Aaron **Ponti**

IMAGE ANALYSIS/COMPUTER VISION EXPERT · SENIOR RESEARCH SOFTWARE ENGINEER

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Summary

As a senior professional specializing in advanced computer vision and machine learning, I bring extensive experience architecting end-to-end solutions that transform imaging devices in life sciences and diagnostics. Through my deep learning consultancy and open-source collaborations, I have built high-impact applications and driven innovation in the biotechnology and biomedical/health fields. Skilled at simplifying complex requirements into approachable software solutions, I have a history of leading and contributing to open-source projects that significantly benefit research communities. My cross-functional collaborations emphasize innovation and the enhancement of research and development processes in scientific domains. I am eager to leverage my expertise in cutting-edge imaging technologies and scalable software solutions to drive meaningful scientific advancements and customer value.

Work Experience

aaronponti.ch - Empowering Scientists with AI and Computer Vision (own firm)
Basel, Switzerland

SCIENTIFIC IMAGE ANALYSIS, MACHINE LEARNING AND SOFTWARE ENGINEERING CONSULTANT
July 2024 - Present

- Ran deep-learning based image analysis consultancy projects with U.S. clients in the biotechnology and medical/health fields.

Single Cell Facility, Department of Biosystems Science and Engineering, ETH Zurich
Basel, Switzerland

IMAGE ANALYSIS EXPERT, SENIOR RESEARCH SOFTWARE ENGINEER
May 2012 - May 2025

- Spearheaded the creation and implementation of an advanced image analysis platform, enhancing research capabilities.
- Developed custom scientific software solutions, contributing to significant improvements in research efficiency.
- Designed a comprehensive data management strategy, facilitating efficient data and metadata registration.
- Engineered software for seamless integration of laboratory hardware, enhancing system functionality.
- Established productive partnerships with commercial and academic institutions, contributing to cutting-edge software development.

Facility for Advanced Imaging and Microscopy, Friedrich Miescher Institute (Novartis)
Basel, Switzerland

IMAGE PROCESSING AND ANALYSIS SPECIALIST, SCIENTIFIC SOFTWARE DEVELOPER
January 2006 - April 2012

- Developed specialized image processing and analysis software, contributing to international open-source projects.
- Supported experiment planning and data analysis, enhancing research output.

Selected Projects

pyMINFLUX: A cross-platform tool for MINFLUX visualization and analysis
ETH Zurich

ALGORITHM AND SOFTWARE DESIGN AND DEVELOPMENT
2022 - Present

- In collaboration with Leibniz Institute of Photonic Technology, Jena. De-facto standard for the visualization and analysis of super-resolution microscopy data (MINFLUX) with users all across Europe.
  Project page: https://pyminflux.ethz.ch

qute: Deep-learning based computer-vision research in microscopy image analysis
ETH Zurich

ALGORITHM AND SOFTWARE DESIGN AND DEVELOPMENT
2022 - Present

- qute leverages and extends several PyTorch-based framework and tools.
  Project page: https://github.com/aarpon/qute

pyPOCQuant: A tool to automatically quantify Point-Of-Care Tests from images
ETH Zurich

COMPUTER VISION ALGORITHM AND SOFTWARE DESIGN AND DEVELOPMENT.
2020 - 2023

- Developed for the quantitative analysis of POCTs during COVID-19 pandemic.
  Main users: Swiss Armed Forces, Baselland Test Center, Swiss Tropical and Health Institute, Basel, Fachhochschule Nordwestschweiz (FHNW), Muttenz, Canton Grisons and Swiss Federal Office of Public Health, other academic research centers.
  Project page: https://gitlab.com/csb.ethz/pypocquant/

SpectraSorter: Software for droplet sorting in high-speed spectrophotometry
ETH Zurich

SOFTWARE DESIGN AND DEVELOPMENT.
2021 - 2022

- Software for droplet sorting based on the analysis of high-speed spectrophotometer (OceanFX) measurements (software - hardware integration).
  Project page: https://github.com/SpectraSorter/SpectraSorter

oBIT: Toolset for automated data and metadata registration from hardware devices.
ETH Zurich

STRATEGY AND SOFTWARE DESIGN AND DEVELOPMENT.
2012 - Present

- The openBIS Importer Toolset is an integrated collection of tools that allows for the semi-automated and semi-unsupervised registration of annotated datasets into openBIS directly from the acquisition stations.
  Project page: https://obit.ethz.ch

Education

Friedrich Miescher Institute *Basel, Switzerland*

Post-doctoral fellow; Prof. Dr. Susan Gasser *2005*

- Development of algorithms for 3D analysis of microscopy data.

Laboratory for Computational Cell Biology, The Scripps Research Institute *San Diego, CA, USA*

Post-doctoral fellow; Prof. Dr. Clare Waterman-Storer *2003 - 2004*

- Development of analysis algorithms and tools for quantitative Fluorescence Speckle Microscopy (qFSM).

Department of Mechanical and Process Engineering, ETH Zurich *Zurich, Switzerland*

PhD in Microscopy Image Analysis; Prof. Dr. Gaudenz Danuser *2000 - 2003*

- Thesis: High-Resolution Analysis of F-Actin Meshwork Kinetics and Kinematics using Computational Fluorescent Speckle Microscopy.

Department of Biology, Faculty of Biotechnology, ETH Zurich *Zurich, Switzerland*

M. Sc. in Biotechnology (Dipl. Natw); Prof. Dr. James Bailey *1994 - 1999*

- Thesis: Metabolic flux analysis in Escherichia coli augmented by mass spectrometry.

Continued Education (Selected)

Deep Learning for Image Analysis *Heidelberg*

EMBL Course *2020*

Parallel Programming with MPI/OpenMP *Zurich*

High-Performance Computing Center Stuttgart *2016*

Machine Learning *Coursera*

Stanford University *2013*

Skills

Scientific stack

Python with scientific libraries (numpy, scipy, pandas, scikit-image, opencv, scikit-learn, pytorch, pytorch-lightning, MONAI), MATLAB

Software engineering

Programmig Languages: Python, C#, Java, C++, PHP, SQL; UI toolkits: Qt, pyQt5, PySide6, Windows Forms, Swing; DevOps: GitHub, Gitlab, Redmine, JIRA, Docker

Languages

Italian (mother tongue); English (fluent); German (good/fluent)

Selected Publications

- Cuny A. P., **Ponti A.**, Kündig, T. Rudolf F., Stelling J. Cell region fingerprints enable highly precise single-cell tracking and lineage reconstruction. Nat Methods (2022).
- Duncombe T. A., **Ponti A.**, Dittrich P. S. SpectraSorter: Ocean Insight spectrometer software application for high-throughput full-spectrum UV–VIS analysis and triggered sorting, SoftwareX, Volume 19, 2022, 101160.
- Cuny A. P., Rudolf F., **Ponti A.**. pyPOCQuant - A tool to automatically quantify Point-Of-Care Tests from images. SoftwareX 15:2021, 100710.
- Welling M., Mohr M. A., **Ponti A.**, Sabater L. R, Boni A., Kitazawa Y., Liberali P., Peters A., Pelczar P., and Pantazis P. High fidelity lineage tracing in mouse pre-implantation embryos using primed conversion of photoconvertible proteins. eLife 2019;8:e44491
- **Ponti A.**, Machacek M., Gupton S., Waterman-Storer C.M., and Danuser G. Two uncoupled actin networks drive cell protrusion. Science 305:1782-1786. 2004.