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
- Sensors & Mechanism Design
- Robot programming (Industrial & ROS)
- Effective technical & business communication

WORK EXPERIENCE

Senior Robotics Research Fellow   **2021-Present**
KUKA Robotics   *Dundalk, Ireland*
Irish Manufacturing Research CLG   *Mullingar, Ireland*

- Software development and industrial testing of Sim2Real Robotic Welding with KUKA KR120 on rails
- Assistive real-time teleoperation control in medical device manufacturing using industrial robots (KUKA & Mecademic)
- 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 cameras and OpenCV, HALCON libraries

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

Doctoral Internship   **2017**
Warsaw University of Technology   *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   **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. Completed a PPAP process for an established speedometer product

EDUCATION

Doctor of Philosophy in Mechanics, Measurements and Robotics Engineering   **2014 - 2017**
University of Genoa   *Italy*

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*

KUKA Programming P1 & P2 | Diploma in CAD |

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 (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 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 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

- *"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).
- "*Towards High Dynamic Operations with Parallel-Serial Robots*", *ASME 2024 IDETC*, Boston, USA, 2024.
- "*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*", *International Conference on Soft Robotics, 2022.*
- "*STORM: Screw Theory Toolbox for Robot Manipulator and Mechanisms*", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2020.*
- "*Development of a Reconfigurable Four-Bar Mechanism for a Human Robot Collaborative Gripper*", *Advances 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