Simone **Giampà**

Robotics & Artificial Intelligence Engineering Researcher

About me

I am a robotics and artificial intelligence Researcher with a strong interest in aerospace applications, and an academic background in Computer Science Engineering. My research focuses on developing and applying advanced AI techniques, such as deep learning, to solve challenging problems in robotics, including autonomous manipulation, navigation and control.

Personal

21/08/1999
Nationality: Italian
Genoa, Italy

Areas of Expertise

Robotics • Deep Learning • Artificial Intelligence • Computer Vision • Parallel Computing • Embedded Systems

Interests

Robotics • Artificial Intelligence • Aerospace • Space Exploration

Contacts

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Linkedin Profile
Github Profile

Programming

C · C++ · Java · Python · Matlab · SQL · ROS, ROS2, MoveIt2, NAV2 · Tensorflow, TFLite, TFMicro · CUDA C/C++, CUDA Python · Pandas, Scikit-Learn, Numpy

Robots & Sensors

Universal Robot arms · AgileX Scout Mobile Robot · Igus Rebel robotic Arm 6DoF · LIDAR · RGB-Depth camera · IMU · Soft Pneumatic Gripper

Micro-controllers

Arduino Uno · Arduino Nano 33 BLE Sense · STM32F4 Nucleo · ESP32 Wifi

Education

2021 - 2024 — **Master's Degree in Computer Science Engineering**
Politecnico di Milano · Milan, Italy
Robotics & Deep Learning specialization - Grade: 106/110

2018 - 2021 — **Bachelor's Degree in Computer Science Engineering**
Politecnico di Milano · Milan, Italy
Grade: 101/110

Work Experience

2024 - Present — **Robotics and Autonomous Systems Researcher**
Leonardo Innovation Labs · Genoa, Italy

Industrial Research on Autonomous Robotics and Deep Learning: working on several research projects aiming at producing patents and publications in renowned robotics conferences. Focusing on autonomous manipulation tasks and control of mobile manipulator arms. Currently working on:

- **Mars Sample Return Project**: a joint collaboration with Leonardo Space, ESA and NASA institutions, for the autonomous control and computer vision tasks of the Mars Sample Retriever Arm.
- **MATISSE**: European project collaboration for In-Orbit-Servicing robotic tasks digital twin simulation.
- **Autonomous Control of Redundant Robotic Arm** for industrial assembly process of large fuselage frames.

Certifications

2024 — **Accelerated Computing with CUDA C/C++**
Nvidia Deep Learning Institute · Certificate
Programming and exercises on CUDA C/C++ and acceleration of custom CUDA kernel with concurrent data streams and performance profiling

2024 — **Accelerated Computing with CUDA Python**
Nvidia Deep Learning Institute · Certificate
Programming with Python-based CUDA kernels acceleration with Numba library and kernel performance profiling

2024 — **Accelerating Data-Science and Machine Learning Workflows**
Nvidia Deep Learning Institute · Certificate
Exercises on Data Science and Analytics using GPU-accelerated libraries: cuDF (Pandas), cuML (Scikit-Learn) and cuPy (Numpy)

Master's Thesis Project

2024 — **Development of an Autonomous Mobile Manipulation Robot for Industrial and Agricultural Environments**
Polimi · Artificial Intelligence and Robotics Laboratory (**AIRLAB**)
`Autonomous Robotics Systems · SLAM · ROS2 · Nav2 · MoveIt2`
Development of an autonomous mobile manipulation system, composed of a mobile wheeled robot, and a 6-DoF robotic arm manipulator, with a soft pneumatic gripper acting as a robotic hand. The system performs several tasks in industrial environments, such as exploration, navigation of an industrial plant, and interactions with control panels. The robotic system is also programmed to collect fruit from a tree, a demo simulation of a fruit picking task in realistic agricultural environments. The whole system comprises of a multitude of sensors and actuators, including a LIDAR for navigation and mapping, stereo cameras, IMU. The mobile manipulator performs object grasping and interaction tasks completely autonomously. The localization, navigation and mapping of the mobile robot base is done using NAV2. The trajectory planning and motion execution of the robotic arm is done with MoveIt2. Every component in the system is controlled via ROS2 and the combination of the tasks is orchestrated via complex robot behavior trees.

Languages

mother tongue	C2	**Italian**
proficient	C1	**English**

Language Certifications

2018	IELTS Grade 7.5: Level C1
2017	B2 First Cambridge
2016	B1 PET Cambridge
2015	Trinity College Grade 6

University Projects

2023 **Robot head construction: Robotics and Design multi-disciplinary course**
`Workshop Laboratory · 3D printing · Multidisciplinary project` Repository
Multidisciplinary project of Robotics and Design: building and programming of a 3d printed and programmable robot head capable of mimicking human emotions and expressiveness, while interacting with other robots of the other student groups.

2023 **Neural Network for Spoken Language Recognition on an Embedded system**
`Tensorflow Lite & Micro · Neural Networks · Embedded Systems` Repository
Neural network recognizing the language a person is speaking, from mel spectrogram features. Developed on an Arduino Nano (TinyML kit) with TensorFlow Lite for Microcontrollers.

2023 **Natural Language Text Processing with Transformer Models**
`Neural Networks · BERT Transformers · Natural Language` Repository
Text analysis, sentiment analysis and response generation with BERT Transformer models. Fine-tuning of small scale Large Language Models (LLM)

2023 **Nonlinear ARMA time series classification with Online Machine Learning models**
`Streaming Machine Learning · Python · River library` Repository
Non-linear ARMA time series generation and classification with streaming (incremental learning) machine learning models in Python using the River ML library. Data Analysis and statistical interpretation of forecast data

2022 **Deep Learning: Convolutional Neural Networks and Transfer Learning**
`Tensorflow · Python · Image Classification` Repository
Image classification challenge with convolutional neural networks and transfer learning of large pre-trained models. Time-series classification challenge with convolutional spectral features.

2022 **Mobile Robotics projects with ROS and real-world LIDAR and encoders data**
`ROS · C++ · SLAM · Mobile Robot · Autonomous navigation` Repository
Two projects using ROS for data analysis of mecanum wheels encoders, IMU sensors and a LIDAR for autonomous simultaneous localization and mapping (SLAM)

2022 **STM32 Nucleo with Sensor Systems development board**
`Sensors · C · Microcontroller · Electronics` Repository
Development of many small projects aimed at handling a wide variety of sensors connected to the STM32 Nucleo board, using FreeRTOS and several wire communication protocols.

2022 **STM32 Nucleo with Miosix Embedded OS kernel-space programming**
`STM32 · Embedded OS programming · C++ · Linux` Repository
Development of the *Game of Life* cellular automaton on an STM32 running an embedded OS in kernel-space, using a serial interface with an emulated terminal on a Linux machine for visualization of the automaton evolving matrix

2021 **Software Engineering project: an online multi-player board game**
`Java · Game · Large group project · Git` Repository
Group project development in Java of a multi-player online board game. Large project developed with extensive software engineering principles and applications of a variety of code design patterns.

2021 **LASER dynamics simulation with cellular automata in Matlab and Java**
`LASER dynamics · Matlab · Java` Repository
Simulation of LASER quantum dynamics of population inversion using a cellular automaton

2021 **Vivado project: image histogram equalization in VHDL**
`Xilinx Vivado · VHDL` Repository
Logic circuit programming in VHDL of an equalization algorithm of a gray-scale image histogram

2020 **A time and memory efficient command-line text editor in C**
`C · Algorithms and Data Structures` Repository
Time and memory efficient text editor using optimized algorithms and data structures