

Ajay Gunalan

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Robotics Software Engineer
Developing what is necessary...!

A robotics-focused software developer with **3+ years** of experience and a strong engineering background. I love to work in a team to develop efficient & pragmatic solutions for impactful technologies.

Education

ITALIAN INSTITUTE OF TECHNOLOGY & UNIVERSITY OF GENOVA
 Doctor of Philosophy in Bioengineering and Robotics

GENOVA, ITALY
November 2020 – Present

B.S.A. CRESCENT INSTITUTE OF SCIENCE AND TECHNOLOGY
 Bachelor of Technology in Mechanical Engineering

8.45/10.00
August 2013 – May 2017

Technical skills

Core competency in **software architect for robots** by leveraging data structures & algorithms, design patterns, real-time systems, multi-threading, and communication protocols. Visit ajaygunalan.com to see my work.

Programming	C++, Python3, MATLAB
Version & Build	git, Make, CMake, Catkin
IDE	Visual Studio, Qt Creator, PyCharm
Debugging Tools	OpenOCD, gdb, Valgrind, strace, ptrace
Framework	ROS, OpenCV, MoveIt, Gazebo, ChibiOS (RTOS)
Simulation Software	KiCad (Circuits) & OSLO (Optics).

Experience

ITALIAN INSTITUTE OF TECHNOLOGY
Ph.D. Student

GENOVA, ITALY
3 Years : November 2020 – Present

My Ph.D. research focuses on developing endoscopic imaging sensor for **surgical robots**.

ITALIAN INSTITUTE OF TECHNOLOGY
C++ Software Engineer - Fellow

GENOVA, ITALY
1 Year : October 2019 – October 2020

A part of team developing user interface (UI) in virtual reality (VR) for **tele-operated robots**. Interfaced various sensors such as gas, temperature, microphone, thermal camera, real-sense and zed with NVIDIA Jetson (linux) and streamed them simultaneous by **multi-threading** and used custom encoders to **reduce latency**. [\[Link\]](#)

INDIAN INSTITUTE OF SCIENCE
Robotics Research Assistant - Software

BANGALORE, INDIA
1.5 Years : February 2018 – June 2019

I was involved in developing a **quadruped robot** called *Stoch*. [\[Link\]](#)

Task

1. Software development for **servo motor control**.
2. Improved the communication rate between low-level drivers in C and control algorithms in python by using **shared-memory** (inter-process communication). [\[Link\]](#)
3. **Trajectory tracking** by PID control using IMU data. [\[Link\]](#)
4. Control the robot like in a video game using **non-blocking communication**. [\[Link\]](#)
5. **Motion planning** simulation of robotic arm in Gazebo using ROS and MoveIt. [\[Link\]](#)
6. How to design actuators for dexterous and agile robots - **Quasi Direct Drive**. [\[Link\]](#)
7. **CAN bus communication** between two debian based system. [\[Link\]](#)
8. **Real-Time Embedded Programming** using ChibiOS on STM32F4 (Basics). [\[Link\]](#)

We developed a **banking service robot** and arm manipulators for specific clients. Learned basic issues (motion planning, controls, sensors) in deploying a robot in real-world. [\[link\]](#)

Task

1. Gravity compensation of arms for assistive mode.
2. Position and Velocity control of DC motor.
3. TCP/IP communication between ROS and non-ROS module.
4. Sensor Integration such as IMU, Tactile (FSR) and Ultrasonic.

Selected Honors and Awards

- Finalist, **Top 10 out of 11,000+ applicants**, in India Innovation Challenge Design Contest 2016 conducted by Department of Science and Technology, Government of India & Texas Instruments Inc., and anchored by Indian Institute of Management, Bangalore for our project **Smart Intravenous Dripper**. [\[link\]](#)

Conference Publication(s)

[\[Google Scholar\]](#), [\[ORCID ID\]](#), [\[Scopus ID\]](#), [\[arXiv identifier\]](#).

1. D. Dholakiya, S. Bhattacharya, **A. Gunalan**, A. Singla, S. Bhatnagar, B. Amrutur, A. Ghosal, and S. Kolathaya. Design, development and experimental realization of a quadrupedal research platform: Stoch. In *2019 5th International Conference on Control, Automation and Robotics (ICCAR)*, pages 229–234, 2019. [\[doi\]](#), [pdf](#)