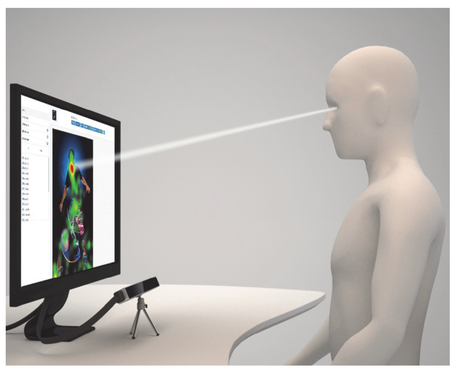
Computer Vision & Multimedia Lab

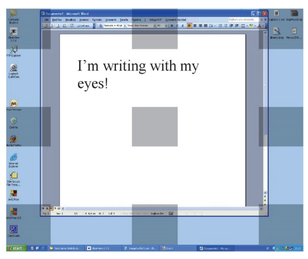
Eye Tracking

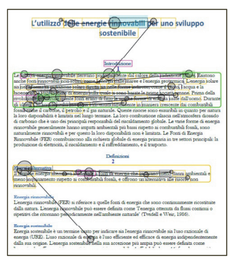
Explicit and Implicit Gaze-Based Communication

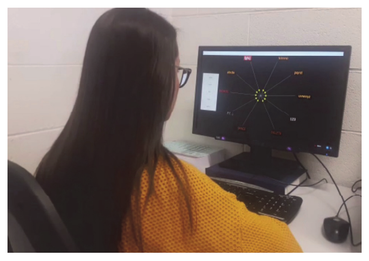


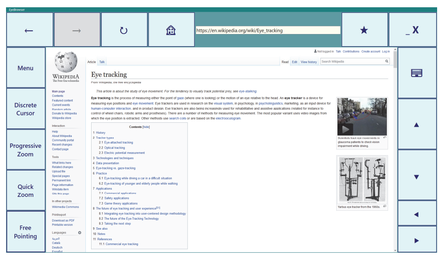
Gaze Input

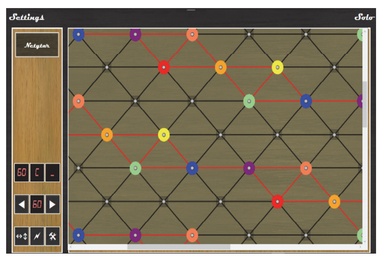
Using eye tracking as an assistive technology or as an additional input channel (besides keyboard, mouse, etc.) to write, surf the Web, play music, etc.





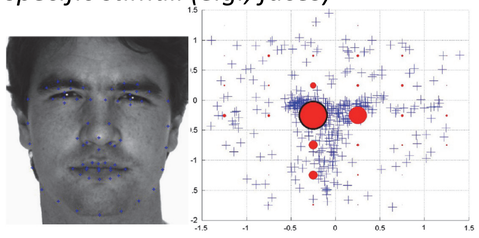






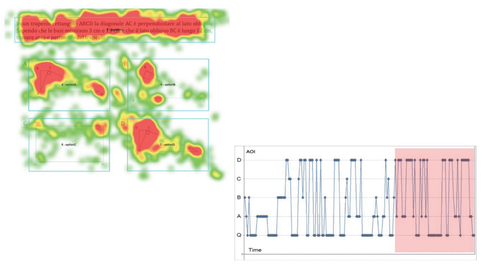
Soft Biometrics

Identifying or verifying the identity of people from the way they look at specific stimuli (e.g., faces)



E-Learning

Understanding learners' behavior and detecting possible comprehension problems

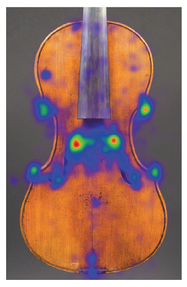


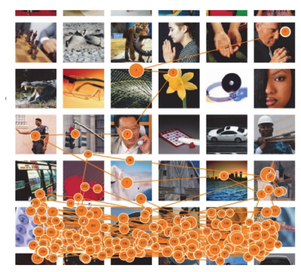
Automotive

Studying the driver's performance through cheap eye tracking solutions

Study of Gaze Behavior

Analysis of the user's gaze behavior while inspecting different kinds of visual stimuli

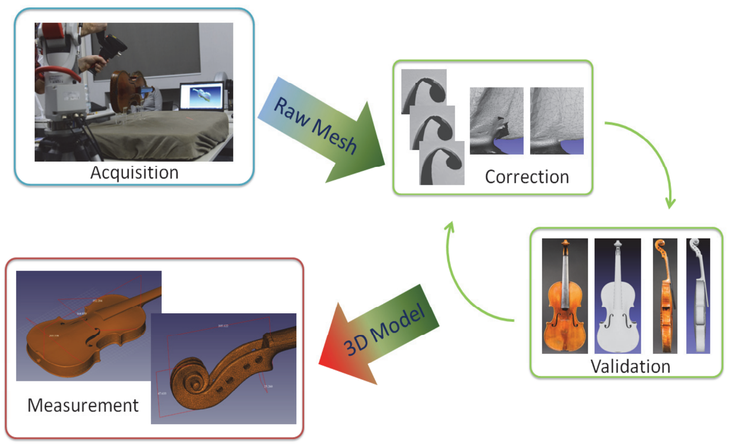




Digital Humanities

3D scan and modeling

Historical violins

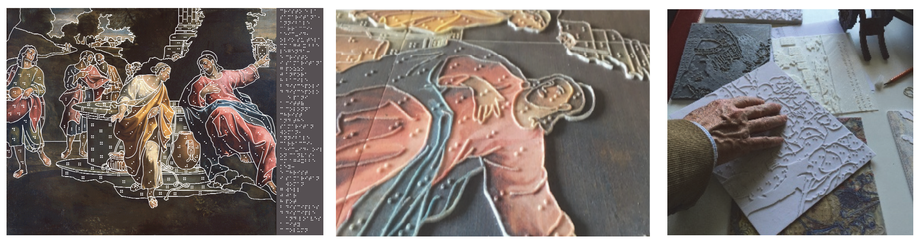


The ark of St. Augustine

The city of Pavia in the Renaissance

3D printed tactile images

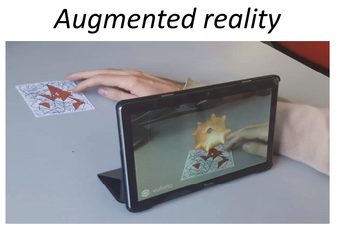
Make artworks accessible for visual impaired and blind people

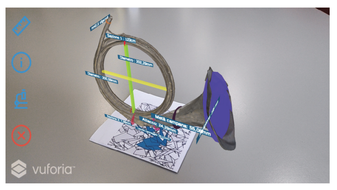


Interactive applications for museums

Gestural interaction

Augmented reality





Gaze-based interaction

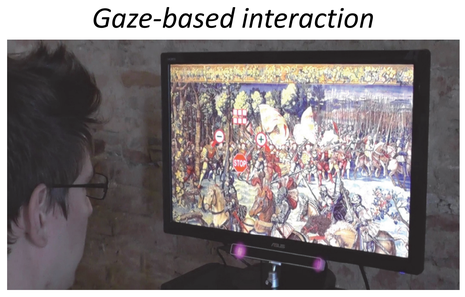
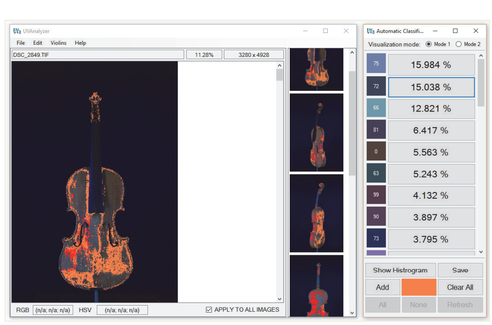


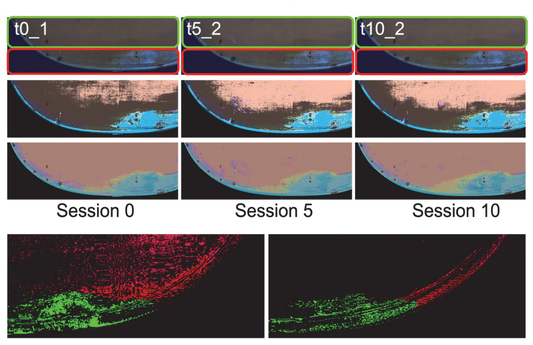
Image processing

Digital anastylosis for frescoes reconstruction

Analysis of UV induced fluorescence (UVIFL) images



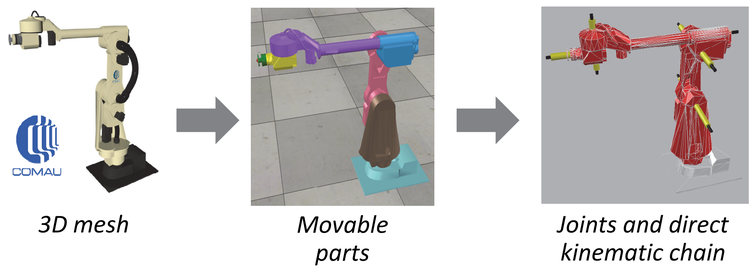
Monitoring of the state of conservation of artworks



Deep Learning

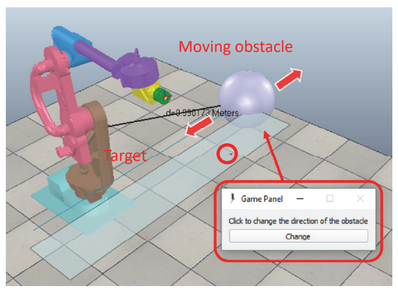
Deep reinforcement learning for collaborative robotics

Virtualization of a real-world robot

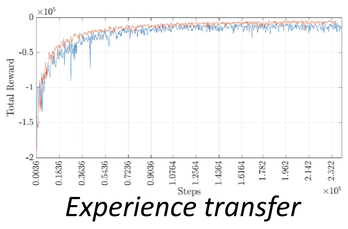


3D mesh | *Movable parts* | *Joints and direct kinematic chain*

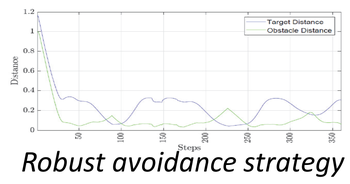
Learning to reach a target while avoiding obstacles in a simulation environment



Incremental autonomous learning



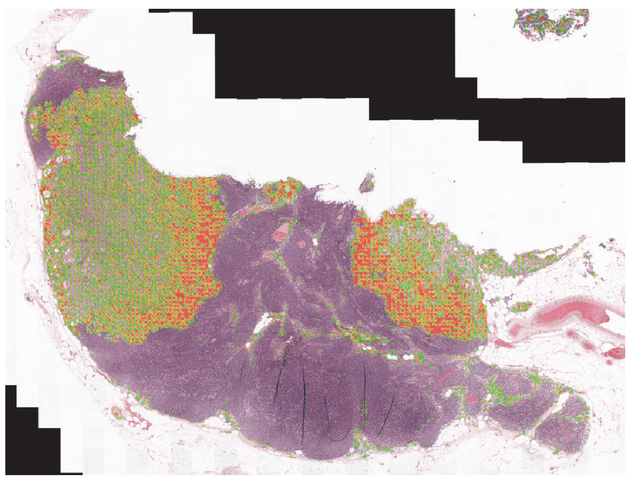
Experience transfer



Robust avoidance strategy

Few Shot Learning Segmentation of Histopathological Images

The network is trained on 29 annotated Whole Slide Images (WSIs) acquired in three medical centers and it learns to properly predict lesions on WSIs of a fourth medical center.



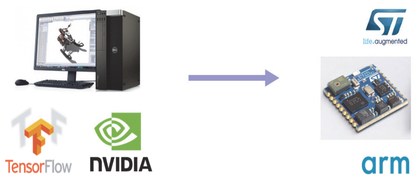
Heatmap highlighting with green and red shades on the top of the original WSI the regions predicted as lesions by the network.

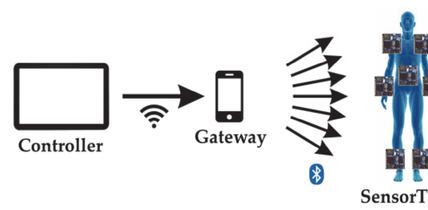
Fall detection with recurrent neural networks

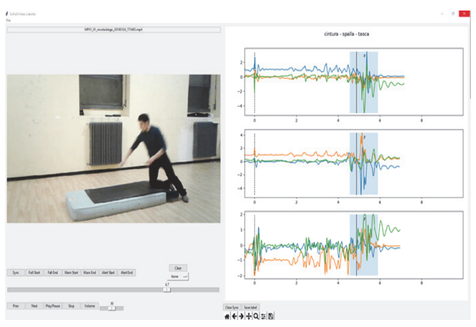
Accidental falls: an enormous human cost, especially for elderly people. Need for automatic fall detection techniques for timely warnings.
Use of "smart" wearable devices.

Collection of datasets with simulated falls by volunteers. Seven carry positions, 17 different activities, 40 volunteers, over 5000 tracks. Manual annotations on videos, basic for training.

Innovative technique: deep learning on embedded.
Implementation challenge: limited computing and memory resources; battery life for continuous use 24x7.







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