

# FRANCESCA CATTAI

## EDUCATION

## SKILLS

- OFFICE - Skillful
- macOS Utilities - Skillful
- Matlab - Skillful
- Comsol Multiphysics - Experienced
- LT-SPICE - Experienced

## LANGUAGES

- Italian - Native
- English - Intermediate
- Spanish - Intermediate

○ Ph.D

### **Sapienza Università di Roma**

*June 2022 - Present*

Winner of a PhD scholarship, in collaboration with the Italian company Sagicofim. This work aims at the design of innovative devices in HVAC systems for the control of airborne biocontamination in living and working environments by physical and chemical agents. Regarding the experimental activities, I'm working on the measurement of the irradiation in different configuration of HVAC components. In addition, I'm designing the experimental campaign for the evaluation of the biological contamination. For the numerical simulations, I work mainly with the Comsol Multiphysics simulation software, in particular in the field of Ray Tracing, CFD and transport of chemical species. I am acquiring the basic concepts regarding Heat Transfer and RF simulations.

○ MASTER'S DEGREE IN BIOMEDICAL ENGINEERING

### **Sapienza Università di Roma**

*November 2019 - May 2022*

- Graduation grade: 110/110 with honors.
- Thesis: "Control by physical agents of airborne biocontamination in HVAC systems: preliminary validation of ultraviolet illuminance on experimental device."

#### UNIVERSITY PROJECTS

- Sizing of a hospital Heating Ventilation Air Conditioning system;
- Sizing and assembling of the first stage of an impedance plethysmograph;
- Simulation of the automation process for the evaluation of the image quality of an ultrasound tomograph;
- Simulation of a tender aimed at the purchase of four laptops for digital radiography;

#### MOST INTERESTING STUDIES

- Electrical measurements for biomedical applications (ING-INF/07) - 29/30
- Technological applications in surgery and pathology hospital environment (ING-IND/34) - 30 e lode/30
- Electromagnetic compatibility in medical devices (ING-INF/02) 29/30
- Numerical methods in biomedical engineering (MAT/08) - 27/30
- Biomedical technologies and equipment (ING-INF/01/02) - 30/30
- Biomedical instrumentation II (ING-INF/34) - 27/30
- Biomedical technology testing (ING-IND/34) - 30/30
- Hospital facilities II (ING-IND/10) - 29/30

○ BACHELOR'S DEGREE IN CLINICAL ENGINEERING

### **Sapienza Università di Roma**

*September 2016 - November 2019*

- Graduation grade: 106/110
- Thesis: "Mechanical behavior of muscle tissue."

#### MOST INTERESTING STUDIES

- Mathematical analysis I (MAT/05) - 30/30
- Mathematical analysis II (MAT/05) - 30 e lode/30
- Applied Thermodynamics and Heat Transfer, Machines and applied mechanics (ING-INF/08/10) 25/30
- Electronics (ING-INF/01) - 26/30
- Biomedical instrumentation I (ING-INF/34) - 27/30
- Fluid mechanics (ICAR/01) - 26/30
- Hospital facilities I (ING-IND/11) - 30/30

○ HIGH SCHOOL DIPLOMA

### **LICEO SCIENTIFICO MORGAGNI**

*September 2011 - July 2016*

## WORK EXPERIENCE

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### SCHOLARSHIP

#### **Sapienza Università di Roma**

*March 2018 - January 2022*

Winner of a collaboration grant, organized by Sapienza University of Rome, in the didactic laboratory of physics at the SBAI department. The activity involved the setting of necessary instrumentation for the students' hands on experiments (voltmeters, ammeters, signal generators, oscilloscopes, resistors, capacitors, basic electrical circuits, instrumentation for physical optics, computer settings for signal acquisition).

## CURRICULAR ACTIVITIES

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### PRESENTATIONS, TUTORING AND CO-TEACHING

- Seminar for students of the course 'Hospital Installations II' of the Master Degree Programme in Biomedical Engineering "Controlling UV-C Irradiation of Airborne Biocontamination in HVAC Systems biocontamination in HVAC systems", (29 May 2023)
- Seminar for students of the course 'Hospital Installations II' of the Master Degree Programme in Biomedical Engineering "Controlling UV-C Irradiation of Airborne Biocontamination in HVAC Systems biocontamination in HVAC systems", (29 May 2024)
- Tutorial activities for students of Clinical Engineering and Biomedical Engineering:
- Mariani: "Sanitation of confined environments using hydrogen peroxide: study by CFD and by CFD and investigation of the effects on human health", 17 June 2023 (LM-21).  
I have fulfilled the role of co-advisor for Bachelor's degree theses in the field of clinical engineering and for Master's degree theses in the field of biomedical engineering:
- Massari: "Thermo-ablation on cardiac tissue: state-of-the-art modelling and numerical and numerical simulation of the porous continuum", 10 October 2023 (L-9).
- Petrini: "Preliminary evaluation by CFD of an aerial device for the control of biocontamination biocontamination control", 14 March 2024 (LM-21).
- Coloricchio: "Preliminary study by CFD analysis of the ventilation of a room for nuclear magnetic resonance for Nuclear Magnetic Resonance", 17 May 2024 (LM-21).

### TRAINING AND SEMINARS

- 19th UIT Summer School "Heat and mass transfer in turbulent flows: modeling and measurement techniques" Certosa di Pontignano, Vagliagli, 53010, Siena, Italy  
Monday 29 August, 2022 – Friday 2 September, 2022 Director: Prof. Alfonso Niro – Politecnico di Milano
- Seminario "Thin Films and Optical Metrology in Photovoltaics Application" 12 Ottobre 2022, Prof. Drhab. Janusz Jaglarz (Cracow University of Technology, Poland)
- Online course 'RF, microwave and optical analysis', 30-31 January 2023.
- Introduction to Computational Fluid Dynamics (CFD) - MSc in Energy Engineering (February 2023- May 2023) Prof. Paolo Gualtieri
- PYTHON PROGRAMMING FOR ENERGY AND NUCLEAR ENGINEERING (June-July 2023)
- Complements of Thermodynamics and Heat Transmission (2.9 October 2024) COURSE - FINITE ELEMENT METHOD (12,14,16 February 2024) Prof. Daniela Addressi

### SYSTEMAIR SEMINAR

- Presentations of activities carried out and results obtained during update meetings with Sagicofim Spa (various meetings during the year) and with Systemair (23 January 2024).

## PUBLICATION AND ACTIVITIES

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### PUBLICATIONS

- Cattai, Francesca; D'Orazio, Annunziata; Sbardella, Gianluca; A systematic review on the application of ultraviolet germicidal irradiation to HVAC systems – *Energies*, 16(22) – 2023 <https://dx.doi.org/10.3390/en16227569>
- Francesca Cattai, Annunziata D'Orazio; Revisione sistematica sull'utilizzo della radiazione germicida ultravioletta nei sistemi HVAC - Parte I - *LA TERMOTECNICA* Aprile 2024
- Francesca Cattai, Annunziata D'Orazio; Revisione sistematica sull'utilizzo della radiazione germicida ultravioletta nei sistemi HVAC - Parte II - *LA TERMOTECNICA* Maggio 2024.

### PROJECTS

- Participation in Sapienza University of Rome's call 2022 'Avvio alla. ricerca' with the project 'Control by UV-C irradiation of airborne biocontamination in HVAC systems' - FINANCED
- Participation in Sapienza University of Rome's call 2023 'Avvio alla. ricerca' with the project 'Control by UV-C irradiation of airborne biocontamination in HVAC systems' - NOT FINANCED
- Participation in the research project 'Design, development and experimental evaluation of active and passive acoustic sensors for real-time monitoring of the residual efficiency of activated carbon filters in HVAC systems', within the framework of the "Progetto Medi di Ateneo 2023" call for proposals (Project leader: Prof. D'Orazio) - FINANCED.
- Participation in the project 'Heat pumps in existing heating and domestic hot water production systems for the improvement of urban air quality and primary energy savings', within the framework of the call for proposals "Progetti di Terza Missione di Ateneo 2023", (Project leader: Prof. D'Orazio) - NOT FINANCED.
- Participation in Sapienza University of Rome's call 2024 'Avvio alla. ricerca' with the project 'Control by UV-C irradiation of airborne biocontamination in HVAC systems' - PENDING
- Participation in the research project 'Acoustic noise in Magnetic Resonance Imaging: theoretical model of the Lorentz force field and numerical analysis of the gradient assembly vibrations', within the framework of the "Progetto Medi di Ateneo 2024" call for proposals (Project leader: Prof. D'Orazio) - PENDING

### REVIEWER

Reviewer of Applied Microbiology and Biotechnology