Asikainen**, Development of a universal real–time control platform for a hydraulic servo system, utilizing the system's mathematical model and multibody simulation

### 2019

- **Ahmed Abdelsalam**, A Novel Method to Re–Design Metallic Components, Utilizing Metal 3D Printing Advantages, By Functionality and Efficiency Evaluation of The Components Using Simulation and Lab Analysis
- **Arina Lomp**, Development of a Robust Communication and Control Platform Between a 5–axis CNC Machine and a Mobile Tele–Operated Collaborative Robot
- **Mohamed Korium**, Development of a metal 3D printing process for jewelry production utilizing Titanium
- **Rustem Sadykov**, Development of a Real–Time Platform for Mapping and Transfer of Video, simulation and Movement between a Humanized Robotic Head and a Set of VR Glasses
- **Vedant Sharma**, Study and research on wood–based materials in 3D printing of packaging parts
- **Vladislav Vasilev**, Design and Development of a State–of–the–art Universal Laboratory for Virtual Reality, Real–time Simulation and Human–Machine Interaction
- **Kirill Krylov**, Development of a platform for 3D Design to direct 3D print process utilizing Sensable Phantom

**2018**
- **Kirill Romanov**, Development of OMNI Based Traction System for a Mobile Robot Utilizing ROS Platform
- **Stanislav Ustinov**, Development of a Novel Real–Time Model of Human Skeleton in Mevea Platform
- **Antti Ahomäki**, Development of a coordinate–based control strategy for a material handling machine utilizing a real–time simulation
- **Mikhail Proskuriakov**, Control of a Hydraulic Servo System Using Beckhoff Real–time Data Acquisition Computer Based on MATLAB/SIMULINK Platform
- **Kaushikk Iyer**, A Novel Wind Energy based House Heating System, utilizing a Direct Conversion of Hydraulic Power to Heat
- **Aleksandr Lukin**, Development of control system for robotic arms of mobile assembly robot

**2017**
- **Iaroslava Andreeva**, The suitability of color laser marking technology for industry
- **Efim Poberezkin**, Design and development of communication system for mobile robot
- **Ekaterina Menshova**, Development of LabVIEW platform for lower-level subsystems of ROS–operated mobile assembly robot
- **Mehrnaz Modaresialam**, Real time monitoring of additive manufacturing
- **Zahra Rezaeisavadkohi**, Monitoring of Diode Laser Polymer Welding
- **Henri Kauppila**, Development of TIERA robot ROS servo control system

**2016**
- **Sebastian Matthews**, A new approach for design and development of a metal additive manufacturing machine
- **Jaakko Roima**, Development of a motion control system for processing with ultra–high–speed laser
- **Pasi Piispa**, Development of additive manufacturing machine for metal materials
- **Syed Chowdhery**, Quadcopter assistant for a mobile assembly robot
- **Sameer Kunwor**, Chassis frame design of a mobile platform equipped with robotic arms
- **Igor Soroka**, Design and implementation of machine vision system for the mobile assembly robot

**2015**
- **Konstantin Frumkin**, Adaptive control of Hydraulic Drive
- **Pekka Marttinen**, Real–time monitoring of laser scribing process with high speed camera
- **Veli–Matti Valtonen**, Real–time monitoring of laser scribing process with photodiodes
- **Juha–Matti Herpiö**, Simulation of wind powered hydraulic heating system
- **Samrat Gautam**, Development of collision avoidance control for tele–operated dual robotic arm

**2014**
- **Andres Belunce**, Novel control method for overhead crane's load stability, Link, Link
- **Ikechukwu Chima**, Experimentation on wind powered hydraulic heating system

- **Ziki Isaac**, Comparison between dSPACE and NI systems based on real–time intelligent control of a tele–operated hydraulic servo system
- **Mika M Ruutiainen**, Real time adaptive control of ultra–fast laser scribing process with spectrometer online monitoring

**2013**

- **Appiah–Osei Agyemang**, Intelligent mapping of stresses in a hydraulic crane
- **Ermiyas Assegu**, Integrator Backstepping Position Control of Asymmetric Electro–Hydraulic Servo System Based on Particle Swarm Optimization

## Bachelor students:

- **Tuomas Syyrilä**, Development of a control framework for a serial robot manipulator and gripper based on Robot Operating System platform (ROS) – 2020
- **Ilia Dobriakov**, Design and Development of a ROS Based LiDAR Platform to Scan Environment for a Mobile Ro–bot's Autonomous Motion – 2019
- **Janne Martikainen**, Älykkään Kalastusvieheen Suunnittelu, Design of an intelligent fishing lure – 2018
- **Perttu Juvonen**, PLC–ohjelmoinnin Opetuksen Pelillistäminen, Gamifying the education of PLC–programming – 2018
- **Tuomas Huuskonen**, Development of a Codesys exercise environment and designing an assignment – 2018

## Supervision of Visiting Scholars

- **Gaëtan Lescaut**, Development of an autonomous control platform in ROS for traction of a mobile robot to safely maneuver inside the manufacturing plant and meet the production line needs– Supmeca – Paris, France – 2020
- **Victor Gottar**, Development of a Novel Real-Time Model of Human Skeleton in Mevea Platform– Supmeca – Paris, France – 2020
- **Matthieu Juguet**, Development of a control platform based on ROS – Profi–Net to connect a mobile robot equipped with a collaborative arm to a Siemens S7 PLC– Supmeca – Paris, France – 2020
- Lara Homberger, Programming of lower-level sensory systems for a mobile assembly robot – Supmeca – Paris, France – 2020
- **Lucie Delahaye**, Design and development of a safety platform for an autonomous mobile robot inside a manufacturing plant in collaboration with humans– Supmeca – Paris, France – 2020
- **Juliette Melierre**, Design and development of an autonomous charging platform for a tele–operated mobile robot utilizing ROS ROS– Supmeca – Paris, France – 2020
- **Florian Picard**, Development of a Control Platform based on ROS–Profi–BUS, to connect a mobile robot equipped with a collaborative arm to a CNC milling machine's PLC – Supmeca – Paris, France – 2020
- **Vanille Lambert**, Development of an autonomous control platform for a mobile robot UR10 arm based on ROS utilizing the input from vision cameras – Supmeca – Paris, France – 2019
- **David Boisdron**, Programming of a mobile assembly robot – Supmeca – Paris, France – 2019
- **Kevin Rossi**, Development of a remote–control system for two UR10 robot arms, grippers and haptic system of a tele–operate mobile robot based on LabVIEW platform – Supmeca – Paris, France – 2019
- **Paul Regnier**, Unification of all the control systems of a Tele–operated mobile robot based on LabVIEW platform – Supmeca – Paris, France – 2017
- **Kristof Szombati**, Design and development of haptic sense for a robotic gripper, Budapest University of Technology and Economics, Hungary – 2018

- **Eszter Tozser**, Atomization of the color laser marking of metals utilizing LabVIEW platform, Budapest University of Technology and Economics, Hungary – 2017
- **María I. Artigas**, Development of force controller for LUT Mobile Assembly Robot arms – University of Seville, Spain – 2017
- **Miguel Cordero Sanchez**, Development of OMNI traction based on ROS approach – Technical University of Madrid, Spain – 2017
- **Nativel Chloe**, Assembly and programing of a Teleoperated mobile robot – Supmeca – Paris, France – 2016

## List of Publications

## Published Journal papers

- Anthony H Dugan, Rustem Sadykov, Daniel Roozbahani, Marjan Alizadeh and Heikki Handroos, Full Immersive Telepresence Through Integration of a VR-Headset with a Teleoperated Humanoid Robotic Head Featuring Real-Time Stereoscopic Vision and Binaural Auditory Perceptions (December 2023), *Springer Virtual Reality*, Preprint, DOI: 10.21203/rs.3.rs-3826544/v1, Link

- Appiah-Osei Agyemang, Sasu Mäkinen, Daniel Roozbahani, Marjan Alizadeh, Heikki Handroos, Intelligent Mapping and Control of Stresses in a Hydraulic Materials Handling Crane (2024), *Engineering Structures*, Under Review

- Aleksandra Loskutova, Daniel Roozbahani, Marjan Alizadeh, Heikki Handroos, Design and Development of a Robust Control Platform for a 3-Finger Robotic Gripper Using EMG-Derived Hand Muscle Signals in NI LabVIEW (2024), *Journal of Intelligent & Robotic Systems*, second revision

- Samrat Gautam, Ming Li, Daniel Roozbahani, Marjan Alizadeh, Heikki Handroos, Design and Development of an Intelligent Collision Avoidance Platform for a Teleoperated Dual Robotic Arm (2024), *IFAC Mechatronics journal*, Under Review

- Kaushikk Iyer, Daniel Roozbahani, Marjan Alizadeh, Heikki Handroos, A Novel Approach for Direct Conversion of Wind Energy to Heat Utilizing a Hydraulic Medium for Domestic Heating Applications, *Energy Reports*, Volume 8, November 2022, Pages 11139-11150. https://doi.org/10.1016/j.egyr.2022.08.255

- Poberezkin, E., Roozbahani, H., Alizadeh, M. et al. Development of a robust Wi-Fi/4G-based ROS communication platform for an assembly and repair mobile robot with reliable behavior under unstable network or connection failure. *Artificial Life and Robotics* 27, 786–795 (2022). https://doi.org/10.1007/s10015-022-00792-5

- Dmitrii Motorin, Daniel Roozbahani, Heikki Handroos, Development of a Novel Method for Estimating and Planning Automatic Skimmer Operation in Response to Offshore Oil Spills, June 2022, *Journal of Environmental Management 317(11)*, https://doi.org/10.1016/j.jenvman.2022.115451

- Daniel Roozbahani, Marjan Alizadeh, Heikki Handroos, Antti Salminen, Design and Development of a Multi–Sensory Real–Time Monitoring Platform for Ultrafast Laser Engraving Process, June 2022, *IEEE Access*, https://doi.org/10.1109/ACCESS.2022.3185131

- Mehrnaz Modaresialam, Daniel Roozbahani, Marjan Alizadeh Heikki Handroos, Antti Salminen, In–Situ Monitoring and Defect Detection of Selective Laser Melting Process and Impact of Process Parameters on the Quality of Fabricated SS 316L, April 2022, *IEEE Access*, https://doi.org/10.1109/ACCESS.2022.3169509

- Mika Ruutiainen, Daniel Roozbahani, Marjan Alizadeh, Heikki Handroos, Antti Salminen, Real–Time Monitoring and Control of Ultra–Fast Laser Engraving Process Utilizing Spectrometer, March 2022, *IEEE Access*, https://doi.org/10.1109/ACCESS.2022.3156280
- Veli–Matti Valtonen, Daniel Roozbahani, Marjan Alizadeh, Heikki Handroos, Antti Salminen, Real–Time Monitoring and Defect Detection of Laser Scribing Process of CIGS Solar Panels Utilizing Photodiodes, January 2022, *IEEE Access*, https://doi.org/10.1109/ACCESS.2022.3158355
- Daniel Roozbahani, Mohamed Korium, Marjan Alizadeh, Svetlana Perepelkina, Heikki Handroos, Direct Metal Laser Sintering of Precious Metals for Jewelry Applications: Process Parameter Selection and Microstructure Analysis, September 2021, *IEEE Access 9(99):126530–126540*, https://doi.org/10.1109/ACCESS.2021.3112479
- Daniel Roozbahani, Marjan Alizadeh, Stanislav Ustinov, Heikki Handroos, Development of a Novel Real–time Simulation of Human Skeleton/Muscles, December 2020, *Journal of Biomechanics 114(110157)*, https://doi.org/10.1016/j.jbiomech.2020.110157
- Daniel Roozbahani, Marjan Alizadeh, Antti Ahomäki, Heikki Handroos, Coordinate–based control for a material handling equipment utilizing real–time simulation, *Elsevier Automation in Construction journal*, December 2020, 122:103483, https://doi.org/10.1016/j.autcon.2020.103483
- Daniel Roozbahani, Alina Boyzova, Amin Hekmatmanesh, Hamid Lankarani, Nils Hakinson, Heikki Handroos, Real–Time Monitoring of the Human Body Using Inertial Motion Capture System and Brain Behavior Using EEG Utilizing Horseback Riding Simulator, *IEEE Access*, Volume 8, Page 162163–162171, September 2020, https://doi.org/10.1109/ACCESS.2020.3021746
- Daniel Roozbahani, Marjan Alizadeh, Heikki Handroos, Antti Salminen, Color Laser Marking: Repeatability, Stability and Resistance Against Mechanical, Chemical and Environmental EffCr, *IEEE Access*, November 2020, https://doi.org/10.1109/ACCESS.2020.3040744
- Daniel Roozbahani, Alina Boyzova, Hamid Lankarani, Nils Hakinson, Heikki Handroos, Monitoring of the human body and brain behavior using optical motion capture system and EEG utilizing horseback riding simulator: an extended case study, *Journal of Physical Therapy Science 32(1):85–91*, January 2020, https://doi.org/10.1589/jpts.32.85
- Daniel Roozbahani, Galina Odintsova, Yaroslava Andreeva, Antti Salminen, V. C. Luong, Roman Yatsuk, Victoria Golubeva, Valery Romanov, Vadim Veiko, Investigation of Production Related Impact on the Optical Properties of Color Laser Marking, *Journal of Materials Processing Technology*, https://doi.org/10.1016/j.jmatprotec.2019.116263
- Daniel Roozbahani, Heikki Handroos, A novel haptic interface and universal control strategy for International Thermonuclear Experimental Reactor (ITER) welding/machining assembly robot, *Robotics and Computer–Integrated Manufacturing journal*, December 2018, https://doi.org/10.1016/j.rcim.2018.12.011
- Daniel Roozbahani, Pekka Marttinen, Antti Salminen, Real–Time monitoring of Laser Scribing Process of CIGS Solar Panels Utilizing High Speed Camera, *IEEE Photonics Technology Letters PP (99):1–1*, August 2018, https://doi.org/10.1109/LPT.2018.2867274
- H Roozbahani, A Salminen, M Manninen, Real–time online monitoring of nanosecond pulsed laser scribing process utilizing spectrometer, *Journal of Laser Applications 29 (2)*, 022208 – 2017, https://doi.org/10.2351/1.4983520

- Daniel Roozbahani, Alireza Fakhrizadeh, Heikki Haario, Heikki Handroos, Novel Online Re– Calibration Method for Multi–Axis Force/Torque Sensor of ITER Welding/Machining Robot, *IEEE Sensors Journal 13(11):4432–4443*, November 2013, https://doi.org/10.1109/JSEN.2013.2274195
- Andres Belunce, Vinicius Pandolfo, Daniel Roozbahani, Heikki Handroos, Novel Control Method for Overhead Crane's Load Stability, *Elsevier Procedia Engineering 106:108–125* · June 2015, https://doi.org/10.1016/j.proeng.2015.06.014
- Daniel Roozbahani, Heikki Handroos, TIERA – Mobiele Assemblagerobot Voor Gevaarlijke Omgevingen, *Journal of Vision and Robotic*, Y10N2, Pages: 1–5, April 2018, Link
- Daniel Roozbahani, Heikki Handroos, Mobiele Assemblagerobot Voor Risicovolle en Gevaarlijke Omgevingen, *Journal of Thema Robotica*, Y10N2, Pages: 24–25, December 2017, Link

## Peer reviewed conference papers

- Shaylyn Westmoreland, Daniel Roozbahani, Development of an Artificial Intelligence-based Platform for Early Diagnosis of Neurological Disorders Using Image Processing and Analysis of Neuroimaging Databases (2024), 92nd American Association of Neurological Surgeons (AANS) Annual Scientific Meeting 2024, Chicago, United States
- Shaylyn Westmoreland, Daniel Roozbahani, NeurOracle (2024), 9Th annual Americas Committee for Treatment and Research in Multiple Sclerosis (ACTRIMS) 2024, Chicago, United States
- Abdelsalam, A., Roozbahani, D., Alizadeh, M., & Handroos, H. (2023). Additive Manufacturing's Impact on Product Design and Development - An Industrial Case Study. *ICPDPMDC 2023: 17th International Conference on Product Development Process, Manufacturing and Design Considerations* (pp.118-128 ). New York, United States, Link

  A. Lukin, G. L. Demidova, A. Rassõlkin, T. Vaimann and H. Roozbahani, "Force-based Feedback for Haptic Device of Mobile Assembly Robot," *2020 27th International Workshop on Electric Drives: MPEI Department of Electric Drives 90th Anniversary (IWED)*, Moscow, Russia, 2020, pp. 1-5, https://doi.org/10.1109/IWED48848.2020.9069581

- Daniel Roozbahani, Juha–Matti Herpiö, Rafael Åman, Heikki Handroos, Simulation of Wind Powered Hydraulic Heating System, 2018 *IEEE Global Fluid Power Society PhD Symposium*, Samara, Russia, July 2018, https://doi.org/10.1109/GFPS.2018.8472387
- Daniel Roozbahani, Ikechukwu Kingsley Chima, Rafael Åman, Heikki Handroos, Experimentation on Wind Powered Hydraulic Heating System, *2018 IEEE Global Fluid Power Society PhD Symposium*, DOI: 10.1109/GFPS.2018.8472396, July 2018, Samara, Russia
  https://lutpub.lut.fi/handle/10024/158619
- Obaidur Rahman, Daniel Roozbahani, Shabbir Memon, Hamid M. Lankarani, Predicting the Failure Probability and Reliability Based Design, Optimization for Pipelines, *IMECE 2017 – International Mechanical Engineering Congress & Exposition*, November 2017, Tampa Convention Center, Tampa, Florida, https://doi.org/10.1109/GFPS.2018.8472396
- Daniel Roozbahani, Heikki Handroos, Developing a Mobile Assembly Robot for Hazardous Environments with CompactRIO and ROS – A case study, Aug 2017, Link
- Daniel Roozbahani, Heikki Handroos, Hamid M. Lankarani, Development of an Intelligent Model–based Simulation Method to Control the Dynamics of an Electrohydraulic Servo System, *IUTAM Symposium Intelligent Multibody Systems – Dynamics, Control, Simulation,* September 2017, Sozopol, Bulgaria, Link

- Daniel Roozbahani, Sasu Mäkinen, Vinicius Pandolfo, Heikki Handroos, Novel Intelligent Control Method for Improving the Fatigue Life of Crane boom, April 2016, *13Th IEEE International Conference on Networking*, Sensing and Control – ISSN: 1810–7869, Mexico City, Mexico, https://doi.org/10.1109/ICNSC.2016.7478982

- Daniel Roozbahani, Matti Manninen, Antti Salminen, Real-time monitoring of laser scribing process utilizing high-speed camera, 2016, *International Congress on Applications of Lasers & Electro–Optics (ICALEO 2016)*, Sheraton San Diego (San Diego, CA, USA), https://de356l4tocdyu.cloudfront.net/pdf/icaleoapweb.pdf

- Daniel Roozbahani, Konstantin Frumkin, Heikki, Handroos, Lyapunov Based Adaptive Control Method for Hydraulic Servo Drive, *FPNI Symposium on Fluid Power (FPNI2016)*, Oct 2016, Florianopolis – Brazil, https://doi.org/10.1115/FPNI2016-1571

- Ermiyas Assegu, Daniel Roozbahani, Heikki Handroos, An Integrator Backstepping Position Control of Electro–Hydraulic Servo System Based on Particle Swarm Optimization, June 2014, *ASME 8th FPNI Ph. D Symposium on Fluid Power – FPNI2014*, At Lappeenranta, Finland, https://doi.org/10.1115/FPNI2014-7801

- Andres Belzunce, Vinicius Pandolfo, Daniel Roozbahani, Heikki Handroos, Novel Control Method for Overhead Crane's Load Stability, September 2014, *2nd International Conference "Dynamics and Vibroacoustics of Machines", DVM2014*, At Samara, Russian Federation, https://doi.org/10.1016/j.proeng.2015.06.014

- Daniel Roozbahani, Heikki Handroos, Novel haptic methods in a teleoperation system of a hydraulic slider, May 2012, *7th FPNI PhD Symposium on Fluid Power*, At Reggio Emilia – Italy - Link

- Daniel Roozbahani, Heikki Handroos, Huapeng Wu, Robust adaptive control of a hydraulic servo system by utilizing real–time simulation, May 2012, *7th FPNI PhD Symposium on Fluid Power*, Reggio Emilia – Italy - Link

- Roozbahani. H, Wu. H, Handroos, H." Real-time simulation based robust adaptive control of hydraulic servo system", 2011 IEEE International Conference on Mechatronics (ICM), page(s): 779 - 784, Istanbul, ISBN: 978-1-61284-982-9, INSPEC Accession Number: 12144446, https://doi.org/10.1109/ICMECH.2011.5971220