



# Ariel Gjaci

PhD student in Robotics and Artificial Intelligence

13/10/1995



## Social Networks



## Languages

- Italian ●●●●●●●●
- Albanian ●●●●●●●●
- English ●●●●●●●●

## About Me

I am a PhD student in Robotics and Artificial Intelligence who completed a Master's degree in Robotics Engineering and a Bachelor's Degree in Biomedical Engineering. I am a technology enthusiast whose passion is to learn and apply knowledge in Artificial Intelligence and other related fields to Robotics.

## Working Experience

- 11/2021 – now **PhD student in Robotics and Artificial Intelligence** Università degli studi di Genova  
I do research related to Culture-Aware Artificial Intelligence for Social Robots. In particular, during my first year, I analyzed different datasets using Random Forest and Support Vector Machines models to acknowledge the influence of cultural factors in data. During the second year, I used an NLP model based on Semantic Similarity to generate culturally-dependent symbolic gestures. In the last year, I will create a hybrid model and I will use the extracted cultural knowledge to generate multi-modal co-speech gestures on social robots.
- 05/2021 – 10/2021 **Junior Software Engineer Consultant** Akka Technologies  
I worked in a team to develop embedded software solutions for military applications. In particular, I developed the backend part of the software used to manage data related to the panels used by avionic pilots.

## Education

### Study

- 2018 – 2021 **Master's Degree in Robotics Engineering** Università degli Studi di Genova  
Worked on many projects concerning robotic applications. Learned how to use ROS and Linux, expanded my programming knowledge, and studied subjects of different kinds (AI, Embedded Systems, Computer Vision, Multi-variable and Non-Linear control, Mechanical Design, ecc.). Graduated defending the thesis: Culture-Aware Co-Speech Gestures Using Generative Adversarial Networks.
- 2014–2018 **Bachelor Degree in Biomedical Engineering** Università degli Studi di Genova  
Learned subjects in different fields like mathematics, physics, signal processing, electronics, programming (C, C++, Matlab), etc. Graduated defending the thesis: Characterization of the Activity Evoked by Stimuli in Hippocampal Neuronal Networks.
- 2009 – 2014 **High School Diploma** ITIS Galileo Ferraris  
Graduated as IT Engineering Technician and learned the basics of some programming languages: C++, PHP, HTML, Assembler, SQL.

## Skills

### Programming Skills

- Python ●●●●●●●●
- C++ ●●●●●●●●
- C ●●●●●●●●
- R ●●●●●●●●
- Matlab/Simulink ●●●●●●●●

### System Level Programming Skills

- Linux ●●●●●●●●
- ROS ●●●●●●●●
- Windows ●●●●●●●●

### Mechanical design skills

- Creo ●●●●●●●●

### Embedded Systems and Electronics skills

- dsPICDEM 2 ●●●●●●●●
- Raspberry Pi ●●●●●●●●
- Arduino ●●●●●●●●

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## Publications

- 2022 **Towards culture-aware co-speech gestures for social robots, International Journal of Social Robotics**  
*Ariel Gjaci, Carmine Tommaso Recchiuto and Antonio Sgorbissa*  
International Journal of Social Robotics
- 2022 **Culture Awareness in Intelligent Systems**  
*Ariel Gjaci, Luca Oneto, Carmine Tommaso Recchiuto and Antonio Sgorbissa*  
Workshop on Artificial Intelligence and Robotics – AIRO 2022
- 2021 **A GAN-based Approach for Generating Culture-Aware Co-Speech Gestures**  
*Ariel Gjaci, Carmine Tommaso Recchiuto and Antonio Sgorbissa*  
Workshop on Artificial Intelligence and Robotics – AIRO 2021

## Educational Experience

- 06/2020 - 06/2021 **Culture-Aware Talking Gestures using Generative Adversarial Networks**  
In this project, I developed a new method for generating non-verbal gestures for a specific culture. Several frameworks and Deep-Learning models were leveraged to work together: "Openpose" for gesture detection, "PySceneDetect" for scene detection from Youtube videos, a Sequence-based model for many-to-one Voice Conversion, a GAN-based model for Audio-To-Gesture mapping (implemented with Tensorflow), a Feed-Forward model for 2D-to-3D pose transformation (implemented with PyTorch). Finally, the gestures generated were mapped to the joints configuration space of the Humanoid robot Pepper. It was used Python 3 for writing the scripts, and Google Colaboratory Notebook for running them. A specific Dataset based on TED-Talk videos of people belonging to the Indian Culture was created.
- 09/2020 – 11/2020 **Robots Play Football**  
This project involved a team of 3 people and it was completed both in simulation and in reality using Python, OpenCV and ROS. Here we created a robotic setup consisting of four Mechanum wheels, four motors ST XH 6 pin Connector (one for each wheel), Arduino Due, Raspberry Pi, RGB camera module for Raspberry, two L298N dual H-Bridge Drivers, Batteries for Raspberry and the motors. The goal was to develop a method that allows the robot to recognize a red ball using the colour segmentation technique, find the ball position exploiting the knowledge of the size of the ball and the focal length of the camera, and then find a way to push the ball to the goal. The position of the robot in the arena was assumed to be known thanks to a Motion-Detection setup, but since we didn't have access to the setup at that time, we relied on odometry by analyzing the data coming from the encoders of the wheels. The simulation was completed in ROS Gazebo and the problem of obstacle avoidance was not considered.
- 04/2020 - 07/2020 **Implementation of an Architecture for Multimodal Semantic Perception Fusion**  
This project involved a team of 10 people and the goal was to implement a Software Architecture for recognizing objects using different perception modules. For instance, we used 2 cameras (RGB and RGB-D) of the Baxter Robot for detecting the common features among objects, then we computed the correlation among these features such that it was possible to know, for each object on a table and with some computed confidence, if it was the same object perceived by the other camera module. Finally, we put together all the features (common and not common) such that they can be also used outside the Architecture. The latter was thought to be as modular as possible so that can be added unlimited perception modules with a minimal change of code. What I did in particular for this project was to test the overall Architecture for checking its performance, limits, bugs, and finally, I generated a Doxygen documentation.

- 04/2020 -  
07/2020
- Implementing a Basic Control System for an Autonomous Catamaran**  
This project involved a team of 2 people and the aim was to implement a system for controlling the motors of an autonomous Catamaran using the dsPICDEM 2 board. Everything was written using the C language, the MPLab software, and some low-level functions of the dsPIC30F4011 microcontroller embedded inside the board. We scheduled many tasks using some timers of the board: led blinking (to indicate some state), management of the temperature, control of RPM of motors using PWM signals, control UART for sending and receiving messages, management of the LCD of the board for showing them, management of different modalities (timeout mode, safe mode etc.)..
- 11/2020 -  
02/2021
- Culturally-Competent Verbal Interaction Service Integration for Pillo Robot**  
This project involved a team of 3 people and has, as its main goal, the integration of the Rest Server of the Pillo Robot with the Cloud server of Caresses. Caresses is a project with different modules and the aim is to implement a culturally-competent behaviour for robots. It can be accessed by TCP/IP connection while the Rest server used to manage the Pillo Robot is called 'Swagger' and can be accessed with the common HTTP methods. We created a third server called 'CaressesBridge' that communicates with the 'Swagger' Server using the Rest API implemented with Flask, decode the messages coming from it (for example the words that the robot has listened from the user), sends the results to the Caresses Server using TCP/IP connection, getting something from Caresses Server (a message, an action to be performed etc.), sending back the message or action to the Swagger Server, put the robot in Listen mode, and finally restart the loop. Many of the actions implemented by Caresses can't be reproduced by the Pillo Robot so we created a method for managing only the chit-chat messaging. The architecture can be easily expanded.
- 04/2020 -  
07/2020
- Design of a new Robot Starting from a Toy Robot**  
The project was realized by a team of 3 people. Here we bought a spider toy robot, we did an accurate measurement of all its components, and then we modelled each part of it using PTC-Creo to have a complete model of the toy. Using this as a starting point, we designed and modelled (again on Creo) a newer Robot that has the possibility to be 3D printed and then moved by 2 motors instead of 1 that we had on the toy. The only constraints were given by the printer limits and by our imagination.
- 05/2019 -  
07/2019
- Multi-View Calibrated Acquisition of Upper Body Human Movements**  
This project involved a team of 3 people and was about the implementation of a multi-view setup with 3 synchronized industrial cameras connected through Ethernet cables. These were used for the reprojection of some upper-body keypoints in a 3D space. All the work can be resumed in 3 main steps: -Find a solid setup for the cameras such that it is possible to have a good view of 8 upper-body keypoints coming from a violinist playing his instrument -Calibrate all the possible pairs of cameras using the 'Stereo Camera Calibrator' Matlab Toolbox and extract the internal and external parameters -Detect and track keypoints of some videos (captured by the setup) using a given Deep Learning model, and reproject them in a 3D space for creating a video showing the movements of the violinist. We had a video for each pair of cameras.