CAMILLE **CUNIN**

Graduate Student

20 rue des Vertus, 75003 PARIS · +33 6 47 79 85 59
camillecunin.github.io
camille.cunin@centrale-marseille.fr

Passionate with **biomedical engineering**, **neuroscience** and **nanotechnologies,**
I want to pursue a research career and lead advances in biological sciences and technologies
to make a difference in the improvement of human health.

EXPERIENCE

NOVEMBER 2019 – MARCH 2020

RESEARCH STUDENT, MGH & HARVARD MEDICAL SCHOOL – ALBERS LAB – MASSGENERAL INSTITUTE FOR NEURODEGENERATIVE DISEASE (MIND) – *CHARLESTON, MA* - The Albers Laboratory uses the **olfactory system** of mice and humans to explore early pathologic events of **neurodegeneration**. Amazed by the brain, my curiosity was tickled by this original approach of neurodegenerative disorders. I spent some time in this lab during my free time, exploring a novel, algorithm-based, **olfactory tool** to predict progression to **amnestic-MCI** or **Alzheimer's disease** among healthy elderly individuals, according to their performances on both **odor naming** and **odor memory**.

MARCH 2019 – MARCH 2020

RESEARCH STUDENT, MGH & HARVARD MEDICAL SCHOOL - THE TEARNEY LAB — WELLMAN CENTER FOR PHOTOMEDICINE – *BOSTON, MA* - I worked on a challenging project to design a novel, minimal invasive, and **high-resolution OCT-imaging device** to diagnose **Crohn's disease**. My research work mainly consisted in developing an OCT-TCE device capable of reaching the terminal ileum, determining **imaging criteria** for mapping the **gastrointestinal tract,** finding the best way to **coat** the device and carrying on **ex vivo and in vivo swine studies** before trying it into humans. I took a gap year to extend my internship and keep working on my project.

JUNE 2019 – AUGUST 2019

HARVARD SCIENCE OF TECHNOLOGY (HST)-WELLMAN SUMMER INSTITUTE FOR BIOMEDICAL OPTICS, WELLMAN CENTER FOR PHOTOMEDICINE – MGH – *BOSTON, MA* - In parallel with my internship, I completed a three-month program in biomedical optics at MGH. Through **hands-on research experience**, this program trained me in the study and **innovation of biomedical optics** for improving human health and advancing biological sciences. I acquired methods to **conduct research responsibly** and to achieve the skills to **communicate research findings** effectively through oral presentations, **scientific poster presentation** and a large panel of courses on diverse medical and engineering topics.

AUGUST 2018

1-MONTH RESEARCH INTERNSHIP, GRANDS MOULINS STORIONE – *MARSEILLE* - As a first working experience in a mill's laboratory, I discovered how to control wheat's quality by carrying out tests on wheat greats and flour such as measures of humidity and ash contend.

EDUCATION

SEPTEMBER 2020 – AUGUST 2021

GRADUATE ENGINEERING SCHOOL - Diplôme d'Ingénieure/MS in Engineering (2nd year), ÉCOLE CENTRALE - *LYON* – To specialized in **Biomedical Engineering & Nanotechnologies**, I joined a selective dual-program in Lyon, including classes in human physiology, immunology, dynamics of biological and human systems, biotechnologies, microelectronics, nano-structures, nano-systems and biological interfaces, complex systems, among others.

JOINT DEGREE PROGRAM - MS in Health Engineering, UNIVERSITÉ CLAUDE BERNARD - *LYON* - In parallel, I am pursuing a one-year, research-oriented master's degree combining classes in **imaging techniques** (US, MRI, CT, X), **image processing, AI algorithms**, **intellectual properties**, **research protocols**, etc.

SEPTEMBER 2017 – AUGUST 2021 – GPA: 3.84 (2017-2020)

GRADUATE ENGINEERING SCHOOL - BS in Engineering + MS in Engineering (1st year), ÉCOLE CENTRALE – *MARSEILLE* Top French Graduate Engineering School which offers a rich **multi-disciplinary program** including advanced classes in mathemati'scs, physics, biosystems and engineering, electronics, control engineering of linear systems, chemical engineering, mechanical engineering, advanced chemistry, computer science, process engineering, among others.

SEPTEMBER 2015 – SEPTEMBER 2017 – GPA: 4.0 (2015-2017)

HIGHER SCHOOL PREPARATORY CLASSES (CPGE) PCSI/PC*, LYCÉE LOUIS-LE-GRAND – *PARIS* - These two highly intensive years are a specificity of the French system and are a preparation for the highly competitive entrance examinations to French Graduate Engineering Schools (*Grandes Écoles d'Ingénieurs)*.

SEPTEMBER 2012 – SEPTEMBER 2015 – BACCALAURÉAT SSI MENTION « TRÈS BIEN »

HIGH SCHOOL, LYCÉE LOUIS-LE-GRAND – *PARIS* - Graduated from high school with highest honors.

RESEARCH PROJECTS

2021 **HIGH-EFFICIENCY NANOWIRES (GaAS//ITO/Si) SOLAR CELLS, ÉCOLE CENTRALE DE LYON & INSTITUT DES NANOTECHNOLOGIES DE LYON (INL),** *LYON* – The purpose of this research project is to get a better insight into the potential of nanotechnologies. At the INL lab, we look for methods to assess performances of semiconductor nanowires based on GaAs//indium tin oxide/Si junctions. The idea is to develop strategies to achieve efficiencies above the Shockley-Queisser limit. One approach we are exploring consists in annealing ITO top contact to reduce the Schottky barrier at the NW/ITO interface, revealed by EBIC microscopy. Another important part of this project consists in assessing the potential for cost efficient production of these GaAs/ITO nanowires solar cells compared to planar Si solar cells.

2020 **SELECTIVE LOSS OF EPISODIC MEMORY OF ODOR PERCEPTS PREDICTS PROGRESSION TO AMNESTIC MCI OR ALZHEIMER'S DISEASE, ALBERS LAB, MIND**, MGH – *CHARLESTON, MA* – After statistically analyzing odor memory scores collected in a longitudinal cohort, I took part in the writing of a short report disclosing the potential of a selective deficit on episodic odor memory for predicting cognitive decline among cognitively normal elderly individuals. Before the COVID-19 pandemic changed our plans, I was working on a second manuscript, a global review on existing olfactory-based approaches used to detect early stages of Alzheimer's disease in pre-clinical but asymptomatic individuals.

2019-2020 **OCT-TETHERED-CAPSULE-ENDOSOCPE DEVICE FOR DETAILED VISUALIZATION OF THE TERMINAL ILEUM, TEARNEY LAB, WELLMAN CENTER FOR PHOTOMEDICINE**, MGH – *BOSTON, MA* – This 1-year internship has provided me with a broad experience of biomedical research and conception of optical medical devices. I learnt how to conduct research protocols, carry on animal studies to test prototypes, perform H&E histology and confocal microscopy to evaluate tissue damage, and collect data to validate my experimentations. Part of my project consisted in selecting a tailored method to hydrophilic coat the final device. An important aspect of my internship trained me to accurately present my work through weekly meetings, mid-term advancement calls, scientific poster presentations, slam talks and seminars.

2018 **IOT PROJECT – LI-FI**, ÉCOLE CENTRALE – *MARSEILLE* - For six months, I worked closely with researchers to study Li-Fi technology. The aim of this project was to understand how to use light to spread information. With my team, we laid the foundations for a prototype capable of spreading data through variations of light intensity. This experience gave me the idea to investigate light-based applications for medical purposes.

2015-16 **DAMPING OF LIQUID SLOSHING BY FOAMS**, LYCÉE LOUIS-LE-GRAND – *PARIS* - In my undergraduate preparatory classes, I worked on the damping effect of a beer foam on top of the liquid. I built a model to describe the foam contribution to the damping coefficient through vicious dissipation on the wall of the container and validated my model through measured and experimentations in the lab.

OTHER INNOVATIVE & START-UP PROJECTS

2020 **GLOBAL STARTUP WEEKEND COVID 19**, APR. 24-26 - *TAIWAN* – During this Global Online Startup Weekend, 70 countries around the world called for developers, designers, marketers, nurses, doctors, students, scientists, business owners, teachers and anyone with an idea to tackle the challenges created by the global COVID-19 pandemic. From Taiwan, I enrolled friends from San Francisco, London and Paris to work on a common project aiming at finding solutions to tackle education-related issues during lockdown in France. Our project ranked #11 among 140 other projects.

2017 **DEEP LEARNING PROJECT**, ÉCOLE CENTRALE DE MARSEILLE - The purpose of this AI project was to build an autonomous robot run by an AI algorithm and capable of driving itself on an unknown track and to avoid obstacles. Familiar with Raspberry PI technology and robotics, I volunteer as project manager for this project to oversee the different parts, from robot prototype to Arduino technology and deep learning coding.

2017 **36H CHRONO**, ÉCOLE CENTRALE DE MARSEILLE Through this thirty-six-hour entrepreneurship challenge, I first learned how to brainstorm ideas, to manage a team and to build a business plan. Our project consisted in launching a company providing services to improve employees' wellbeing through diverse activities tailored to their needs and availabilities. Through this project, I acquired a large amount of knowledge on entrepreneurship, which will help in the future, as I am planning to launch my own startup.

AWARDS & ACADEMIC ACHIEVEMENTS

2021 (Aug.) Graduation year (*Diplôme d'Ingénieur* (MS) in General Engineering + MSc in Health Engineering)
2020 (Apr.) Fundamentals of Neuroscience (3 certified parts) – HarvardX online classes
2019 (Sep.) Best slam talk runner-up award for people's choice — at Wellman Scientific Day - MGH
2019 (Aug.) HST-Wellman Summer Institute for Biomedical Optics at MGH
2018 (Nov.) Bachelor of Engineering Sciences
2017 (Sep.) Grand-prize winner of the ECM Innovation Challenge – Dyson Award
2015 (July) Graduation from high school with highest honors

PUBLICATION & ABSTRACTS

Dhilla Albers A, Keim A, Cunin C, Hyman BT, Gomez-Isla T, Blacker D, Das S, Locascio, J, Albers, MW, Selective loss of episodic memory of odor percepts is associated with progression to amnestic MCI or Alzheimer's Disease in cognitively normal seniors, (2021), *in prep.*

Song, D, Cunin C, Tearney GJ, Location-aware Optical Coherent Tomography (OCT) Tethered Capsule Endomicroscopy (TCE) of the Small Intestine, Endoscopic Microscopy XVI, part of SPIE BiOS 2021, PW21B-BO103-16

ONLINE COURSES – MARCH – JUNE 2020 – *TAIWAN*

- HarvardX - Fundamentals of **Neuroscience** (3 certified modules)
- AdelaideX - Essential Human Biology - **Cells and Tissues**
- MITX - Introduction to **Biology** - Secret of Life
- EPFLX - Fundamentals of **Biomedical Imaging** - Ultrasounds, X-ray, positron emission tomography (PET) and applications
- IBM - Introduction to **Data Science** & **Data Science Tools**

LANGUAGES

- **FRENCH**: Native
- **ENGLISH**: 100 (TOEFL iBT)
- **GERMAN / SPANICH**: A2
- **PROGRAMMING LANGUAGES**: Python, Matlab, HTML, CSS, Javascript

ASSOCIATIONS & VOLUNTEERING

FRENCH TRANSALATOR – APR. 2020 - NOW – N95DECON, INC., a California public benefit corporation, has been formed to support the work of a collection of volunteer scientists, engineers, clinicians, and students from universities across the United States as well as other professionals in the private sector to help disseminate scientific information about personal protective equipment decontamination, including N95 respirators during COVID-19 pandemic (https://www.n95decon.org/).

RESEARCH VOLUNTEER – MAY – NOV. 2019 – VISUAL ATTENTION LAB - HARVARD MEDICAL SCHOOL-BRIGHAM & WOMEN'S HOSPITAL – For a few months, I took part in weekly studies to help understand the mechanisms by which attention selects specific items, as well as to evaluate the potential of AI for use in differential diagnosis. This included studies of how to terminate searches without finding the target and studies of the processing of visual stimuli before they are selected by attention for further, more complete analysis.

STUDENTS REPRESENTATIVE – 2019 - NOW – CENTRALE MARSEILLE ALUMNI (AIECM) – As an elected representative of my year group, my role is to hold our school year together after graduation, for instance by organizing regular events and seminars to feed the alumni network.

PRESIDENT - 2017–2018 – CENTRALE GLISSE – To provide watersports for all, I relaunched this association to offer École Centrale students the possibility to practice nautical sports (windsurf, kitesurf…), usually costly, at a more accessible price including lessons and facilities. Through this project, I not only developed management skills, but I also learned canvassing to find watersport teachers and sponsors.

JUNIOR ENTREPRENEUR - 2017–2018 – PROJECT MANAGER & WEB SPECIALIST AT KSI CENTRALE MARSEILLE - As a project manager, my role was to identify clients' needs, to write specifications, to draw up provisional budget and planning, as well as to draft commercial proposals. My experience as a Junior Entrepreneur strengthened my ability to organize information, to identify priorities and to work efficiency to meet deadlines. As a quality controller, I took part in the quality process by reviewing and validating every study related to web development and computer-related topics.

HOSPITAL VOLONTEER - 2017–2018 – CHEER UP! - I used to periodically visit children suffering from cancer at the hospital to talk about their projects and help them fulfill their dreams. As a first experience with the clinical world, I experienced the in-hospital world and realized how important innovation in the biomedical field is.

REFERENCES

GUILLERMO J. TEARNEY, MD, PHD, FACC, FCAP, FNAI Remondi Family Endowed MGH Research Institute Chair Professor of Pathology, Harvard Medical School Massachusetts General Hospital, Department of Pathology Wellman Center for Photomedicine. Boston Phone: +1 (617) 724-2979. Email: GTEARNEY@PARTNERS.ORG

GUILLAUME CHIAVASSA, PHD, Professor of Applied Mathematics and School Advisor at École Centrale de Marseille, 38 rue Joliot Curie, 13013 Marseille. Phone: (+33) 4 91 05 44 29. Email: guillaume.chiavassa@centrale-marseille.fr

EMMANUELLE LAURENCEAU, PhD-HDR, Institut des Nanotechnologies de Lyon- UMR 5270, Equipe Chimie et Nanobiotechnologie, Professor of Chemistry and Biotechnology at Ecole Centrale de Lyon, 36 avenue Guy de Collongue, 69134 Ecully. Phone: (+33) 4 72 18 62 40 Email: emmanuelle.laurenceau@ec-lyon.fr

MARK W. ALBERS, MD, PHD, Assistant Professor of Neurology at Harvard Medical School; Assistant Neurologist at Massachusetts General Hospital. Lab Phone: +1 (617) 643-0680. Email: albers.mark@mgh.harvard.edu