# Chun Hei Michael Chan

EE PhD Candidate @ EPFL — Neuro-X Medical Image Processing Lab (MIP) - Swiss Federal Institute of Technology Lausanne (EPFL) chunheimichael.chan@epfl.ch **M** miki998.github.io

# **Field of Interests**

I am interested in application of imaging technique, image processing, data-driven model for **healthcare**, **well-being** and **neuroscience**. My fields of interest range from **biomedical imaging**, **signal processing** and **computer vision** to **data-driven models** and **biophysical model**. Currently, I am working on functional connectivity gradients and its relationship with emotion timecourses during naturalistic stimuli.

# Education

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

## **Research Experiences**

PhD Candidate - Medical Imaging Processing Lab	10/2023 - Present
Directed GSP, Brain GSP applications on microstructure, CCEP maps + sEEG	
Advisor: Dimitri Van De Ville	
Research Assistant - Medical Imaging Processing Lab	04/2023 - 09/2023
Brain organization revealed by functional connectivity gradients	
Supervised by Elenor Morgenroth and Laura Vilaclara	
Advisor: Dimitri Van De Ville	
Research Intern - Medical Imaging Processing Lab	10/2022 - 02/2023
Master Thesis: Dynamic Gradients during film are modulated by emotion experience	
Functional Connectivity Gradients measures	
Supervised by Elenor Morgenroth and Laura Vilaclara	
Advisor: Dimitri Van De Ville	
Research Assistant - Persuasive Technology Lab	04/2022 - 02/2023
Design and prototyping for self-motivation questionnaire	
Self determination theory (SDT) approach.	
Advisor: Mauro Cherubini	

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Research Intern - Center for Biomedical Imaging	01/2022 - 06/2022
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 Jessie Julie Mosso	
Advisor: Cristina Cudalbu and Dimitri Van De Ville	
Research Intern - Centre des Mathématiques Appliqueées École Polytechnique	02/2020 - 05/2020
Operational Research: SDP solver	
Approximation algorithm to maxcut problem - derandomization of rounding relaxation problem	
Advisor: Giovanni Conforti	
Project Student - LEARN Center	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	

# **Industry Experiences**

Algorithm Team Intern - Intuitive Surgical Inc.	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	
CTO-AI Team Intern - Logitech International S.A	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	
Computer Vision Research Intern - Besedo Content Moderation	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.	
Data Science Intern - SGI Venture Limited	06/2019 - 08/2019
Pet Facial Recognition in low size population	
General face detection algorithm (YOLO architecture) and LBPH feature comparison	

## **Scientific Contributions**

MRS Workshop 2022 CIBM Poster: "Exploiting dual diffusion MRS and MRI acquisitions in the rat cerebellum at 14.1 T: a measurement of intra-extracellular water exchange"

**BBL CIBM FCBG Research Day Poster**: "Discerning subjects personality and variability in emotion guided cortico-subcortical gradients during films"

**Nature Communications 2022**: "A convolutional neural network segments yeast microscopy images with high accuracy" **OHBM 2023 Poster**: "Dynamic Gradients during film are modulated by emotion experience"

DIS 2023 (Abstract submitted): "Supporting self-reflection: Comparing analogue, digital and hybrid approaches"

# Teaching

ML4Science Project I	10/2023 - 02/2024
Project Supervisor	
Superivising group of 3 Master level students	
Project on stimulus-based upsampling BOLD using 3D CNN encoder.	
Neural Signals and Signal Processing (NX-421)	09/2023 - 02/2024
Teaching Assistant	
Creation and correction of projects and exercises for Master level students.	
General handling of course logistics and exam preparation	
Image Processing I (MICRO-511)	09/2023 - 02/2024
Teaching Assistant	
Correction of projects and exercises for Master level students and exam testing.	

## Award

St 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 **Applied Computational Techniques**: Fast Gradient Signed attack, You look only once (arch), LBPH, Mask RCNN, LSTM, LDDMM, and many others techniques applied to projects (most can be found on my personal github)

# Extra-Curricular

### Social Entrepreneurship

Regional phase for HULT Prize

## Sports

Table Tennis Toamasina community Championship 3rd Place Fan of basketball and regular swimmer

### **Community Work Volunteering**

Toamasina Event Host Speaker during Cultural Festival

Translator for community events

## **Music and Instrument**

The Associated Board of the Royal Schools of Music (ABRSM): 8th Grade Piano High School music band performing during "Fête de la musique" (World Music Day)