



## Giulio Campagna

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Date of birth: 03/05/1995 | **Nationality:** Italian | **Gender:** Male |

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<https://www.campagna-robotics.com/> | <https://vbn.aau.dk/en/persons/153215> |

<https://www.linkedin.com/in/giulio-campagna-7505881a4> | Skype: xaldinwow4e |

Rendsburggade 14, 9000, Aalborg, Denmark

About me:

Born the 3rd of May 1995 in Siena, Italy.

Received **B.S. degree** in **Computer and Information Engineering** in 2018 from the **University of Siena** with a **thesis** entitled "*Experimentation on Real Video of Systems for Object Detection*".

Received **M.S. degree** in **Computer and Automation Engineering - Robotics and Automation** in 2021 from the **University of Siena** with a **thesis** entitled "*Commanding Grasping Robot through Virtual Reality and Simulated Wrenches*".

Actually, **PhD fellow** at **Aalborg University** with the **research group Human Machine Interaction**.

The **actual research** is focused on **automatic trust assessment in human robot interaction** through machine learning techniques and sensorial data.

In MIT's [report](#) from March **2018**, **Aalborg University** is considered to be the **fourth best university** in the **world** within **engineering**. This equates to a **first place** among universities in **Europe**.

### WORK EXPERIENCE

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CURRENT - Aalborg, Denmark

**PH.D. FELLOW IN HUMAN-ROBOT INTERACTION** - AALBORG UNIVERSITY - TECHNICAL FACULTY OF IT AND DESIGN

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- Research projects (e.g. Automatic Trust Assessment in Human Robot Interaction)
- Research works in collaboration with other important universities (e.g. Southern Denmark University) and German Aerospace Center (DLR)
- Participation in workshops and conferences
- Dissemination and Press-Media
- Peer Reviewer
- Courses
- Teaching

**Research Line:** Human - Robot Interaction

**Research Group:** [Human Machine Interaction](#) | [Aalborg U Robotics](#)

**Laboratory:** [Human Robot Interaction](#)

03/12/2020 - 01/04/2021 - Siena, Italy

**CURRICULAR INTERNSHIP: ROBOTICS AND VIRTUAL REALITY** - UNIVERSITY OF SIENA

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The concept behind the project is the communication between virtual reality and real world.

The experimental setup includes the following components:

- CyberGloveIII motion data glove
- IMU MPU 6050
- Leap Motion Controller

The user, using these devices, is able to control in real-time the avatar of the hand in the virtual environment. Moreover, when the user touch virtual items in the virtual world, the forces are provided through an haptic feedback device.

The KINOVA robot is teleoperated using position and rotation information of the object inside the virtual sphere. The purpose is to manipulate the object grasped in real world through the virtual reality.

The experiments are performed in SIRSLab laboratory at the University of Siena.

<https://computer-automation.unisi.it/it>

<https://www.linkedin.com/in/giulio-campagna-7505881a4>

<https://www.campagna-robotics.com/>

05/2018 – 09/2018 – Siena, Italy

## **CURRICULAR INTERNSHIP: ARTIFICIAL INTELLIGENCE – UNIVERSITY OF SIENA**

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### - Object Detection Task

Experimentation on real videos of systems for object detection. The goal was to analyze videos of highways and detect and locate various objects (e.g. cars) using OpenCV library that is suitable for image manipulation, tracking and recognition of the objects

- Analysis of theory concepts like Machine Learning, Convolutional Neural Networks (CNN), Tensorflow library.

<https://ing-informatica-informazione.unisi.it/it> | 53010, Siena, Italy

## ● **EDUCATION AND TRAINING**

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CURRENT – Rendsburggade 14, Aalborg, Denmark

## **PH.D. FELLOW IN HUMAN-ROBOT INTERACTION – Aalborg University - Technical Faculty of IT and Design**

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- Research projects (e.g. Automatic Trust Assessment in Human Robot Interaction)
- Research works in collaboration with other important universities (e.g. Southern Denmark University) and German Aerospace Center (DLR)
- Participation in workshops and conferences
- Dissemination and Press-Media
- Peer Reviewer
- Courses
- Teaching

**Research Line:** Human - Robot Interaction

**Research Group:** [Human Machine Interaction](#) | [Aalborg U Robotics](#)

**Laboratory:** [Human Robot Interaction](#)

EQF level 8

01/10/2018 – 26/04/2021 – 56, Via Roma, San Niccolò, Siena, Italy

## **MASTER'S DEGREE: COMPUTER AND AUTOMATION ENGINEERING- ROBOTICS AND AUTOMATION – University of Siena - Department of Information Engineering and Mathematical Sciences**

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- The thesis is available on the [link](#)

- Some Courses Performed: Human-Centered Robotics, Complex Dynamic Systems, Discrete Event Systems, Machine Learning, Sensors and Microsystems, Artificial Intelligence, Mathematical Methods for Engineering, Network Optimization, Data and Decision Analysis, Multivariable, Nonlinear and Robust Control

-Performed the following projects:

- Control of Allegro Hand through the use of ROS (Robot Operating System) in Ubuntu 16.04 LTS environment
- "A machine learning algorithm for Atari Breakout": after having created the famous game in Python, Machine Learning was used to predict the optimal moves to win the game
- Project: Love Dynamics through Complex Dynamic Systems
- Project Decision Analysis: Cooperation Robots. The task of the two robots is to transport an object from an initial position to a final position trying to avoid collisions with objects. The aim is to find optimal policy reducing the costs. Use of the concept of Dynamic Programming, Markov Process, Monte Carlo simulation
- Project Filtering Techniques : Network Agents. Network of agents is connected with a ring structure and they exchange information about their status with neighbors. The aim is to estimate these states using the Kalman Filter and Extended Kalman Filter
- Project Network Optimization : Lin Kernighan Algorithm

**Thesis:** Commanding Grasping Robot through Virtual Reality and Simulated Wrenches

109/110 (missed 110 by 0.06 in terms of weighted average of marks) | EQF level 7 |

<https://computer-automation.unisi.it/it>

01/09/2020 – 15/11/2020 – Denmark

**ERASMUS TRAINEESHIP** – Aarhus University (AU)

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The concept behind the project is the communication between virtual reality and real world to perform a teleoperation task.

The experimental setup includes a subject wearing a virtual reality viewer (Oculus Rift), a robotic manipulator and objects to be grasped and manipulated. Through the Unity3D software, a virtual environment is displayed in which the avatar of the subject's hand is reproduced. Using Oculus Rift, the human sees the virtual hand, virtual objects and a sphere.

The sphere, since it is more suitable for contact detection, is the container of the target object to grasp. Moreover, they have same reference frame and mass. As consequence, the contact points are considered between the virtual hand and the sphere.

The position and rotation of the hand are tracked through Optitrack Motive, an accurate and precise tracking software for objects and rigid bodies. The hand applies forces to the sphere which are perceived through haptic devices that provide a feedback of the generalized forces applied.

The wrench applied on the center of mass of the sphere is considered the same one applied on the real object.

The purpose is to replicate in the real world the grasping task performed in the virtual reality controlling the end-effector through the pose of the virtual object.

**Field(s) of study**

- Robotics and Virtual Reality

<https://www.linkedin.com/in/giulio-campagna-7505881a4>

<https://www.campagna-robotics.com/>

02/10/2019 – 01/04/2020 – Munich, Germany

**ERASMUS FOR STUDIES** – Technische Universität München (TUM), Munich (Germany)

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- Project/courses in:

- Dynamic Human Robot Interaction
- Project In Human-Centered Neuroengineering for Cybathlon
- Advanced Robot Control and Learning

- Interesting projects:

- Developing of a shape based grasping algorithm using an Eye Tracking Device and a EMG Myo Armband, ROS and YOLO Neural Network (for the Cybathlon project)
- "Robothon Competition", consisting in using robotic learning techniques to differentiate the garbage. It was used ROS as framework. (Advanced Robot Control and Learning course)

<https://www.campagna-robotics.com/>

<https://www.linkedin.com/in/giulio-campagna-7505881a4>

2014 – 2018 – 56, Via Roma, San Niccolò, Siena, Italy

**BACHELOR'S DEGREE: COMPUTER AND INFORMATION ENGINEERING** – University of Siena - Department of Information Engineering and Mathematical Sciences

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Integration of the studies with courses: Robotics, Digital Control. Some courses, already present in the educational plan, were Control Systems, Dynamic Systems.

**Thesis:** Experimentation for real video of systems for Object Detection

EQF level 6 | <https://ing-informatica-informazione.unisi.it/it>

Siena, Italy

**HIGH SCHOOL GRADUATION** – Scientific-Technological High School, Tito Sarrocchi

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100/100 | EQF level 5

## ● RESEARCH INFORMATION

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### Research

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- **ORCID:** 0000-0002-2422-1663
- **RESEARCHID:** [ADG-0240-2022](https://orcid.org/0000-0002-2422-1663)
  
- **SOCIAL PROFILES:**
  1. [Personal Website](#)
  2. [Aalborg University Profile](#)
  3. [LinkedIn](#)
  4. [ORCID](#)
  5. [Google Scholar](#)
  6. [ResearchGate](#)
  7. [Loop](#)
  8. [Publons](#)
  9. [Academia](#)
  10. [IEEE Collabratec](#)

## ● PUBLICATIONS

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### Commanding Grasping Robot through Virtual Reality and Simulated Wrenches

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<https://www.tesionline.it/default/tesi.asp?id=55899> – 2019

Authors: Giulio Campagna

## ● ACTIVITY

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02/03/2022

**10th Annual Aalborg Robotics Workshop**

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## ● HONOURS AND AWARDS

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02/2022

**Qualification to the profession of Robotics and Automation Engineer in section A, Information Engineering sector, class LM-32 – University of Florence**

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[https://www.campagna-robotics.com/files/ugd/1d4f1d\\_39cf3b8589a94aa382b4558df3a12cc9.pdf](https://www.campagna-robotics.com/files/ugd/1d4f1d_39cf3b8589a94aa382b4558df3a12cc9.pdf)

30/06/2022

**Registration of Master Thesis in Italian Database PubbliTesi for recognition of one among best thesis – Pubblitesi**

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<https://www.linkedin.com/feed/update/urn:li:activity:6948250431697395712/>

## ● NETWORKS AND MEMBERSHIPS

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CURRENT

### IDA (Ingeniørforeningen i Danmark)

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Denmark

The Danish Society of Engineers, IDA is a professional body and trade union for technical and scientific professionals

<https://ida.dk/>

24/02/2022 – CURRENT

### IEEE MEMBERSHIP

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IEEE (**Institute of Electrical and Electronics Engineers**) is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity.

<https://www.ieee.org/>

24/02/2022 – CURRENT

### IEEE ROBOTICS & AUTOMATION SOCIETY (RAS) MEMBERSHIP

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The **IEEE Robotics and Automation Society's** objectives are scientific, literary and educational in character.

The Society strives for the advancement of the theory and practice of robotics and automation engineering and science and of the allied arts and sciences, and for the maintenance of high professional standards among its members, all in consonance with the Constitution and Bylaws of the IEEE and with special attention to such aims within the Field of Interest of the Society.

<https://www.ieee-ras.org/>

24/02/2022 – CURRENT

### TECHNICAL COMMITTEE FOR HUMAN-ROBOT INTERACTION & COORDINATION

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The **IEEE-RAS Technical Committee on Human-Robot Interaction and Coordination** aims at providing a framework for discussion for the variety of issues related to the development of robots intended to interact with human beings.

<https://www.ieee-ras.org/human-robot-interaction-coordination>

## ● LANGUAGE SKILLS

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Mother tongue(s): **ITALIAN**

Other language(s):

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	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken production	Spoken interaction	
<b>ENGLISH</b>	B2	C1	B2	B2	B2
<b>FRENCH</b>	A1	A1	A1	A1	A1

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Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

## ● DIGITAL SKILLS

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### My Digital Skills

#### Tools & Technologies

Anaconda | Jupyter Notebook | Leap Motion | SolidWorks | Linux and Windows operative systems | Unity3D | Arduino | Robotic Operative System (ROS) | YOLO | Oculus Rift | GitHub | IMU | Latex | Optitrack Motive | Monte Carlo Simulation | Maestro Servo Controller Pololu | OpenCV | Emotive EPOC+ - 14 channels EEG | MATLAB | Xsens | Coppeliassim - Vrep | CyberGlove | C and C++ | Python | C#

#### Generic Skills

Communication- proficient user | Information processing Proficient | Safety | Problem solving Proficient | Content creation- proficient user | Research Writing

#### Other skills and Applications

Computer Vision | Machine Learning | Dynamic Programming | Multivariable Nonlinear and Robust Control | Automation | Advanced Robot Control and Learning | Network Optimization | Object Detection | Robotics Grasping | Extended Kalman Filtering | Robot Vision | Kalman Filtering | Human Robot Interaction | Tracking | Virtual Reality (VR) | Artificial Intelligence | Deep Learning | Data Analysis | Reinforcement Learning | Teleoperation | Haptics | Robotics

## ● ORGANISATIONAL SKILLS

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### Organisational skills

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- Group-work capabilities: I am motivated and collaborative and supporting the group to reach the goal
- Good sense of organization as I am very precise and orderly (also in everyday life)
- Responsible, determined, diligent (enhanced in the university environment)
- Problem solving skills: I methodologically apply principles to reach the solution of problems
- Work Methodology: I usually apply planning of tasks and workflow in order to finalize job activities in time

## ● COMMUNICATION AND INTERPERSONAL SKILLS

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### Communication and interpersonal skills

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- Good team spirit and ability to adapt to the environment. (university experience, frequenting multicultural environments)
- Excellent communication skills
- Favorable to the team work: sometimes it is essential to cooperate with other people in order to achieve the goal. There must be good cooperation
- Synthetic and clear
- Initiative

## ● DRIVING LICENCE

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Driving Licence: B

## ● CERTIFICATIONS

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24/02/2022 - CURRENT

### IEEE MEMBERSHIP

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[https://www.campagna-robotics.com/files/ugd/1d4f1d\\_1e7facd0acf146e2951572f410d9ba2d.pdf](https://www.campagna-robotics.com/files/ugd/1d4f1d_1e7facd0acf146e2951572f410d9ba2d.pdf)

## IEEE ROBOTICS & AUTOMATION SOCIETY (RAS) MEMBERSHIP

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[https://www.campagna-robotics.com/files/ugd/1d4f1d\\_a72c41eb9bd245a7bce65e6a5604d20c.pdf](https://www.campagna-robotics.com/files/ugd/1d4f1d_a72c41eb9bd245a7bce65e6a5604d20c.pdf)

### FIRST

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FIRST - University of Cambridge, 10 08 2021, Certificate Number: B6014466 - European Level: B2  
[https://www.campagna-robotics.com/files/ugd/1d4f1d\\_b7ef89cc2c9d4016ac1b52f5f42035f0.pdf](https://www.campagna-robotics.com/files/ugd/1d4f1d_b7ef89cc2c9d4016ac1b52f5f42035f0.pdf)

### PET

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PET - University of Cambridge, 01 05 2014, Certificate Number: 0044043424 - European Level: B1  
[https://www.campagna-robotics.com/files/ugd/1d4f1d\\_db96ce0b8949475280806ce046801885.pdf](https://www.campagna-robotics.com/files/ugd/1d4f1d_db96ce0b8949475280806ce046801885.pdf)

### DELTA A1

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DELTA - DELTA, 26 11 2009 - European Level: A1  
[https://www.campagna-robotics.com/files/ugd/1d4f1d\\_b0c55e801df345f7903d46b02269a3b4.pdf](https://www.campagna-robotics.com/files/ugd/1d4f1d_b0c55e801df345f7903d46b02269a3b4.pdf)

### ECDL CORE

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ECDL CORE, AICA, 23-04-2010, N° IT 1526910  
[https://www.campagna-robotics.com/files/ugd/1d4f1d\\_9975058b339a467c89d1134e5c705c34.pdf](https://www.campagna-robotics.com/files/ugd/1d4f1d_9975058b339a467c89d1134e5c705c34.pdf)

### ECDL ADVANCED AM4

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ECDL ADVANCED MODULE AM4, AICA, 19-01-2012, N° ADV026100  
[https://www.campagna-robotics.com/files/ugd/1d4f1d\\_32ffe3230edc479fa3a2003bf9e572c9.pdf](https://www.campagna-robotics.com/files/ugd/1d4f1d_32ffe3230edc479fa3a2003bf9e572c9.pdf)

## COURSE

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### Applying the Danish Code of Conduct for Research Integrity to your Research

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TYPE:  
Ph.D. Course

PLACE:  
Aalborg University

TOPICS:  
The course briefly introduces the principles of research integrity, dwell on the basic standards for conducting responsible research - from the planning phase to the dissemination of results, and also shortly introduces the current administration for misconducts.

The course is based on the Danish Code of Conduct for Research Integrity (Ministry of Higher Education and Science, 2014), that was accepted by all Danish Universities.

[https://www.campagna-robotics.com/files/ugd/1d4f1d\\_6768b194139a455eb5d1d624c481d100.pdf](https://www.campagna-robotics.com/files/ugd/1d4f1d_6768b194139a455eb5d1d624c481d100.pdf)

### International Scientific Networking

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TYPE:  
Ph.D. Course

PLACE:  
Aalborg University

TOPICS:

- To learn that networking is important
- To learn how to get to know and how to get to be known
- To learn how to show interest and how to become interesting

[https://www.campagna-robotics.com/files/ugd/1d4f1d\\_3d11241b35664f1b8f14d9cb55a4e93b.pdf](https://www.campagna-robotics.com/files/ugd/1d4f1d_3d11241b35664f1b8f14d9cb55a4e93b.pdf)

## Deep Learning

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TYPE:

Ph.D. Course

PLACE:

Aalborg University

TOPICS:

- Machine learning fundamentals
- Deep learning concepts
- Deep learning methods including deep autoencoders, deep neural networks, long short-term memory recurrent neural networks, convolutional neural networks, and generative adversarial networks.

[https://www.campagna-robotics.com/files/ugd/1d4f1d\\_8c2fd8c40d054f129506c4c059e295fa.pdf](https://www.campagna-robotics.com/files/ugd/1d4f1d_8c2fd8c40d054f129506c4c059e295fa.pdf)

## PROJECTS

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01/09/2021 – 31/03/2025

### RETRO: Regulating Trust in Human Robot Interaction

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Trust has been shown to be a crucial factor in the efficient use of automation.

Trust in HRI increases the level of complexity due to the physical embodiment of the robot that shares the same space as the operator and thus resembles (partly) a "face-to-face" interaction.

Research in trust has so far been restricted to post-hoc measurements of whole interaction episodes. This is useful as an analytical tool to statically optimize the system design, but does not support trust adjustment during the interaction to ensure efficient task completion.

The goal of this project is thus: (i) identification of multi-modal trust indicators in two experimental scenarios (collaborative robotics; social robotics); (ii) data collection and training of deep learning network for dynamic real-time trust prediction; (iii) development of trust regulation strategies ensuring efficient use of the robot system.

06/2020 – 07/2020

### Cooperation Robots

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<https://www.campagna-robotics.com/>

In a company, daily work activities are carried out through an interaction between robots and humans. In particular, two robots take care of transporting objects from one location to another, leaving humans with less mechanical tasks. The task of the two robots is, therefore, to transport an object from an initial position to a final position trying to avoid collisions with any objects and machinery in the company.

Furthermore, in order to have correct grasping on the object so that it does not slide, the robots must stay at a desired distance.

Unfortunately, one of the two robots sometimes does not work properly and there are small deviations in the direction of movement. In particular, with probability 0.7 the robot maintains the desired direction, with probability 0.2 deviates to the left side and with probability 0.1 deviates to the right side.

To visualize better the situation, suppose there is a grid of hexagonal cells that represents the environment. Suppose that at the initial position we have the two robots that are distant one cell and between them there is the object. This is the desired setup that should be kept. At each time instant each robot can perform a move in six different directions since for each cell we have attached six other cells.

Cost function will consider not only the time steps that passes, but also time spent when there are collisions between robots and obstacles. In particular the cost function will take account also cost related to the distance between the robots. It should be remembered that if the malfunctioning robot collides against an obstacle, it will stay put for a time step (one second).

The goal is to determine an optimal policy so that the time required to complete the task is minimized.

Assume that we are in 2D dimensions.



For simplicity, suppose that the object cannot collide with obstacles and assume that the two robots can be on the same cell but this is not considered a collision.

06/2020 – 07/2020

## Lin Kernighan Algorithm

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<https://www.campagna-robotics.com/>

The traveling salesman problem (TSP) is one of the most widely studied problems in combinatorial optimization. Given a collection of cities and the cost of travel between each pair of them, the traveling salesman problem is to find the cheapest way of visiting all of the cities and returning to the starting point. TSP may also be stated as the problem of finding a Hamiltonian cycle (tour) of minimum weight in an edge-weighted graph.

The Lin-Kernighan algorithm belongs to the class of so-called local search algorithms.

A local search algorithm starts at some location in the search space and subsequently moves from the present location to a neighboring location.

The algorithm is specified in exchanges that can convert one candidate solution into another.

Given a feasible TSP tour, the algorithm repeatedly performs exchanges that reduce the length of the current tour, until a tour is reached for which no exchange yields an improvement. This process may be repeated many times from initial tours generated in some randomized way.

The Lin-Kernighan algorithm (LK) performs so-called k-opt moves on tours. A k-opt move changes a tour by replacing k edges from the tour by k edges in such a way that a shorter tour is achieved.

10/2019 – 04/2020

## Shape Based Grasping Techniques with Eye Tracking Device

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<https://www.linkedin.com/in/giulio-campagna-7505881a4/>

<https://www.campagna-robotics.com/>

The loss of one hand can significantly affect the level of autonomy and the capability of performing daily living, working and social activities. The current prosthetic solutions contribute in a poor way to overcome these problems due to limitations in the interfaces adopted for controlling the prosthesis and to the lack of force or tactile feedback, thus limiting hand grasping capabilities.

For this reason, it was carried out a project to develop a system targeted to be used for a prosthetic hand.

It consists of an algorithm that allows an adaptive grasping based on the shape of the object. This system, first of all, extracts the user's intention to grab an object through EMG signals using the EMG Myo Armband device. After that, the visual feedback is used to make the appropriate grasping using an Eye Tracking Device. In this way it is possible to identify exactly the object we are observing, which is then recognized using YOLO, a real time object recognition algorithm.

Various experiments were then carried out to test the effectiveness of the system and, finally, possible improvements were proposed.

03/2020 – 03/2020

## Robothon: Beach CleanUp Challenge

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<https://www.linkedin.com/in/giulio-campagna-7505881a4/>

<https://www.campagna-robotics.com/>

The protection of our planet from pollution is one of the most pressing challenges.

Regarding this topic, cleaning up coastal lines is a very important and challenging task that has to be carried out manually by workers.

Thanks to the University of TUM, I had the possibility to participate at Robothon competition whose subject this year was to implement a robotic platform to help cleaning the beaches.

The task was to autonomously sort various objects by first identifying the object, classifying where it belongs and finally placing it accordingly.

At the moment, this is a really important topic in the field of research. Me and my team were really satisfied about the results because we succeeded in a challenge that involved different domains of knowledge such as control, robotics, machine learning.

11/2018 – 02/2019

## Atari Breakout and Self-Supervised Learning

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<https://www.linkedin.com/in/giulio-campagna-7505881a4/>

A machine learning algorithm for the famous game Atari Breakout. Developed in Python with the "pygame" library, it is based on a self supervised algorithm.