ALESSANDRO ALBANESI

Biomedical Engineer

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SKILLS

- **Programming languages**: Python, C#
- **Computer Vision**: DICOM and NIFTI formats (CT and MRI), Camera Models, 3D Registration algorithms, Pose estimation,
- **Image Analysis**: OpenCV, VTK, ITK, PyVista, 3D Slicer
- **Mixed Reality Development**: Unity, Microsoft HoloLens2, Hololens Research Mode
- **Miscellaneus**: Meshmixer, MeshLab, Matlab
- **Soft Skills**: Team Player, Bias for action, Proactive in learning and integrating new skills

WORK EXPERIENCE

Project Intern

IHU, Institute of Image Guided Surgery

[regular] Feb 2022 – Sep 2022 Strasbourg, France

- Development of Mixed-Reality tool for guidance in liver surgery ablation (HoloLens2): application was shown at the Business Engineering and Surgical Technologies (B.E.S.T) workshop
- Development of Mixed-Reality tool for endoscopic ultrasound navigation (HoloLens2): application was shown at the French Foundation pour la recherche sur le cancer (ARC) commission.
- Ideation of 3D registration algorithm for hologram-to-patient alignment
- Use of EM tracking sensors (NDI trakSTAR 3D guidance system) and Integration with HoloLens2 using OpenIGTLink

ACADEMIC PROJECTS

Development of a Mixed-Reality system using HoloLens2 and a robotic arm to visualize real-time US images from an echo machine

- US probe tracking using optical system (NDI Polaris Vicra)
- Communication protocol between tracking system – HoloLens2 using ROS

Development of an automatic framework for craniotomy guidance in brain tumor removal

- Development of a Mixed-Reality GUI
- Development of a desktop application (PyVista and PyQt)
- Development of an algorithm for automatic computation of best craniotomy area
- Communication protocol between Hololens2 - laptop using WebSocket

Development of an automatic end-to-end framework for pre-operative planning in procedures of deep brain stimulation for Parkinson disease

- Development of an application for image navigation (PyQt)
- Development of an optimization algorithm for trajectory calculation
- Integration of deep-learning networks for automatic target identification and brain structures extraction (nnUnet and FastSurfer) based on MRI images

PUBLICATIONS

Conference Proceedings

- A. Albanesi, M. Schiariti, P. Ferroli, *et al.*, "Mixed-reality tool for craniotomy procedures: Preliminary evaluation of a hologram-to-head registration algorithm," in *Proc. Int. Conf. on Extended Reality*, Springer, 2024, pp. 262–270.

EDUCATION

PhD student

Politecnico Di Milano

[regular] Sept 2023 - Current

PhD student at the Bioengineering group of the Department of Electronics, Information and Bioengineering (DEIB). XR/AR Solutions for Neurosurgery Procedures

M.S. in Biomedical Engineering

Politecnico Di Milano

[regular] 2020 - 2023

Biomedical Technologies for Electronics.
Evaluation: 110/110

HealthTech Master program

University of Strasbourg

[regular] 2021 - 2022

Master program in Computer Aided Surgery and Robotics.

B.S. in Biomedical Engineering

Politecnico Di Milano

[regular] 2017 – 2020

Evaluation: 104/110

HONORS AND AWARDS

HealthTech Scolarship: Highly competitive interdisciplinary graduate program at the University Of Strasbourg, France

LANGUAGES

- English (Professional Level): TOEIC score 925/990
- Italian (native language)