



# Martin HOLUB

## Mechanical- and Bio- Engineering Graduate

As engineer trained in physics and biology, my interest lies in developing tools and methods that enable discovery and control in cell and molecular biology. Enjoying basic science, I aim to acquire skills for independent research and establish publication record to develop academic career.

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🏠 Zürich

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### SKILLS

µ-fluidics Nanoparticles

Hydrogels Neuroscience

Electrochemistry DLS

Scanning probe microscopy



Viability assays

Bioprinting PCR AFM

RNA/DNA isolation

Plasmonics Cavitation

Protein analysis

Inventor Ansys

COMSOL 3D printing



Soldering Machining

Arduino CFD LoRaWAN

Design Matlab LabView

Python R Bash Linux

Git Perl C/C++ MySQL



Snakemake MongoDB

Machine Learning

Reinforcement Learning



LaTeX Blogging

Public speaking

Markdown

### LANGUAGES

EN ●●●●●●●●

DE ●●●●○○○○

FR ●●●●○○○○

CZ ●●●●●●●●

### EDUCATION

**M.Sc. Mechanical Engineering (Bioengineering)**  
ETH Zürich, D-MAVT

📍 Zürich, Switzerland  
📅 09/2016 – ongoing

- **“Scanning Nanothermometry”**: Master thesis at the Laboratory of Biosensors and Bioelectronics with focus on method development, instrumentation and nanotechnology
  - Implemented method for non-contact measurement of temperature with nanometer resolution leveraging ion flow through nanopipette
  - Achieved faster scanning times compared to the state-of-the-art by using probe oscillating at high frequency
  - Developed a method for depositing nanoparticles (NPs) on surface with nanopipette
  - Achieved heating of NPs at plasmon resonance and described phenomenon theoretically
  - Mapped surface topography with custom built AFM probe in air and water
  - Numerically verified measured values using a multiphysics model implemented in COMSOL
  - Developed Python module for analyzing data from SICM and AFM experiments
  - Paper is currently in progress
- **“A Novel Extrusion System for Bioprinting”**: Semester project at Biofabrication and Tissue Engineering Lab (Grade 5.75), with focus on technology development and soft-materials
  - Evaluated extrusion system based on endless piston principle and compared it against conventional pneumatic extrusion system
  - Assessed rheological properties of printed materials and extruded volume precision
  - Prepared hydrogels at various viscosities using nano-particles
  - Verified and compared cell-viability
  - Communicated the results to the group and professor
  - Results were presented on poster at Biofabrication conference in Beijing
- Various projects in Bioinformatics, Tissue Engineering, Microfluidics, Mechanobiology, Electronics, Neuroscience, Machine Learning and other

**B.Sc. Mechanical Engineering**  
Brno University of Technology (BUT)

📍 Brno, Czech Republic  
📅 09/2013 – 08/2016

- **“Cavitation in Microfluidics”**: bachelor thesis (Awarded by Honeywell for outstanding quality)
  - Carried out numerical studies of cavitating flow in constrained milli- and micro-channels
  - Summarized theoretical description of cavitation dynamics and critically reviewed literature
  - Designed experimental setup for validation of numerical data
  - Presented results to a panel of experts from other universities and industry
- Various projects in Mechanical Design, Material Science and Fluid & Thermodynamics
- BEST Courses on Technology (Uni. of Erlangen-Nuremberg, 05/2015 and Ghent Uni., 06/2014)
- GPA 1.03 (1 is best) from 203 credits (2nd best from over 650 students in that year)
- Selected courses: Automation, Machine Learning (via Coursera), Numerical Methods, Microsensors and MEMS, Fluid Dynamics, Thermodynamics & Heat Transfer, Finite Element Method & ANSYS, Dynamics, Engineering Design, Introduction to Material Science.

### SELECTED WORK EXPERIENCE

**Intern in Software Development & Bioinformatics**  
NEBION AG

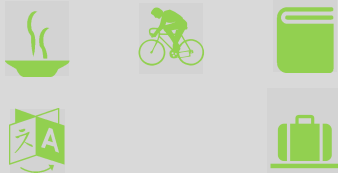
📍 Zürich, Switzerland  
📅 03/2018 – 10/2018

- Built a scalable pipeline for automated analysis of microarray and next-generation sequencing data
- Implemented machine learning algorithm for automatic quality assessment of biological datasets
- Supported team in Zürich and abroad in statistical analysis and interpretation of biological datasets
- Created and distributed an R package for preprocessing of data from several major platforms
- Developed a Python module for remapping µarray probes to updated genome and transcriptome
- Presented in internal seminars on various topics including R packaging and Deep Learning

## AWARDS AND CERTIFICATES

- ETH Week Award for “The Most Fascinating Science”
- Thermodynamics and Energy Conversion in Micro- and Nanoscale Technologies – “Best Poster Award”
- Certificate for tutoring 8 students throughout ETH Week 2018
- GE (General Electric) Foundation Scholar-Leaders Award
- Outstanding Bachelor Thesis Award (awarded by Honeywell Inc.)
- C1 CAE Cambridge Language Certificate
- B2 DELF French Certificate
- B2-C1 Österreich Institut und ETH/UZH Sprachzentrum certificate
- Golden Medal in Junior Division at the world’s biggest beach Ultimate Frisbee Tournament

## HOBBIES



## REFERENCES

- Prof. Bruno Weber (Institute of Pharmacology and Toxicology, UZH): [bweber@pharma.uzh.ch](mailto:bweber@pharma.uzh.ch)
- Prof. Marcy Zenobi-Wong (Biofabrication and Tissue Engineering Lab, ETHZ): [marcy.zenobi@hest.ethz.ch](mailto:marcy.zenobi@hest.ethz.ch)
- Dr. Stefan Bleuler (NEBION AG): [stefan@nebion.com](mailto:stefan@nebion.com)

## Research Assistant in Neuroimaging Institute of Pharmacology and Toxicology, UZH

Zürich, Switzerland  
11/2016 – 02/2018

- Developed algorithms for analysis of 2-photon fluorescence microscopy data (spectral unmixing, segmentation, motion estimation and others) to support ongoing research in the cell-to-cell communication pathways involved in energy metabolism and information processing in cerebral cortex, with special focus on the role of astrocytes and microglia
- Carried out calibration of novel chemical compound for time-resolved phosphorescence imaging
- Tested and adapted a custom device for quantification of fluorescence decay
- Contributed to two publications: *Oxyphor 2P: A High-Performance Probe for Deep-Tissue Longitudinal Oxygen Imaging*. Cell Metabolism (2019) and *CHIPS: An Extensible Toolbox for Cellular and Hemodynamic Two-Photon Image Analysis*. Neuroinformatics (2017)

## Research Assistant in Microelectronics Laboratory of Sensors and Nanosystems, CEITEC

Brno, Czech Republic  
06/2016 – 08/2016

- Contribution to proof-of-concept for handheld microfluidic sensor for point of care diagnostics
- Fabricated a complex PDMS chip and tested flow regimes. Used skills include soft lithography, chip interfacing and testing, fluorescence microscopy
- Designed, built and programmed a custom syringe pump. Used skills include parts design and 3D printing, mechanics-electronics-software integration, component sourcing

## PERSONAL PROJECTS

### Device for temperature and position tracking of sensitive deliveries (2018)

*Designed, built and programmed a mobile sensor device for remote tracking. Work included Mechanical design, 3D printing, microcontroller programming and interfacing with IoT network (LoRaWAN).*

### Tutor in Design Thinking (2018)

*Tutored and coached an interdisciplinary team of 8 students during ETH Week 2018.*

### Career fair for university students & graduates (2016)

*Co-organized a career fair for 3500+ students. The work included contacting companies, managing budget and on-site coordination of over 50 assistants.*

### Personal website and blog (2016)

*Designed and implemented personal website and blog on custom domain ([martinholub.com](http://martinholub.com))*

### Online career brochure and application for students & graduates (2015)

*Coordinated design and development of online application showcasing career opportunities.*

### Volunteering and engagement (2013 – Present)

*Volunteering activities in Social Service, Education, Culture and Sustainable Development in Switzerland, Czech Republic and France. Donating time and money to a cause. Coaching an Ultimate Frisbee sports club.*

## PUBLICATIONS

### Journals

- Barrett, M., Ferrari, K., Stobart, J., **Holub, M.**, & Weber, B. (2017). CHIPS: An Extensible Toolbox for Cellular and Hemodynamic Two-Photon Image Analysis. Neuroinformatics, Neuroinformatics, 04 October 2017.
- Hrdy, R.; Kynclova, H.; Klepacova, I.; Bartosik, M.; Neuzil, P. Portable Lock-in Amplifier-Based Electrochemical Method to Measure an Array of 64 Sensors for Point-of-Care Applications. ANALYTICAL CHEMISTRY, 2017, 86(17), 8731-8737.
  - I contributed to the publication as an undergraduate researcher at CEITEC (Central European Institute of Technology)
- Esipova T.V., Barrett M.J.P., Erlebach E., Masunov A.E., Weber B., Vinogradov S., 2019, Oxyphor 2P: A High-Performance Probe for Deep-Tissue Longitudinal Oxygen Imaging. Cell Metabolism, 29:1-9
  - Contributed to the publication as research assistant, carrying out in-vitro calibration

### Conference Posters & Submissions

- Fisch, P., **Holub, M.**, Zenobi-Wong, M. (2017). Comparison of Printing Accuracy of Screw- vs. Press-Driven Extrusion of Bioinks. International conference on biofabrication, Beijing: 2017
- Jedelský, J.; Malý, M.; **Holub, M.**; Jícha, M. (2015). Some Aspects of Disintegration of Annular Liquid Sheet in Pressure- Swirl Atomization. In Conference on Modelling Fluid Flow. Budapest: 2015. s. 1-8. ISBN: 978-963-313-190-9.

### Theses

- **Holub, M.** (2017). A novel extrusion system for bioprinting, a comparative study; Semester project, ETH Zürich, Zürich, Switzerland
- **Holub, M.** (2016). Cavitation in Microfluidics (link); Bachelor thesis; BUT, Brno, Czech Republic