

# Mario Avolio

COMPUTER & ROBOT VISION · ARTIFICIAL INTELLIGENCE

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## Education

### University of Milano Bicocca

Milan (MI), Italy

M.S. IN COMPUTER SCIENCE (GRADE: 110/110 CUM LAUDE)

Sept. 2021 - March 2024

- **Thesis title:** *Self-Supervised Learning And Model Adaptation For Facial Attribute Classification*
- **Project:** Developed an advanced framework using Self-Supervised Learning and Model Adaptation to enhance facial attribute classification, achieving high accuracy on diverse datasets.
- **Keywords:** Facial Attribute Classification, MAAD-Face Dataset, CelebA Dataset, Self-Supervised Learning, DINOv2, Low-Rank Adaptation (LoRA), Parameter-efficient Model Adaptation for Vision Transformers (PEViT), Dataset Quantization (DQ)

### University of Calabria

Arcavacata (CS), Italy

B.S. IN COMPUTER SCIENCE (GRADE: 108/110)

Sept. 2018 - Sept. 2021

- **Thesis title:** *Dalla visione all'azione: moduli di ragionamento automatico full-stack*
- **Project:** Developed "BrainyBot", a robotic system capable of autonomously solving complex mobile games like Candy Crush Saga and Ball Sort Puzzle through touch screen interaction.
- **Keywords:** Answer Set Programming (DLV2), Object & Image Recognition, Knowledge Representation, Sense-Think-Act paradigm

### I.I.S. Silvio Lopianò

Cetraro (CS), Italy

SCIENTIFIC HIGH SCHOOL DIPLOMA

Sept. 2013 - July 2018

## Experience

### SaaS Chatbot Project based on Self-RAG

Remote

LEAD DEVELOPER & ARCHITECT

Sept. 2024 - Present

- Led the development and architecture of a SaaS platform that allows businesses to create custom chatbots using LangChain and LangGraph with Self-RAG for autonomous information retrieval and response generation.
- Implemented the system to support the upload of documents in various formats (PDF, Word, Excel) and convert them automatically for processing by the LLM.
- Developed a web-based chatbot and REST API interface using FastAPI, allowing both user-friendly and programmatic interactions with the chatbot service.
- Integrated Elasticsearch and custom filtering mechanisms to allow users to set filters based on specific criteria such as date and document categories.

## Skills

<b>Programming Languages</b>	Python, Java, C++, C, MATLAB, Perl, Bash
<b>Frameworks &amp; Libraries</b>	TensorFlow, PyTorch, Keras, Scikit-learn, OpenCV, Matplotlib, Pandas, Numpy, Seaborn, Hugging Face Transformers, Haystack, LangChain, LangGraph, Plotly, EmbASP
<b>Computer Vision</b>	Adaptive Algorithms (contrast, noise reduction, artifact removal), Image Quality Assessment, Object & Image Recognition (Traditional & Deep Learning), Multimedia Indexing & Retrieval
<b>Robot Localization &amp; Mapping</b>	Bayesian Filtering (Gaussian Filters, Nonparametric Filters), Robot Motion & Perception, SLAM (EKF, FAST, Graph-Based)
<b>Natural Language Processing</b>	Text Classification & Sentiment Analysis, Named-Entity Recognition (CRFs, neural extensions), Topic Extraction (LDA, Neural Topic Models), Text Summarization, Text Generation, Question Answering (Retriever-Reader Architectures)
<b>Answer Set Programming</b>	DLV2
<b>Optimization</b>	LINGO, OPL-CPLEX
<b>Technologies &amp; Tools</b>	Linux, Git, GNU Tools, MPI, OpenMP, Android Studio, Unity3D, Jupyter Notebooks
<b>Virtualization</b>	Docker, VirtualBox
<b>Automation &amp; CI/CD</b>	GitLab CI/CD, GitHub Actions, Make, Maven, Gradle, CMake, systemd
<b>Databases</b>	MariaDB, SQLite, MySQL, PostgreSQL, MongoDB, SQL, Neo4J
<b>Documentation Tools</b>	LaTeX, AsciiDoc, Markdown
<b>Languages</b>	English, Italian

## Research Publications

### From Vision to Execution: Enabling Knowledge Representation and Reasoning in Hybrid Intelligent Robots Playing Mobile Games

KR2023

CO-AUTHOR

Rhodes, Greece | September 2-8, 2023

- The paper explores the automation of interactions with touch surfaces, presenting a delta robot designed to engage in match-3 games and ball-sorting puzzles on mobile phones. This robot employs a vision module to identify objects by color and shape, and utilizes declarative models for decision-making based on game rules and strategies. By integrating AI techniques such as vision processing and answer set programming, the system simplifies motion control through its delta robot configuration. The authors detail the components of their robotic application, demonstrating its capabilities through implementations of various games. They suggest that this approach facilitates innovative combinations of knowledge representation and robotics, offering a controlled environment for experimenting with hybrid reasoning methods without the burden of technical implementation.
- Keywords: Applications of KR in robotics, Applications of KR Integrating symbolic and sub-symbolic approaches, KR related tools and systems.

## Honors & Awards

### DOMESTIC AWARDS

July 2021 **Best Students 2020 Award**, Graduation Day

University of  
Calabria