

# Ajay Gunalan Ph.D.

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**It's Not Possible. No, It's Necessary.**

I love the thrill of developing cutting-edge tech by fusing multiple disciplines and collaborating in a diverse team.

## EDUCATION

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ITALIAN INSTITUTE OF TECHNOLOGY & UNIVERSITY OF GENOA Ph.D. in Bioengineering and Robotics	GENOA, ITALY Nov 2020 - March 2024
B.S.A. CRESCENT INSTITUTE OF SCIENCE AND TECHNOLOGY B.Tech. in Mechanical Engineering   CGPA: 8.45/10.00	CHENNAI, INDIA Aug 2013 - May 2017
G.R.T MAHALAKSHMI VIDYALAYA 12th Grade   88.0%	CHENNAI, INDIA Mar 2013
A.V.MEYAPPAN MATRICULATION 10th Grade   87.4%	CHENNAI, INDIA Mar 2011

## SUMMARY & SKILLS

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- 3 years of experience in computational imaging, **image processing**, inverse problems, **machine learning**, interferometry and optics ([YouTube Link](#))
- 3 years of experience in robotic software development, multi-threading, **ROS**, communication protocols and signal processing with a strong foundation in data structures and algorithms. ([LeetCode](#))

Programming Languages	C, C++, Python, MATLAB, L <sup>A</sup> T <sub>E</sub> X
Libraries & Frameworks	OpenCV, PyTorch, CUDA, ROS, MoveIt, git, Make, CMake
Embedded Systems	Arduino, STM32F4, Embedded Linux

## EXPERIENCE

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ITALIAN INSTITUTE OF TECHNOLOGY Ph.D. Student	GENOA, ITALY Nov 2020 - April 2024
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### Computational Sensing for ISM & OCT Guided Laser Microsurgery.

- Towards OCT-Guided Endoscopic Laser Surgery—A Review ([pub.](#))
- Compressive Image Scanning Microscope. ([code](#), [pub.](#))
- Compressive 3D OCT-Guided Laser Microsurgery. (in-preparation)
- Autonomous Computer-Assisted Laser Microsurgery. (accepted, [video](#))

ITALIAN INSTITUTE OF TECHNOLOGY C++ Software Engineer	GENOA, ITALY Oct 2019 - Oct 2020
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Interfaced multiple real-sense, zed & other sensors with Nvidia jetson to stream audio, video & pointcloud simultaneously in virtual reality (VR) for **tele-operated robots** by **multi-threading**. ([LOR](#), [blog](#))

ROBERT BOSCH CENTRE FOR CYBER PHYSICAL SYSTEMS, IISc Software Engineer	BANGALORE, INDIA Feb 2018 - Jun 2019
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(1) Motion planning simulation of a robotic arm in Gazebo using ROS and MoveIt; (2) CAN bus communication between two linux system; (3) Software development for servo motor control and trajectory tracking for **quadruped robot**; (4) Improved the communication rate between low-level drivers and control algorithms by **shared-memory (IPC)**; (5) Control the robot like in a video game using **non-blocking communication** ([blog](#), [pub.](#))

ASIMOV ROBOTICS PVT. LTD. Software Engineer Internship	KOCHI, INDIA Jul 2017 - Dec 2017
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(1) Gravity compensation for a banking **service robot**; (2) Position and velocity control of DC motor; (3) TCP/IP communication between **ROS** and non-ROS module; (4) Sensors like IMU, etc. integration using **I2C & SPI**. ([blog](#))

## SELECTED AWARDS

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- Finalist, **Top 10 out of 11,000+** applicants, in IICDC 2016 by Texas Instruments Inc. & Indian Institute of Management, Bangalore for our **medical device**, "Smart Intravenous Dropper". ([blog](#))

## OTHER DETAILS

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- **Publication:** [Google Scholar](#)
- **Online Courses:** First Order Optical System Design by University of Colorado Boulder. ([link](#))
- **Citizenship/DOB:** Indian/December 20, 1995

## PUBLICATIONS

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1. **A. Gunalan** et al. "Compressive 3D OCT-Guided Laser Microsurgery". (in-preparation)
2. *S. Li, A. Gunalan et al. "Auto-CALM: Autonomous Computer-Assisted Laser Microsurgery," to IEEE Transactions on Medical Robotics and Bionics. (accepted) [[video](#)]*
3. **A. Gunalan** et al. "Compressive Image Scanning Microscope," In: *International Symposium on Computational Sensing, Luxembourg, 2023.* [[link](#)]
4. **A. Gunalan, L. S. Mattos,** "Towards OCT-Guided Endoscopic Laser Surgery—A Review," *Diagnostics, 2023.* [[link](#)]
5. *S. Li, M.A. Azam, A. Gunalan, et al. "One-Step Enhancer: Deblurring and Denoising of OCT Images", Applied Sciences, 2022.* [[link](#)]
6. *D. Dholakiya, S. Bhattacharya, A. Gunalan, et al. "Design, Development and Experimental Realization of a Quadrupedal Research Platform: Stoch". In:IEEE International Conference on Control Automation and Robotics (ICCAR), 2019.* [[link](#)]

## RELEVANT PH.D. COURSEWORK

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1. Nanophotonic Devices: From Fabrication to Applications by [Andrea Toma](#), IIT, Italy.
2. Electronics and Circuits by [Marco Sartore](#), University of Genoa, Italy.
3. Advanced Optical Fluorescence Microscopy Methods by [Paolo Bianchini](#), IIT, Italy.

## MISCELLANEOUS

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- Took seminars on simulation of a robotic arm in Gazebo using ROS and **MoveIt** for students of Dr. Shishir Kolathaya and Prof. Ashitav Goshal at IISc, Bangalore [[link](#)].
- Internship (July 2016) at TIDC INDIA, Ambattur, India, where I learnt various process and methodologies involved in design and fabrication of cam chain used in two-wheelers.
- Internship (June 2016) at J.K. Fenner(India) Ltd, Sriperumbudur, India, where I learnt various process and methodologies involved in design and fabrication of rubber seal's used in bearings.
- Implant Training (June 2015) at Ashok Leyland, Ennore, India, where I had a practical exposure to various manufacturing methods and assemble line production system.

## REFEREES

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1. Dr. Leonardo De Mattos  
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Genova, Italy  
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2. Dr. Nikhil Deshpande  
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3. Dr. Veronica Penza  
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