Edoardo Ghini
Robotics Engineer

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CAREER MOTIVATION

I am striving to develop my career in the direction that will bring me to work at the most interesting topics.
Having a passion for robotics and programming makes me love to create complex things with code.
I consider myself extremely curious and always ready to understand deeply how things work.
Always trying to be involved in the most interesting and fascinating ideas in the field.

EDUCATION

2013 – 2016 **Computer Engineering**
FINAL GRADE 95 /110
Bachelor of Science
Roma Tre University

This course covered all the fundamentals of computer engineering introducing me to programming. The thesis covered what I learnt in the brief internship as a PHP back-end developer.
Thesis: *Unit testing avoiding regression in CI*

2016 – 2019 **Master in Artificial Intelligence and Robotics**
FINAL GRADE 103 /110
MScEng
La Sapienza, University of Rome

This degree had a pivotal role in me figuring out what was my passion. It covered extensively the foundation of Robotics such as rigid body kinematics and dynamics, autonomous navigation, filtering and of Artificial intelligence teaching first-order logic and planning and reasoning. A lot of practical experience came alongside the theory in the form of several deeply invested projects.
My thesis was in internal to the university, and consisted in implementing a 3D Lidar **SLAM** pipeline: I used a probabilistic approach (**Gaussian assumption**) in a **Least Square** formulation extracting High-level geometric features. Everything was implemented in C++ using ROS.
Thesis: *Position tracking using high order primitives*

SUBJECTS

CALCULUS
PHYSICS
OPERATIVE SYSTEMS
DATABASES
NETWORK PROTOCOLS
ALGORITHMS
SOFTWARE ARCHITECTURE

SUBJECTS

PROBABILISTIC ROBOTICS
COMPUTER VISION
CONTROL THEORY
MULTIAGENT SYSTEMS
PATH PLANNING
FIRST-ORDER LOGIC
COMPUTER GRAPHICS
NEURAL NETWORKS
DRONES CONTROL
MACHINE LEARNING
ROBUST CONTROL
HUMANOIDS GAIT

WORK EXPERIENCE

MAR 2016 – JUL 2016 (FULL TIME)

Translated
Back-end developer

During this internship, I was responsible for the codebase of a web application (**Matecat**), written in PHP. I developed unit-tests to certify the correctness of the core of the application. Dealing with databases, caching and client-server communications: **MySQL**,**Redis**, and **Apache**. Learner advanced testing techniques: **mock objects**, **reflection**, and **TDD**.

OCT 2020,APR 2022 (FULL TIME)

INRIA, French national research institute
Robotics Engineer

I developed from scratch a system to **teleoperate** an industrial robot in hazardous environments.
Each module of the pipeline was written in C++ and containerized with **Docker** and communicating through **ROS**.
The dynamics of the system was simulated in a **digital twin** using *dart* and *gazebo*. Joint-space and Cartesian control of the robot were using *pinocchio* and *tsid* libraries. I designed a **GUI** for teleoperation with the C++ library *ImGui* where I used quaternions extensively and designed a state machine to introduce **automation** of the task.
Learned the formulation of the Dynamic Programming problem used to solve control problems on humanoid robots. I also developed experience in URDF creation, modern C++ frameworks and acquaintance with robots of the lab: the manipulator *franka* and the humanoid robot *talos*. This project resulted in the publication of this **paper** in the conference **IEEE ARSO**, Jun 2023, Berlin.

JUN 2022, NOW (FULL TIME)

Kudan
Software Engineer

I am working in an R&D team focussing on SLAM both LiDAR and camera based.
Maintaining and enhancing a C++ library deployed on multi-platform. I am working hard to transform promising academic results in production ready code and became more aware of depths of the software cycle (planning, code reviews, deployment). Constantly strengthening my theoretical knowledge base in state estimation and graph optimisation.
Working with pose constraints (GPS, INS) and IMU data. Getting to know the intricacies of *Lie algebra* to deal with $SE(3)$ manifolds and enforce the probabilistic approach with covariance estimation and propagation.
Frequently using templates and design patterns (e.g. factory pattern) in development.
Always applying best practices according to the C++ standard such as move semantic.

PERSONAL PROJECTS

Spiking network CNN for classification
I implemented a custom tensorflow layer to obtain a NN of spiking neurons to be used in image classification.

Chess endgames RL engine
I developed in python a reinforcement learning strategy to a achieve autonomous playing on a three by eight board with only Kings and Pawns.

3D game in WebGL using shaders and lighting tecniques
I created an imitation of the game *Slander man* using computer graphics primitives in Javascript.

Multi agent algorithm for camera field of view coverage
I implemented an article in C++ to solve the problem of multiple cameras at the corners of a room trying to minimise blind spots. With visualisation in OpenGL.

REFERENCES

Dr. Serena Ivaldi
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Dr. Giorgio Grisetti
Professor
La Sapienza, University of Rome
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INTERESTS

- The mystery of consciousness
- RUST programming language
- Simulation and reinforcement learning
- Containerisation in Docker
- NEOVIM as code editor
- Strategy games and video games
- All kind of sports
- Fantasy and sci-fi books