

# Chun Hei Michael Chan

EE PhD Candidate @ EPFL — Neuro-X  
Medical Image Processing Lab (MIP) - Swiss Federal Institute of Technology Lausanne (EPFL)

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## Field of Interests

My research focuses on the theory of **directed graph signal processing/neural networks, network-based statistical methods**, and applications in **network neuroscience**.

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## Education

<b>Swiss Federal Institute of Technology Lausanne</b> , Lausanne, Switzerland PhD Candidate, Electrical Engineering Thesis on Directed Graph Signal Processing and applications on Neuroimaging	2023 - Present
<b>Swiss Federal Institute of Technology Lausanne</b> , Lausanne, Switzerland M.Sc., Data Science Thesis (Medical Image Processing Lab at Swiss Federal Institute of Technology Lausanne)	2020 - 2023
<b>Ecole Polytechnique</b> , Palaiseau, France B.Sc., Mathematics and Computer Science Thesis (Centre des Mathématiques Appliquées at Ecole Polytechnique)	2017 - 2020

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## Research Experiences

<b>PhD Candidate - Medical Imaging Processing Lab</b> Theoretical development of directed GSP and applications on brain connectomics Advisor: <a href="#">Dimitri Van De Ville</a>	10/2023 - Present
<b>Project Student / Research Assistant - Medical Imaging Processing Lab</b> Brain organization revealed by functional connectivity gradients Supervised by <a href="#">Elenor Morgenroth</a> and <a href="#">Laura Vilaclara</a> Advisor: <a href="#">Dimitri Van De Ville</a>	11/2022 - 09/2023
<b>Research Assistant - Persuasive Technology Lab</b> Design and prototyping for self-motivation questionnaire Self determination theory (SDT) approach. Advisor: <a href="#">Mauro Cherubini</a>	04/2022 - 02/2023
<b>Project Student - Center for Biomedical Imaging</b> Diagnosis of hepatitis C from microstructure deformation and time exchange GM and WM microstructure modelling by diffusion MRI through SANDI and WMTI Time exchange estimation between GM neurites and extra-cellular space NEXI model Supervised by <a href="#">Jessie Julie Mosso</a> Advisor: <a href="#">Cristina Cudalbu</a>	01/2022 - 06/2022

<b>Project Student - Centre des Mathématiques Appliquées École Polytechnique</b>	02/2020 - 05/2020
Operational Research: SDP solver	
Approximation algorithm to maxcut problem - derandomization of rounding relaxation problem	
Advisor: <a href="#">Giovanni Conforti</a>	
<b>Project Student - LEARN Center</b>	09/2019 - 12/2019
Flipped Learning Class: analysis of effect	
Analysis of regularity and clickstream activity of students in an introductory Linear Algebra course at EPFL	
Student features clustering while looking at clusters' representative value's correlation to grades	

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## Industry Experiences

<b>Algorithm Team Intern - Intuitive Surgical Inc.</b>	07/2022 - 09/2022
POC Amplitude Pulsatile Component (APC) Maps in Endoscope stream of images	
Extracting rPPG (POS method) and measuring proxy for perfusion index (lock in amplitude)	
APC map and signal refinement through tracking and warping of patches	
<b>CTO-AI Team Intern - Logitech International S.A</b>	09/2021 - 02/2022
Evaluation of improvement in robustness and accuracy of HR/HRV by improving hardware and modelling	
Introducing FPS and Infra-red sensitive camera for motion and difficult light conditions	
Attention models and 3d cnn in rPPG-robustness improvements and interpretability	
<b>Computer Vision Research Intern - Besedo Content Moderation</b>	06/2020 - 09/2020
Watermarked image Filtering	
Detect watermark with high-confidence to remove watermarked photos uploaded by users to retail websites	
Transfer Learning of general object detection on top of other statistical model.	
<b>Data Science Intern - SGI Venture Limited</b>	06/2019 - 08/2019
Pet Facial Recognition in low size population	
General face detection algorithm (YOLO architecture) and LBPH feature comparison	

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## Scientific Contributions

- **Chan, C. H. M.**, et al. "Graph Diffusion-Advection Operator for Directed Graph Signal Processing." arXiv preprint arXiv:2606.16306 (2026). (Submitted to **Transactions on Signal and Information Processing over Networks**)
- **Chan, C. H. M.**, Cionca, A. , and Van De Ville, D. . "Statistical testing on directed graphs by surrogate data generation." arXiv preprint arXiv:2606.00758 (2026). (Submitted to **Transactions on Signal and Information Processing over Networks**)
- **Chan, C. H. M.**, et al. "Individual differences of cortical and subcortical emotion-informed functional gradients." bioRxiv (2026): 2026-02. (Submitted to **Human Brain Mapping**)
- **Chan, C. H. M.**, Cionca, A., and Van De Ville, D. "Graph Signal Surrogate Generation for Statistical Testing of Covariance Structure on Directed Graphs" 2026 34th **European Signal Processing Conference (EUSIPCO)**. IEEE, 2026.
- Cionca, A., **Chan, C. H. M** et al. "Directed Brain Connectomics Revealed by Bicomunity Structure." bioRxiv (2026): 2026-02. (Submitted to **Science Advances**)
- Spencer, A.P.C., ... , **Chan, C. H. M.** et al. "The microstructure-weighted human connectome: network properties and structure-function correlations across spatial scales." bioRxiv (2026): 2026-05. (Submitted to **Network Neuroscience**)
- Mosso, J., **Chan, C. H. M.**, et al. "In vivo diffusion MRS and MRI reveal cerebellar microstructure alterations in the rat developing brain during hepatic encephalopathy". (2025) (Submitted to **Imaging Neuroscience**)
- Asadi, S., ... , **Chan, C. H. M.**, et al. "Non-invasive prediction of conduction velocities in the human brain from MRI-derived microstructure features at 7 Tesla." bioRxiv (2025): 2025-10. (Submitted to **Imaging Neuroscience**)

- Chan, C. H. M., Cionca, A., and Van De Ville, D. . “Hilbert transform on graphs: Let there be phase.” **IEEE Signal Processing Letters** (2025).
  - Cionca, A., Chan, C. H. M., and Van De Ville, D. . “Community detection for directed networks revisited using bimodularity.” **Proceedings of the National Academy of Sciences** 122.35 (2025): e2500571122.
  - David, F.\* , Chan, C. H. M.\* et al. “Deep Neural Encoder-Decoder Model to Relate fMRI Brain Activity with Naturalistic Stimuli.” 2025 47th Annual **International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)**. IEEE, 2025.
  - Cionca, A.\* , Chan, C. H. M.\* , et al. “Community-Driven Signal Processing On Directed Brain Graphs.” 2025 33rd **European Signal Processing Conference (EUSIPCO)**. IEEE, 2025.
  - Arnéra, J., Chan, C.H.M., and Mauro Cherubini. “Digital, analog, or hybrid: Comparing strategies to support self-reflection.” Proceedings of the 2024 **ACM Designing Interactive Systems Conference**. 2024.
  - Dietler, Nicola, . . . , Chan, C.H.M. et al. “A convolutional neural network segments yeast microscopy images with high accuracy.” **Nature communications** 11.1 (2020): 5723.
- Conference Abstracts: **GSP Workshop (2026) / OHBM (2023, 2025) / ABIM (2025) / MRS Workshop (2022)**

## Teaching

<p><b>EPFL Student Projects Supervision</b></p> <p>Project Supervisor</p> <p>12 Master level students supervised for their semester-long projects.</p>	09/2023 - Present
<p><b>Neural Signals and Signal Processing (NX-421)</b></p> <p>Head Teaching Assistant</p> <p>Creation and correction of projects and exercises for Master level students.</p> <p>General handling of course logistics and exam preparation</p>	09/2023 - Present
<p><b>Image Processing I/II (MICRO-511/MICRO-512)</b></p> <p>Teaching Assistant</p> <p>Correction of projects and exercises for Master level students and exam testing.</p>	09/2023 - Present

## Award

- 🏆 Conference Travel Grant, **ICASSP 2026**
- 🏆 1st Runner-up, Swiss Society for Bioengineering Student Award, **SSBE 2023**
- 🏆 2nd Runner-up, Data Analytics Competition, **Facebook Analytics 2020**
- 🏆 Scholarship Holder, Undergraduate Studies, **Bourse d'excellence Campus France**

## Technical Skills

**Languages:** Python, C++, C, COQ

**Software & Tools:** Git,  $\LaTeX$ , Jupyter/google collab, nvidia-gpu computing, docker, PySpark, Unix, Unity3D, Swift IOS dev

**Computational Methods:** transformers, adversarial attacks, object detections/segmentations, LSTM/RNN, and many others techniques applied to projects (most can be found on my personal github)