Giulia Martinelli

CURRENT POSITION

04/2025 – CURRENT
Post-Doc Researcher

My research lies at the intersection of Computer Vision and Computer Graphics, with a focus on the creation and animation of realistic Digital Humans. I am currently involved in a multidisciplinary project that spans the full pipeline of digital human modeling—from high-fidelity 3D appearance reconstruction to motion capture, retargeting, and real-time animation.

Key areas of my work include:

- Parametric human models (e.g., SMPL, SMPL-X) for capturing and representing body shape, facial expressions, and hand gestures.
- Motion capture, both markerless (from sparse or multi-camera setups) and marker-based using optical systems such as OptiTrack, with robust 3D pose estimation in real-world conditions.
- Motion retargeting and animation control for integration into interactive environments (e.g., Unreal Engine).
- Applications ranging from virtual and augmented reality to sports analytics

WORK EXPERIENCE

🏛 **UNIVERSITY OF TRENTO - DEPARTMENT OF INFORMATION ENGINEERING AND COMPUTER SCIENCE** – TRENTO, ITALY

UNIVERSITY TEACHING ASSISTANT – 11/2021 – CURRENT

Main activities and responsibilities:
1. Teaching Assistant Computer Vision Course (A.A. 2021/2022 - 2022/2023 - 2023/2024)
2. Laboratory Tutor Sport Tech Course (A.A. 2024/2025)
3. Supervision of Master Thesis
4. Supervisor for Multisensory Interactions Laboratory
5. Supervision of Motion Capture projects
6. Supervision of Computer Vision projects
7. Supervision of Sport Tech projects

🏛 **ESA RAHTU** – TAMPERE, FINLAND

PHD PERIOD ABROAD AT TAMPERE UNIVERSITY – 31/01/2024 – 29/04/2024

Working extensively with a Volumetric Capture system, for creating a synthetic dataset of human characters. My research aims were:
- automate animation processes for scans,
- addressing challenges such as automatic rigging,
- skinning,
- cloth animation,
- and the conversion of scans into realistic virtual characters to populate virtual environments.

🏛 **IMI REMOSA** – CAGLIARI , ITALY

Address Viale Pula, 37, 09123 , Cagliari , Italy

INTERNSHIP – 09/2016 – 01/2017

🏛 **UNIVERSITY OF TRENTO** – TRENTO, ITALY

POST-DEGREE RESEARCH SCHOLARSHIP – 11/2020 – 10/2021

- Development of an algorithm for gender recognition, based on pose detection and analysis of moving subjects.
- Human Pose estimation from top-view RGB images.

- Tutor/Supervisor of 4 Computer Vision projects.
- Tutor/Supervisor for one student's thesis.

EDUCATION AND TRAINING

11/2021 – 04/2025 Trento, Italy
PHD - INFORMATION AND COMMUNICATION TECHNOLOGY University of Trento

Computer Vision applied to Human Motion Modelling. My research focused on advancing the field of automatic motion retargeting using cutting-edge techniques such as Transformers and mask modelling, collecting data from Optical Motion Capture System.

Field of study Computer Vision | **Thesis** Digital Humans: Improving Appearance Rendering, Advancing Motion Retargeting

2016 – 2020 Trento, Italy
MASTER'S DEGREE IN MECHATRONICS ENGINEERING University of Trento

Projects:
- **Computer Vision: Low-cost Detection of Printed Circuit Boards (PCB) Defects.**
- Systems and techniques for digital signal processing: Implementation in AppDesigner of a Dual Tone Multi-frequency (DTMF) tone generation and decoding.
- Embedded systems: Assembly of a Hexacopter and creation of a synchronization process for a swarm of drones.
- Modeling and design with finite elements: Simulation on COMSOL Multiphysics of a Surface Acoustic Wave Sensor (SAWS).
- **Robotic Perception and Action: Development of a UNITY project that implements SLAM (Simultaneous Localization and Mapping) algorithm.**
- Design and Control of Product and Process: Development of Nitrotech N8's motorized version for Manfrotto Group.
- Distributed systems for measurement and automation: Localization of Mini Quadrotors via IMU and Ultra-Wideband Wireless Technology.

Field of study Curriculum Electronics and Robotics | **Final grade** 108 |

Thesis Human Mesh Recovery for Gender Recognition in Videos

2013 – 2017 Cagliari, Italy
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING University of Cagliari

Final grade 100 |

Thesis Application of the Lean Production criteria within the "Refractory Application" Department of IMI REMOSA S.p.A

UNIVERSITY OF CAMBRIDGE ESOL EXAMINATIONS B1 University of Cambridge

Final grade Pass with Merit

06/2013 Iglesias, Italy
HIGH SCHOOL DIPLOMA ISTITUTO DI ISTRUZIONE SUPERIORE "G. Asproni - Iglesias"

Field of study Scientifico | **Final grade** 100

LANGUAGE SKILLS

Mother tongue(s): **ITALIAN**

Other language(s):

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken production	Spoken interaction	
ENGLISH	C1	C1	C1	C1	C1

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

SKILLS

Python | C Sharp | LateX | HTML | R Language | Ruby | MATLAB | Simulink | AppDesigner | COMSOL Multiphysics | Maple | Solidworks | AutoDesk Inventor | Unity | Adobe Photoshop | Adobe Illustrator | Git | Linux | UNREAL ENGINE | OptiTrack - Motive - Optical motion capture software | Volumetric Capture Sysyem | Character Creator | Autodesk (Maya, 3D Max) | Autodesk Motion Builder | Blender | Wrap Faceform | Frameworks & Libraries: OpenCV, Sci-kit learn, NumPy, Pandas, SciPy, Matplotlib.

PUBLICATIONS

2021
PanopTOP: a framework for generating viewpoint-invariant human pose estimation datasets

N. Garau, G. Martinelli, P. Brodka, N. Bisagno, and N. Conci (Proceedings of the IEEE/CVF International Conference on Computer Vision. 2021. p. 234-242.)

2022
Gender Recognition from 3D Shape Parameters

G. Martinelli, N. Garau, N. Conci (International Conference on Image Analysis and Processing. Cham: Springer International Publishing, 2022. p. 203-214.)

2023
A Case Study for the Automatic Supervision of Body-Weight Exercises: The Squat

P Aliprandi, L Girardi, G Martinelli, F De Natale, N Bisagno, N Conci. (2023 IEEE International Workshop on Sport, Technology and Research (STAR), 13-16)

2023
Meta-Trainer: An Augmented Reality Trainer for Home Fitness with Real-Time Feedback

L Orlandi, G Martinelli, F Laiti, D Lobba, N Bisagno, N Conci. (2023 IEEE International Workshop on Sport, Technology and Research (STAR), 90-93)

2023
UNPOSED: an Ultra-wideband Network for Pose Estimation with Deep Learning

G Martinelli, L Santoro, M Nardello, D Brunelli, D Fontanelli, N Conci (2023 IEEE International Workshop on Metrology for Industry 4.0 & IoT)

2024
Ski Pose Estimation

G. Martinelli, F. Diprima, N. Bisagno, N. Conci (2024 IEEE International Workshop on Sport Technology and Research (STAR))

2024
ALL SKELETONS ARE CREATED EQUAL! A DOMAIN ADAPTATION TRANSFORMER TO HANDLE MULTIPLE TOPOLOGIES

G. Martinelli, N. Garau, N. Bisagno, N. Conci. (2024 IEEE International Conference on Image Processing (ICIP2024))

2024
EPOCH: Jointly Estimating the 3D Pose of Cameras and Humans

N. Garau, G. Martinelli, N. Bisagno, D. Tomè, C. Stoll (European Conference on Computer Vision. Cham: Springer Nature Switzerland, 2024. p. 1-18)

2024
MoMa: Skinned motion retargeting using masked pose modeling

G. Martinelli, N. Garau, N. Bisagno, N. Conci. (Journal Computer Vision and Image Understanding (CVIU), Volume 249)

2024
Skeleton-Aware Motion Retargeting Using Masked Pose Modeling

G.Martinelli, N.Garau, N.Bisagno, N.Conci. (European Conference on Computer Vision. Cham: Springer Nature Switzerland, 2024. p. 287-303.)

2025
Build-A-Volcap: Automated Synthetic Validation of Real-world Volumetric Capture Quality

A. Rech, G. Martinelli, N. Garau, N. Conci, F. De Natale (2024 IEEE International Conference on Image Processing (ICIP2025))

2025
Learning to Judge Motion: Likelihood-Based Evaluation with Normalizing Flows

Mahamat Issa Choueb, Praveen Kumar Sekharamantry, Giulia Martinelli, Alessandro Floris, Nicola Conci (13th European Workshop on Visual Information Processing (EUVIP2025))

2025
Tracking Volleyball Players from a Multi-Camera Top-View Setup

N. Bisagno, G. Martinelli, N. Conci (2025 IEEE International Workshop on Sport Technology and Research (STAR))

2025
Comparing IMU and Optical Motion Capture System for Sport Biomechanics

D. Fruet, A. Tauro, D. Di Liberto, C. Pedrott, I. Bracci, G.Martinelli, G. Nollo (2025 IEEE International Workshop on Sport Technology and Research (STAR))

2025
Breaking the Game: A Low-Cost System for 3D Human and Ball Pose Estimation in Basketball

G. Martinelli, N. Bisagno, N. Conci (2025 IEEE International Workshop on Sport Technology and Research (STAR))