

Keerthi Sagar, PhD

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<https://keerthisagarsn.github.io/>

PROFESSIONAL SUMMARY

Robotics engineer with multi-disciplinary research and industry experience including specialization in robotics, planning algorithms, mechanical design, and fluid mechanics. Areas of expertise include:

- C++ & Python optimization, control algorithms
- Robot programming (Industrial & ROS1/2)
- Sensors & Mechanism Design
- Effective technical & business communication

WORK EXPERIENCE

Robotics & Automation Technologist

2024-Present

"Irish Manufacturing Research"

Mullingar, Ireland

- Coordinating the development of AI-driven automated robotic welding using machine vision systems and robot motion control to achieve sub-1 mm accuracy with minimal cycle-time for industrial grade deployment.
- Leading development effort on integrating cognitive robot architecture into flexible manufacturing (IntraLogistics) for EU-H2020 Project "CoreSense" and EU-Horizon calls proposal development.
- Involved in direct industrial contractual work with leading medical device manufacturing companies in Ireland for delivering niche automation solutions and process road mapping.

Marie-Curie Research Fellow

2021-2024

"KUKA Robotics"

Dundalk, Ireland

"Irish Manufacturing Research "

Mullingar, Ireland

- Assistive real-time teleoperation control in medical device manufacturing using industrial robots (KUKA & Mecademic)
- Constrained heterogeneous dual-arm manipulation in cluttered environments using ROS2 and CasADi solver
- Software development and industrial testing of Sim2Real Robotic Welding with KUKA KR120 on rails
- Programming industrial and prototype systems using Siemens PLC's, SIMATIC HMI and ROS control systems.
- Implement machine Vision based visual-servoing and visual-inspection using Basler, RealSense, OpenCV & HALCON

Researcher

2018-2021

"University of Genoa"

Genova, Italy

- Developed an intelligent tactile robotic gripper to demonstrate Human-Robot Collaboration windshield assembly process in Centro Ricerche Fiat, Italy. (Research Team)
- Designed and built a 7 – DOF Stewart platform for Virtual-Reality Car & flight gaming experience (Design Team)
- Embedded programming and control of tensegrity snake-arm robots for probing and inspection
- Defined the software architecture and developed a Python software toolbox for robot manipulation - "STORM"
- Motion planning & control of Mobile Manipulators involving Robot-Robot Coordination for aerospace sheet-metal fixturing using Integer-Linear Programming (ILP) and Hierarchical-Constraint-Satisfaction technique with backpropagation.

Post-Graduate Engineer Trainee

2013

"Pricol Limited"

Coimbatore, India

- Designer for Indian TVS two-wheeler speedometers responsible for customer interaction, product benchmarking, CAD modelling, 2D Drafting, DFMEA, Sample and Prototype making, Engineering Change Order (ECO) preparation
- Successfully optimized the number of coil windings for a two-wheeler fuel gauge variant leading to reduction in copper weight, hence a saving of 1.5 Million (INR) for every product variant in a year.

EDUCATION

Doctor of Philosophy in Mechanics, Measurements and Robotics Engineering

2014 - 2017

University of Genoa

Italy

Doctoral Internship of Philosophy in Mechanics, Measurements and Robotics Engineering

March - July, 2017

Warsaw University of Technology

Poland

Master of Design (Mechanical Systems) (9.4/10)

2011 - 2013

Indian Institute of Information Technology, Design and Manufacturing, Kancheepuram (Chennai)

India

Bachelor of Engineering in Mechanical Engineering (83.4/100)

2007 - 2011

Anna University (First Class)

India

CERTIFICATION

KUKA Programming P1 & P2 | Diploma in CAD | Robotic Welding

CORE SKILLS

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|-------------------------|--|
| – CAD | Creo, CATIA V5, Inventor, CURA (3D Printing) |
| – Robot Software | KUKA SIM, Unity, Delmia, Process Simulate, ROS-1&2 |
| – Optimization & Vision | GUROBI, SciPy, PyTorch, OpenCV |
| – Programming | C++, Python, Matlab, Git |

LANGUAGE SKILLS

English (Proficient) | Italian (Basic) | Tamil (Native) | Hindi (Intermediate) | Telugu (Mother Tongue)

AWARDS & ACHIEVEMENTS

Research Fellowship

- Awarded "Marie Skłodowska-Curie" grant of **200,000 EUR** under Enterprise-Ireland's CareerFit-Plus Programme to conduct research on fine robot manipulation in complex scenarios (2021-2024)
- "Second place" in ACROBA Hackathon, 2024 involving industrial-grade bin-picking challenge using Collaborative robots
- "Best-presentation" award for presenting research work on "Direct-Collocation based Trajectory Optimization of Cable Driven Parallel Robot Using an Analytical Kinetostatic Index" at the IEEE ICCMA, 2024 conference held in London.

Doctorate

- Nominated for "Best Paper" award for the conference paper "Coordinated Selection and Timing of Multiple Trajectories of Discretely Mobile Robots" in International Conference on Robotics and Smart Manufacturing (2018).

Post-Graduate

- "Best Project" award in Master of Design for work on developing a "Miniaturized Flexible Flow Pump" (2013)
- "Indian-Ministry of Human Resource Development" scholarship for complete course of study (2011-2013)

Under-Graduate

- "National Winner", of the prestigious International Business Plan competition by India Future of Change- 2010 edition , amongst participants such as IIMA, B, C and Kellog School of Management. (2010)
- "Finalists" in the Business Plan event in the All-Asia Management Fest "Vishisth'10" held at IIT - DELHI. The B-Plan summary presented in IIT-DELHI was published in the "ENTREPRENEUR" magazine May 2010 edition
- "First-position" for presenting the project "Micro Hybrid in Two Wheelers" in the National level Tech Fest "Impulse V2" at PSG Tech, Coimbatore. (2011)
- "Second-position" in the national level business plan event "Axis'10TechFest" held at VNIT-NAGPUR (2010)

SELECTIVE SCIENTIFIC PUBLICATIONS

- "Polytope-based continuous scalar performance measure with analytical gradient for effective robot manipulation", IEEE Robotics and Automation Letters, 2023 (Presented at IEEE-RAS ICRA, 2024, Yokohama, Japan).
- "Constrained_manipulability: A ROS 2 library to Compute and Visualize Constrained Capacities for Robotic Manipulators", Journal of Open Source Software, 2025
- "A roadmap for improving data quality through standards for collaborative intelligence in human-robot applications", Frontiers in Robotics & AI, 2024
- "Towards High Dynamic Operations with Parallel-Serial Robots", ASME 2023 IDETC, Boston, USA, 2023.
- "User-Centered Evaluation Framework for Telerobot Interface and Interaction factors--A Case Study on Medical Device Manufacturing", European Safety and Reliability Conference (ESREL 2023).
- "Hedra: A bio-inspired modular tensegrity robot with polyhedral parallel modules", Intl. Conf. on Soft Robotics (ROBOSOFT), 2022.
- "STORM: Screw Theory Toolbox for Robot Manipulator & Mechanisms", Intl. Conf. on Intelligent Robots & Systems (IROS), 2020.
- "Development of a Reconfigurable Four-Bar Mechanism for a Human Robot Collaborative Gripper", Adv. in Robot Kinematics, 2020
- "The SwarmItFix Pilot" Flexible Automation and Intelligent Manufacturing (FAIM), Procedia Manufacturing, 2017.
- "Multi-goal path planning for robotic agents with discrete step locomotion" ASME 2017 IDETC, 2017.
- "Miniaturized Flexible flow pump using SMA Actuator" Procedia Engineering, 2013