# Lento **Manickathan**

POSTDOCTORAL RESEARCHER · AEROSPACE ENGINEER

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## Summary

Aerospace Engineer and PhD in mechanical engineering with expertise in high-performance computing and machine learning. Keen at developing skills in computer vision techniques. A brief summary of expertise:

- CFD simulation with OpenFOAM
- PIV experimental skills
- Machine learning with PyTorch
- Cloud computing, GPU computing
- Programming in Python
- Administration of HPC system

## Academic & Professional Experience

**Empa (Swiss Federal Laboratories for Materials Science and Technology)**  *Zürich, Switzerland*
POSTDOCTORAL RESEARCHER  *Jun. 2019 - Present*

- Application of machine learning in quantitative flow visualization.
- Supervised optical flow algorithms for PIV.
- Convolutional Neural Networks (CNN) in PyTorch.
- Additional responsibilities: Lab HPC support, Fluid Tunnel support, Deputy Laser safety officer (LSO), and Deputy data management.

**ETH Zurich**  *Zürich, Switzerland*
SCIENTIFIC ASSISTANT  *May 2015 - May 2019*

- Numerical and experimental research at Empa.
- Neutron radiography at Paul Scherrer Institute (PSI).
- Teaching assistant for Application of CFD in buildings.
- Supervision of master thesis project: *Praharsh Pai Raikar*.

**Shell Global Solutions**  *Rijswijk, The Netherlands*
RESEARCH INTERN  *Sep. 2012 - Feb. 2013*

- Investigating the combustion of hydrogen rich Syngas fuel in gas turbine.

## Education

**ETH Zurich**  *Zürich, Switzerland*
PH.D. IN MECHANICAL ENGINEERING  *May 2015 - Jun. 2019*

- **Thesis**: Impact of Vegetation on Urban Microclimate.
- **Advisor**: Prof. Dr. Jan Carmeliet
- Development of a coupled soil-vegetation-air-radiation model in C++ within the OpenFOAM library.
- Wind tunnel study of flow past model and natural plants using PIV.
- X-ray tomography of small natural plants and high-performance big data analysis in python (HDF5, scikit-image, Dask, Numba).

**TU Delft (Delft University of Technology)**  *Delft, The Netherlands*
M.SC. IN AEROSPACE ENGINEERING  *Sep. 2011 - Dec. 2014*

- **Major**: Aerodynamics and Wind Engineering
- **Thesis**: Hybrid Eulerian-Lagrangian Vortex Particle Method: Developing a fast and accurate numerical method for the application of Vertical-Axis Wind Turbine (VAWT).
- **Advisor**: Dr. ir. Carlos Simão Ferreira
- Development of a high-performance numerical method in python with Cython and GPU (CUDA) acceleration.

**TU Delft (Delft University of Technology)**                    *Delft, The Netherlands*

B.Sc in Aerospace Engineering                                      *Sep. 2008 - Aug. 2011*

- **Minor**: Wind Energy and Sustainability
- **Thesis**: Designing a multi-purpose autonomous aerial monitoring aircraft.
- Design a UAV that can cope with severe weather conditions, while performing a variety of sensing and monitoring tasks.

## Extracurricular Activities

**Leonardo Times Magazine**                                      *Delft, The Netherlands*

Editor                                                             *Sep. 2011 - Aug. 2012*

- Journal of the Society for Aerospace Engineering students, the VSV *Leonardo da Vinci* at the Delft University of Technology.
- In charge of current affairs section.

**TU Delft Formula Student**                                     *Delft, The Netherlands*

Powertrain Engineer                                                *Sep. 2009 - Jul. 2010*

- In charge of designing the powertrain intake system.
- Design and production of the carbon-fiber intake system.
- *2010 Formula Student Germany Champion.*

## Skills

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|---:|---|
| **CAD** | Blender · CATIA |
| **CFD** | FEniCS · Fluent · OpenFOAM |
| **DevOps** | Ansible · AWS (EC2) · Docker · Git · Grafana · Kubernetes · Travis CI · Vagrant |
| **Database** | InfluxDB · MariaDB |
| **Embedded Platform** | Arduino · NVIDIA Jetson Nano · Raspberry Pi |
| **Markup / Typesetting** | Jinja · LaTeX · Markdown · MkDocs · Vim |
| **ML Libraries** | PyTorch · Scikit-learn |
| **OS** | Linux (Arch Linux, Debian, Red Hat) · MacOS · Windows |
| **Programming** | C++ · MATLAB · Python · R · Shell |
| **Python Libraries** | CuPy · Cython · Dask · H5py · Matplotlib · MPI4py · Numba · NumPy · Pandas · SciPy · Scikit-image |
| **Web development** | CSS · Hugo · HTML5 · Nginx |

## Languages

**English** (Fluent), **German** (Conversational), **Malayalam** (Fluent), **Dutch** (Basic)

## Honors & Awards

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| 2017 | **Outstanding Oral Presentation**, 13th Symposium on Urban Environment | *Seattle, USA* |
| 2016 | **Young Best Researcher**, 4th International Conference on Countermeasures to Urban Heat Island | *Singapore* |

## Publications

### Journals

- **Manickathan, L.**, Mucignat, C., Lunati, I. (2022). Random displacement training for fluid flow motion estimation. (*in preparation*)
- **Manickathan, L.**, Defraeye, T., Carl, S., Richter, H., Allegrini, J., Derome, D., & Carmeliet, J. (2022). A study on diurnal microclimate hysteresis and plant morphology of a Buxus sempervirens using PIV, infrared thermography, and X-ray imaging. *Agricultural and Forest Meteorology 313*, 108722.
- **Manickathan, L.**, Defraeye, T., Allegrini, J., Derome, D., & Carmeliet, J. (2018). Parametric study of the influence of environmental factors and tree properties on the transpirative cooling effect of trees. *Agricultural and Forest Meteorology, 248*, 259-274.
- **Manickathan, L.**, Defraeye, T., Allegrini, J., Derome, D., & Carmeliet, J. (2018). Comparative study of flow field and drag coefficient of model and small natural trees in a wind tunnel. *Urban Forestry & Urban Greening, 35*, 230–239.

### Preprints

- Palha, A., **Manickathan, L.**, Ferreira, C. S., & van Bussel, G. (2015). A hybrid Eulerian-Lagrangian flow solver. *arXiv preprint arXiv:1505.03368.*