

# Antonio D'Aquilio

## Building Physics | Machine Learning



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📍 London, UK

🖱 [https://ant-daq.github.io/AD\\_Portfolio/](https://ant-daq.github.io/AD_Portfolio/)

## 📖 PUBLICATIONS

### A surrogate CFD model using Machine Learning for fast design explorations of the indoor environment

*IBPSA 2023 - Shanghai*

Introducing a novel approach for the fast prediction of the indoor environment performance of a HVAC system. The surrogate modelling approach implements a fully Convolutional Neural Network architecture and can output physics field such as air temperature, velocity and age of air. The model is able to predict results 4 order or magnitude faster than standard CFD, with low error metrics.

### Simulating natural ventilation in large sports buildings. 🌐

*SimAUD 2016 - London*

An investigation of the potential for a novel workflow capable of capturing the airflow and temperature distribution within large volume spaces such as indoor swimming pools.

### Exploration of Design Alternatives using Multivariate Analysis Algorithms 🌐

*SimAUD 2016 - London*

Investigation of SOM clustering algorithm for the support of early stage multivariate exploration of architectural designs. Winner of the 'Best Paper' award at the SimAUD conference.

## 👤 PROFILE

Hello! I'm Antonio, a Principal Engineer specializing at the intersection of Building Physics and Data Science. Throughout my professional journey, I've crafted software and cutting-edge tools that empower automation, enable data analysis, and enhance efficiency throughout the lifecycle of the project delivery. Presently, I'm developing novel Machine Learning techniques with the aim of delivering faster design explorations and introducing innovative services.

## 📁 PROFESSIONAL EXPERIENCE

### Hoare Lea

*Principal Engineer - Building Physics | Data Science - Team Lead*

May 2022 - present | London, UK

Running a team of 6 focusing on the delivery of innovative computational workflows, automation software and Machine Learning applications. Envisioned and currently working on a Machine Learning toolset for the real-time prediction of the performance of the indoor environment. Thanks to the novelty of this technique, I have published a research paper at the IBPSA 2023 conference and presented the work in Shanghai, China.

### Introba (ex. Integral Group)

*Senior Building Physicist*

Oct 2017 - Dec 2021 | London, UK

Accelerated the transition to computational and parametric design workflows within the team, including climate analysis, detailed energy modelling, complex daylighting as well as indoor and outdoor comfort analysis making use of Computational Fluid Dynamics (CFD).

### Arup

*Graduate Mechanical Engineer*

Jan 2016 - Sep 2017 | Amsterdam, Netherlands

Developed computational workflows for the delivery of complex building physics analysis within the early design stages of projects, looking at solar radiation, daylighting and natural ventilation analysis.

Developed capability statement videos showing the company's cutting-edge parametric approach to analytics and design optimisation.

## SKILLS

**Programming** (*Python / Matlab / Javascript*)

**Data Science** (*Numpy / Pandas / Sklearn / Pytorch*)

**Data Visualisation / Dashboarding**  
(*Matplotlib / Seaborn / Bokeh / Streamlit*)

**Database** (*SQL*)

**API/Web scraping** (*Flask / Beautiful Soup*)


**Version control** (*Git / Github*)

**Building Physics** (*EnergyPlus / IES / Therm / Radiance / OpenFOAM*)

## SIDE PROJECTS


### EPW Weather analysis tool

*python / streamlit / bokeh / pandas*

I created a web dashboard  for exploring EPW weather files, a standard format for typical annual weather data. The app features interactive plots, allowing users to analyze the data and identify patterns.

### Pill Counter Experiment

*python / numpy / pytorch / matplotlib*

I've been counting vitamin pills daily for my well-being, finding it tedious and error-prone. In an effort to automate the task, I created a Jupyter notebook  to teach an algorithm to handle the pill counting for me.

### Pigeon

*python / grasshopper for rhino / contam*

This is a tool that allows the quick simulation of natural ventilation rates between rooms within the Grasshopper parametric environment.

## COURSES

### Machine Learning Professional Certificate *IBM*

Jul 2023 - present

Regression, Classification, Recommender systems, Clustering, Scikit-Learn, Python, NumPy, Pandas, Data Science, Matplotlib, Seaborn, SQL

### Machine Learning Specialization *DeepLearning.AI*

Dec 2021 - Feb 2022

Linear Regression, Support Vector Machine, Logistic Regression, Artificial Neural Networks, K-means clustering, Principal Component Analysis, MATLAB

### Deep Learning Specialization *DeepLearning.AI*

Aug 2023 - present

Neural nets, Sequence models, Convolutional neural networks, Structuring ML projects, Hyperparameter tuning and optimisation

## EDUCATION

### Delft University of Technology (TU Delft) *MSc Building Technology (cum laude)*

Sep 2013 - Jun 2015 | Delft, Netherlands

Master thesis on the use of Genetic Algorithms for the optimisation of building's energy performance and natural ventilation in the early stages of the design process.

### Roma Tre University *Architecture Sciences (cum laude)*

Sep 2009 - Mar 2013 | Rome, Italy

## CERTIFICATIONS

### MCIBSE / CEng

*Chartered Engineer and Member of CIBSE*

## LANGUAGES

**Italian** (*Native speaker*),

**English** (*Highly proficient*),

**Spanish** (*Limited working proficiency*)