# Alessandro **Delmonte**

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*Biomedical engineer specialized in artificial intelligence, machine learning and computer vision with applications to image processing and 3D modeling. Senior Engineer of the image-guided surgery research team at Necker hospital / Imagine Institut.*

## Experience

### Necker Hospital for Sick Children - Imagine Institute

*March 2019 - Current*

Research Engineer (AI Scientist & Computer Vision Engineer) — *Paris, FR*

- Definition, development and deployment of deep-learning methods for **multi-class 3D semantic MRI segmentation**. **TensorFlow** and **PyTorch** based. Workflow integration for robotic-assisted pediatric surgery. Scientific dissemination and intellectual property deposit pending.
- Development of a **3D interaction and visualization platform in Unity3D**. Prototype actively used in the OR.
- Development of an augmented reality system for robotic video processing. **Deep learning for stereo-vision reconstruction, segmentation and partial point cloud registration.**
- **Raised more than 200k€ funding**, **incubation at ParisBiotechSante** and scientific acceleration grants.
- Technology transfer: **grants preparation, investors meetings, clinical trial**. Assessed IP, market access. Strategy definition for start-up creation. and clinical data analysis (Imagine Institut and HEC collaboration).
- Direct technical supervision of 1 engineer, 3 engineering intern (ENSTA Paris, Sorbonne Université), 2 M2 medicine students (Université de Paris). 2 PhD students technical advisor (Télécom Paris).
- **Classification and regression** analysis of medical and biological data for recovery predictions and decision support. Database and pipelines management. **Continuous Integration**. Technical/scientific documentation redaction.
- **3D printing** of bio-mechanical parts for clinical and research purposes. FDM, SLS and PolyJet. External collaborator in several clinical projects. Involved in **VR** development for surgical simulations and skills-assessment and data visualization. Start-up and research.

Research Engineer (Medical Image Processing Developer) — *March 2018 - Feb. 2019*

- **Symbolic AI** for MRI processing and segmentation. Integration of medical knowledge in mathematical and AI models. Nervous network reconstruction with **unsupervised clustering methods, mathematical modeling and fuzzy sets theory**. Development in Python (scikit-learn, scipy, OpenCV, AST) with focus on performance (parallel computing) and usability.
- Portability work-flow coordination. **UI development** for software plug-ins. Internet site development and **web management** for different teams.
- Master students co-supervision (Télécom Paris, Paris Descartes University).

### LTCI, Télécom Paris - Institut Polytechnique de Paris

*Sep. 2017 - Feb. 2018*

Research Engineer Intern (Fuzzy Logic Researcher) — *Paris, FR*

- **Uncertainty analysis with fuzzy logic** for medical imaging processing. Spatial reasoning for human-centered interactions.
- Diffusion **MRI processing** for nervous network pathways classification.

## Education

### Polytechnic University of Turin

*2018*

M.Sc. in Biomedical Engineering - Major: Medical Informatics — *Turin, IT*

### Télécom Paris - Institut Polytechnique de Paris

*2018*

Exchange Semester — *Paris, FR*

## Languages

**Italian:** Mother-tongue **English:** Full Professional Proficiency **French:** Full Professional Proficiency

## Skills

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|---|---|---|---|---|---|
| **Programming** | Python, C#, R, Matlab, C++ | **DL Frameworks** | TensorFlow, PyTorch | **Dev Tools** | Qt, Unity3D, ITK, VTK |
| **Version Control** | Git, SVN | **DevOps** | Docker, AWS | **Productivity** | Bash, Vim, LaTeX, Office |
| **Project Management** | Jira, Trello, Asana | **OS** | Linux, MacOS, Windows | **Front-End** | HTML, CSS |

**AI, ML, Data Science and Mathematics**: Strong experience in supervised and unsupervised machine learning, DL and AI algorithms. Python data science stack. Good foundations of statistical approaches. User interfaces using Qt. Mathematics and geometry methods for image processing, data analysis and 3D computing. Familiar with SQL and DBMS.

**Productivity**: Agile methodology. Creative thinking and problem-solver. User-centered design. Redaction of dissemination material, technical papers and documentation.

# Intellectual Property

**Automatic Generation of 3D Anatomical Models** — *Patent Pending*

Delmonte A., Bloch I., Sarnacki S. — *European Patent*

Various example embodiments relate generally to a method / device for automatic segmentation of medical images and a method / device for representing the segmented image together with the peripheral nervous system.

**IMAG2Surg** — *Oct. 2019*

Delmonte A. (60%), Bloch I. (20%), Sarnacki S. (20%) — *APP software deposit*

Medical 3D model interaction and exploration tool for surgical planning, intra-operative guidance and post-op recovery assessment.

# Invited Speaker

**Université de Paris Medical School - DIU Robotic Surgery** — *2022*

*Title:* Image Guided Robotic Surgery

*Link:* https://odf.u-paris.fr/fr/offre-de-formation/diplome-d-universite-du-diu-1/sciences-technologies-sante-STS/diu-chirurgie-robotique-KRQ3EOJN.html

**Université de Paris Medical School - DFGSM3** — *2021-22*

*Title:* Image Guided Surgery and Artificial Intelligence

*Link:* https://u-paris.fr/medecine/formation-initiale/dfgsm3/

**École Arts et Métiers - Master BME BioImaging Program** — *2019-20 - 2020-21 - 2021-22*

*Title:* Industrial and Medical Applications in Medical Image Analysis

*Link:* https://www.bme-paris.com/program/master-2/bioimaging/

# Courses

Leading Changes in Health Informatics - John Hopkins University — *2020-21*

Bio-entrepreneurs Launchpad Program - HEC Paris & École Polytechnique de Paris @ Institut Imagine & BPI France — *2019-20*

Computational Brain Connectivity Mapping (CoBCoM) - Inria Sophia Antipolis — *2017-18*

# Papers & Abstracts

Automatic size and pose homogenization with spatial transformer network to improve and accelerate pediatric segmentation — *Apr. 2021, Nice, FR*

La Barbera G., Gori P., Boussaid H., Belucci B., Delmonte A., Goulin J., Sarnacki S., Rouet L., Bloch I. - *IEEE ISBI (International Symposium on Biomedical Imaging)*

Introduction of 3D modeling and nerves tractography in the management of pelvic tumors — *Oct. 2020, Toronto, CAN*

Goulin J., Meignan P., Blanc T., Delmonte A., Peyrot Q., Berteloot L., Boddaert N., Bloch I., Sarnacki S. - *Pediatric Blood And Cancer - SIOP 2020 Best Paper Award*

Reconstruction 3D en IRM du pelvis de l'enfant: segmentation des structures osseuses par IA — *Oct. 2019, Strasbourg, FR*

Peyrot Q., Muller C.O., Virzi A., Delmonte A., Meignan P., Berteloot L., Grevent D., Blanc T., Gori P., Boddaert N., Bloch I., Sarnacki S. - *SFCP Congrès de Chirurgie Pédiatrique*

Etude du développement du système nerveux périphérique pelvien : du fœtus à l'enfant porteur de malformations et tumeurs pelviennes — *Oct. 2019, Strasbourg, FR*

Meignan P., Muller C.O., Belle M., Peyrot Q., Delmonte A., Berteloot L., Grevent D., Blanc T., Boddaert N., Chedotal A., Bloch I., Sarnacki S. - *SFCP Congrès de Chirurgie Pédiatrique*

Integrating tractography in pelvic surgery: a proof of concept — *Sep. 2019*

Muller C.O., Mille E., Virzi A., Marret J.B., Peyrot Q., Delmonte A., Berteloot L., Gori P., Blanc T., Grevent D., Boddaert N., Bloch I., Sarnacki S. - *Journal of Pediatric Surgery Case Reports*

Nervous system exploration using tractography to enhance pelvic surgery — *June 2019, Rennes, FR*

Delmonte A., Muller C.O., Meignan P., Peyrot Q., Virzi A., Berteloot L., Grevent D., Blanc T., Gori P., Boddaert N., Bloch I., Sarnacki S. - *Surgetica at CARS (Computer Assisted Radiology and Surgery)*

Biometric and morphological features of the fetal bladder in lower urinary tract obstruction on magnetic resonance imaging. New perspectives for fetal cystoscopy — *April 2019*

Vinit N., Grevent D., Millischer-Bellaiche A., Pandya V., Sonigo P., Delmonte A., Sarnacki S., Aigrain Y., Boddaert N., Bessières B., Benchimol G., Salomon L., Stirnemann J., Blanc T., Ville Y. - *Ultrasound in Obstetrics and Gynecology*

White matter multi-resolution segmentation using fuzzy set theory — *April 2019, Venice, IT*

Delmonte A., Mercier C., Pallud J., Bloch I., Gori P. - *IEEE ISBI (International Symposium on Biomedical Imaging)*

Segmentation of white matter tractograms using fuzzy spatial relations — *June 2018, Singapore, SG*

Delmonte A., Bloch I., Hasboun D., Mercier C., Pallud J., Gori P. - *OHBM Annual Meeting (Organization for Human Brain Mapping)*