

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 & ROS)
- Sensors & Mechanism Design
- Effective technical & business communication

WORK EXPERIENCE

Marie-Curie Research Fellow

KUKA Robotics

Irish Manufacturing Research CLG

2021-2024

Dundalk, Ireland

Mullingar, Ireland

- Software development and industrial testing of Sim2Real Robotic Welding with KUKA KR120 on rails
- Assistive teleoperation control in medical device manufacturing using industrial robots (KUKA & Mecademic)
- Real-time teleoperation motion control in confined spaces and testing with Vodafone's 5G capabilities
- Public Demonstration of state-of-art robot technologies in industrial manufacturing forums

Researcher

University of Genoa

2018-2021

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 and control of Mobile Manipulators involving Robot-Robot Coordination for sheet-metal fixturing EU FP7 project "SwarmItFix" using C++ and CAN protocol

Doctoral Internship

Warsaw University of Technology

2017

Warsaw, Poland

- Developed planning algorithms using Integer-Linear Programming (ILP) and Hierarchical-Constraint-Satisfaction technique with backpropagation for swarm-like multi-agent mobile robots for aerospace fixturing application

Post-Graduate Engineer Trainee

Pricol Limited

2013

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. Completed a PPAP process for an established speedometer product

EDUCATION

Doctor of Philosophy in Mechanics, Measurements and Robotics Engineering

University of Genoa

2014 - 2017

Italy

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

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

2011 - 2013

India

Bachelor of Engineering in Mechanical Engineering (83.4/100)

Anna University (First Class)

2007 - 2011

India

LANGUAGE SKILLS

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

CORE SKILLS

- **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

AWARDS & ACHIEVEMENTS

Research Fellowship

- Awarded "Marie Skłodowska-Curie" grant of **200,000 EUR** under Enterprise-Ireland's CareerFit-Plus Programme (2021-2024)

Doctorate

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

Post-Graduate

- "Best Project" award in Master of Design, (2013) batch for work on developing a "Miniaturized Flexible Flow Pump"
- "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), amongst participants such as IIMA, B, C and Kellogg 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 business plan event in National Level Tech Fest "Axis'10TechFest" held at VNIT-NAGPUR (2010)

High-School

- Ranked among the top 10% scorers in the "INTER LEVEL NATIONAL MATHEMATICS TALENT COMPETITIONS 2006" and secured a meritorious position in "MATHS OLYMPIAD 2001"

SELECTIVE SCIENTIFIC PUBLICATIONS

- Keerthi Sagar, Stéphane Caro, Taşkın Padır, Philip Long. "**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).
- Keerthi Sagar, Vishal Ramadoss, Matteo Zoppi. "**Towards High Dynamic Operations with Parallel-Serial Robots**", *ASME 2024 IDETC*, Boston, USA, 2024.
- Ines-Ramos, Keerthi Sagar, Philip Long, Ernesto Damiani, M Leva, Gabriele Gianini. "**User-Centered Evaluation Framework for Telerobot Interface and Interaction factors--A Case Study on Medical Device Manufacturing**", *European Safety and Reliability Conference (ESREL 2023)*.
- Vishal Ramadoss *, Keerthi Sagar*, Dimiter Zlatanov, Matteo Zoppi. "**Hedra: A bio-inspired modular tensegrity robot with polyhedral parallel modules**", *International Conference on Soft Robotics (RoboSoft)*, 2022 (* Equal Contribution)
- Keerthi Sagar*, Vishal Ramadoss*, Dimiter Zlatanov, Matteo Zoppi. "**STORM: Screw Theory Toolbox for Robot Manipulator and Mechanisms**", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2020.
- Keerthi Sagar, Vishal Ramadoss, Michal Jilich, Matteo Zoppi, Dimiter Zlatanov, Alessandro Zanella. "**Development of a Reconfigurable Four-Bar Mechanism for a Human Robot Collaborative Gripper**", *Advances in Robot Kinematics*, 2020
- Keerthi Sagar, Luis de Leonardo, Rezia Molfino, Teresa Zielińska, Cezary Zieliński, Dimiter Zlatanov, and Matteo Zoppi. "**The SwarmFix Pilot**" *FAIM 2017*, Flexible Automation and Intelligent Manufacturing, Procedia Manufacturing, 2017.
- Keerthi Sagar, Dimiter Zlatanov, Matteo Zoppi, Cristiano Nattero, and M. Sreekumar. "**Multi-goal path planning for robotic agents with discrete step locomotion**" *ASME 2017 IDETC*, 2017.
- S.N.Keerthi Sagar et al, 2013 "**Miniaturized Flexible flow pump using SMA Actuator**" *International Conference on Design & Manufacturing*, Procedia Engineering Volume 64, 2013, Pages 896–906.