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:

- Control: C++ , Python, PyTorch, SciPy, CasADi, SLAM
- Simulation: Unity, Gazebo, Visual Components
- Robot programming – *Industria* & ROS-1&2
- 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" using ROS2, SLAM, Nav2, KnowRob, Behaviour Trees, Gazebo and mobile manipulators.
- Coordinated and development effort in EU-Horizon & Enterprise Ireland proposal calls.
- 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 heterogenous 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 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 – Institute of Control and Computation 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

- ***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