LUCA BONAMINI

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ABOUT ME

I am a Robotic and Automation Engineer (MSc) and Mechanical Engineer (BSc) presently working at University of Pisa research center Centro E.Piaggio. I currently hold the role of responsible for the Perception module within the Italian Team that participates in Roborace, the first world championship of completely autonomous racing cars. I have two years experience in robot localization and navigation, having collaborated as a student in the development of EGO-1, a soft dual-arm mobile platform. I am looking for opportunities in the autonomous vehicles world, for which I have a great passion. I pursue the goal of emerging in this field thanks to my technical skills and my team leadership.

EDUCATION

School of Engineering, University of Pisa *09/2015 - 12/2018*
Master's Degree in Robotics and Automation Engineering
Final Mark: 106/110
Average Mark: 27/30
Thesis Title: *Toward a shared autonomy control framework: application to Ego robot navigation.*
Tutors: *Prof. Antonio Bicchi, Prof. Lucia Pallottino*
Abstract: In this thesis I proposed a Shared Autonomy approach for the EGO-1 robotic framework, a dual-arm mobile platform capable of performing man-machine interactions, and operating in different environments, predominantly in tele-operation. First of all, I implemented a SLAM algorithm, so as to make the robot able to create a 3D reconstruction of the surrounding environment, to localize it inside it through a Particle Filter, and finally to perform Autonomous navigation. Furthermore, I have examined how to provide the tele-operator with more information so as to perform tele-operation tasks in a safer way; in particular, I have developed and implemented a Shared Autonomy Control and a Visual Feedback for Obstacle Avoidance, so that the operator can avoid any obstacles in a reactive way, or supervise the navigation and leave to the control the task of correcting the trajectory.

School of Engineering, University of Genova *09/2011 - 07/2015*
Bachelors Degree in Mechanical Engineering
Final Mark: 95/110
Thesis Title: *Design of a parallel axis gear reducer.*
Tutors: *Prof. Pietro Fanghella*
Abstract: In this work I presented the design of a two-stage parallel shaft gear reducer. First of all, the characteristics requested by the reducer were analyzed, defining the layout; subsequently, the calculations were performed in order to model the internal components of the gearbox; finally, the CAD models obtained from the calculation of the calculations were presented.

Scientific High School Antonio Pacinotti *09/2005 - 06/2011*
Scientific High School Diploma
Final Mark: 92/100

WORK EXPERIENCE

Research Center E. Piaggio *12/2018 - ad oggi*
Research Fellow

Descrizione: *I'm responsible for Perception Module inside Roborace AI Italian Team. My job is to develop and implement SLAM and pose estimation and inertial navigation algorithms for deployment on a self-driving car (Kalman filters, EKF, UKF, Particle Filter, etc.) using different sensors including LIDARs, cameras and radars. Moreover I'm a collaborator in Alter-EGO project, working on Augmented Reality for mobile robot tele-operation.*

ACCADEMIA PROJECTS

Tutor: Prof. Antonio Bicchi - Course: Robotics

· **Activity**: The aim of this work was the implementation of state of the art SLAM algorithms in order to improve the autonomy of Alter-EGO platform. Moreover, a Particle Filter has been designed and implemented so that the robot could locate itself in an indoor environment.

Tutor: Prof. Mario Innocenti - Course: Control of Uncertainty systems

· **Activity**: Development of Robust Control system (H-inf synthesis & Mu synthesis) for the first module of a space launcher.

Tutor: Prof. Andrea Caiti - Course: Identification of uncertainty systems

· **Activity**: Implementation of a state of the art algorithm for nonlinear systems through the use of piecewise linear functions.

Tutor: Prof. Lorenzo Pollini - Course: Guidance and Navigation systems

· **Activity**: Development of a tracking target algorithm through the use of RGB-D camera.

Tutor: Prof. Marco Gabiccini - Course: Robot Mechanics

· **Activity**: Synthesis of efficient recursive algorithms for systems of rigid-bodies.

Tutor: Prof. Mario Innocenti - Course: Aerospace Robotics

· **Activity**: The aim of this work was the design of an interplanetary trajectory for a spacecraft going from Earth to Saturn, using Hohmann and patched conics methods.

Tutor: Prof. Lucia Pallottino - Course: Distributed Robotics systems

· **Activity**: Development of a Leader-Follower algorithm based on AprilTags.

LANGUAGES

- **Italian**, Native Speaker
- **English**, Fluent

MAIN SKILLS

Programming Software
Advanced knowledge: ROS, Matlab, Simulink, Dev-C++, C++/C, Python

Mechanical Software
Basic knowledge: PTC Creo Parametric, SolidWorks, Ansys APDL, Ansys Workbench, Mathematica

Image Processing and Animation Software Advanced knowledge: Gimp, iMovie e MovieMaker

Basic Software and Hardware

Advanced knowledge in Windows, Linux e OS X.

Advanced knowledge in the following common use software: Office (Word, Excel, PowerPoint, Access), Internet Browsers (Chrome, Internet Explorer, Outlook, Mozilla Firefox, Safari), Latex among others.

Advanced knowledge in software installation and computer maintenance.

TECHNICAL SKILLS

Knowledge : Robot Localization and Navigation, Robot Tele-operation, Thermo-Fluid Dynamics, Digital and Non Linear Control, Electronic Devices for Robotic Automation, Real-Time Systems, Stochastic Processes, Systems and Control Theory, Mecatronics, Virtual Augmented Reality, Robot Mechanics, System Identification Methods, Robust and Multivariable Control, Underwater Robotics.