

# Federico Nocentini

PhD Student

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🌐 Federico Nocentini

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## Education

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- **PhD in 3D Computer Vision and Artificial Intelligence** **Florence, Italy**  
*Università degli Studi di Firenze - Media Integration and Communication Center* *November 2022 - Present*  
Topics of research: Deep Learning; 3D Computer Vision; 3D Talking Heads Generation.
- **M.Sc in Computer Science and Engineering** **Florence, Italy**  
*Università degli Studi di Firenze, Grade: 110/110* *February 2020 - October 2022*  
Thesis: Generating Emotional 3D Talking Heads from Audio Spectrograms.
- **B.Sc in Computer Science and Engineering** **Florence, Italy**  
*Università degli Studi di Firenze, Grade: 104/110* *September 2016 - February 2020*  
Thesis: Facial recognition with depth images generated from a deformable model of the face.

## Publications

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- **Learning Landmarks Motion from Speech for Speaker-Agnostic 3D Talking Heads Generation**  
A novel approach for generating 3D talking heads from raw audio inputs. This method grounds on the idea that speech related movements can be comprehensively and efficiently described by the motion of a few control points located on the movable parts of the face, i.e., landmarks. This paper was published at ICIAP 2023 and presented orally.
- **S2L+S2D: Identity-Preserving Speech-Driven 3D Talking Heads**  
In this demo, users are empowered to record their own voices, employing their speech to effortlessly animate a handpicked 3D avatar of their choosing. This demo was showcased at IJCB 2023 and received the **Best Demo Award**.
- **ScanTalk: 3D Talking Heads from Unregistered Scans**  
ScanTalk is a novel framework for 3D Talking Heads generation capable of animating **any** 3D faces in arbitrary topologies including scanned data. This paper will be published at ECCV 2024.
- **EmoVOCA: Speech-Driven Emotional 3D Talking Heads**  
EmoVOCA is a new synthetic dataset combining emotional nuances with 3D talking heads. On such data, drawing from state-of-the-art techniques, we designed and trained a deep architecture that generates expressive 3D talking heads using an audio, an emotion, and intensity labels

## Projects

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- **Citation intent classification**  
A model built with Pytorch for citation intent classification in scientific papers using the Scicite dataset. To leverage the connection between the structure of scientific papers and the intent of citations, we studied a multitask framework with two structural scaffolds (auxiliary tasks) related to the structure of scientific documents.
- **Outfit colors classification with CNN**  
A CNN model built with Pytorch for outfit classification based on colors. The classes are taken from Shigenobu Kobayashi's book Color Image Scale.
- **Mean shift clustering with CUDA and OpenMP**  
Sequential C++ and parallel CUDA and OpenMP implementations of the mean shift clustering algorithm. The execution times obtained for datasets of increasing dimension are compared to measure the speedup of the parallel versions.
- **Depth of Field and Motion Blur**  
Implementation of Depth of Field and Motion Blur as postprocessing effects using Three.js

### ○ **Social distancing detector**

A tool built with Python to monitor people's compliance to social distancing in crowded places in real-time. It uses a neural network based on Keras for people detection and OpenCV for measuring distances in various types of input video streams.

### ○ **K-means clustering with CUDA and OpenMP**

Sequential Python and parallel CUDA and OpenMP implementations of the k-means clustering algorithm. The execution times obtained for datasets of increasing dimension are compared to measure the speedup of the parallel versions.

## Languages

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- **Italian:** Mother tongue
- **English:** Full professional proficiency

## Skills

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### Framework and tools

- PyTorch
- PyTorch3D
- Tensorflow
- Open3D
- Trimesh
- Numpy
- Pandas
- Matplotlib
- OpenCV

### Programming languages

- Python
- Java
- C++
- C
- Javascript

## Other

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Most of the projects (in addition to others not mentioned here) are available on my Github profile. The publications are available in my Google Scholar profile.