

# Max Möbus (Moebus)

✉ max.moebus@inf.ethz.ch | 🏠 maxmoebus.com | 📄 maxmoebus | ☎ 0000-0003-3414-7142 | 🎓 Max Moebus

## Education

### SIPLAB, ETH Zurich

PhD in Computer Science at the Sensing, Interaction & Perception Lab with Prof. Christian Holz

Zurich, CH

Sept 2021 - present

- **Research focus:** (Statistical) Machine Learning for (Bio-)Medical Time Series in Mobile and Predictive Health

### University of Oxford, Lincoln College

M.Sc. in Statistical Science — Final Result: Pass with Merit

Oxford, UK

Oct 2020 - Sept 2021

- **Thesis:** Model comparison for option pricing in Lévy stochastic volatility via markets simulation of Stochastic Differential Equations (Result: Distinction)

### University College London (UCL)

B.Sc. in Statistical Science — Final Result: First Class Honours (79%), Undergraduate Project Prize

London, UK

Sept 2017 - July 2020

- **Thesis:** Applications of Optimal Transport Theory in Machine Learning (e.g., Wasserstein GANs)

## Research Experience

### SIPLAB, ETH Zurich

Research Assistant & PhD Student at the Sensing, Interaction & Perception Lab with Prof. Christian Holz

Zurich, CH

Oct 2021 - present

- **Research focus:** (Statistical) Machine Learning for (Bio-)Medical Time Series in Mobile and Predictive Health
  - Part I :** Identifying drivers of subjective health (e.g., fatigue ratings) from wearable sensor data (accelerometer, PPG, EDA) via interpretable forecasting
  - Part II :** Modeling disease and mortality risk from multimodal biomedical time series (motion, ECG, GP records) on the UK Biobank (500k participants)
  - Part III:** Enhancing (statistical) machine learning methods for irregular and multimodal time series with a focus on interpretability

### Saïd Business School, University of Oxford

Graduate Research Assistant with Prof. Mari Sako and Dr Matthias Qian

Oxford, UK

March 2021 - Aug. 2021

- Constructed customizable NLP models for the Oxford Sentence Annotator: a smart text annotator built in collaboration with OpenOcean VC

## Industry Experience

### Amazon

Intern, Business Analyst: European Transportation Team

London, UK

June 2020 - Sept 2020

- Built fully automated analysis process to tackle regularly low-performing routes responsible for 3 bn packages a year (root cause analysis in PowerBI with integrated R scripts, ETL data pipeline in SQL, validation & upload of data using Python, tailored statistical tests in R, automated communication in VBA)

### Auto1 Group

Intern, Business Analytics

Berlin, DE

June 2019 - Sept 2019

- Constructed predictive models that forecast claim rates to adjust country-wide budgets (logistic & kNN-regression)
- Developed KPI-dashboards and R Shiny web application to redefine sales strategy for 26 European countries — worth £2.5bn of annual revenue

### Kienbaum Consultants International

Intern, Management Consulting — Process Excellence Division

Düsseldorf, DE

Jan 2017 - March 2017

- Evaluated customer data (£400m in annual revenue) to identify the most lucrative customer clusters for a world-leading metal fittings producer

## Skills & Interests

<b>Statistics</b>	statistical ML, linear & non-linear models, interpretability, stochastic processes, Bayesian methods (MCMC, decision, risk)
<b>Data Science &amp; ML</b>	<b>Time Series</b> [supervised learning, forecasting, regular & irregular], <b>Tabular</b> [interpretable modeling, causality, feature engineering], <b>Text</b> [classification, sentiment analysis, Huggingface], <b>Big Data</b> [resource efficient processing & modeling, local or in the cloud]
<b>Wearables</b>	modeling health metrics such as heart rate, physical activity & sleep stages from IMU, PPG, EDA, skin temperature, ECG,...
<b>Programming Languages</b>	<b>Python</b> [Pandas, Polars, PyTorch, TensorFlow, Keras, NumPy, ScipPy, Scikit-learn, etc.], <b>R</b> [data.table, MGCV, ggplot2], <b>SQL</b>
<b>Interests</b>	<b>German</b> [native], <b>English</b> [fluent]
	<b>Football</b> [central defender, Team Captain & Social Secretary at UCL Football Club, UCL Sports Colours Award], <b>skiing</b> [basically compulsory in Switzerland], <b>water sports</b> [sailing, wind-surfing], <b>reading</b> [Weapons of Math Destruction, Algorithms to Live By]

## Selected Publications

- [1] **Max Moebus**, Lars Hauptmann, Nicolas Kopp, Berken Utku Demirel, Björn Braun, and Christian Holz. “Nightbeat: Heart Rate Estimation From a Wrist-Worn Accelerometer During Sleep”. In: *IEEE BHI*. **Accepted as Oral (18%)**. 2024.
- [2] **Max Moebus**, Marc Hilty, Pietro Oldrati, Liliana Barrios, PHRT Author Consortium, and Christian Holz. “Assessing the Role of the Autonomic Nervous System as a Driver of Sleep Quality in Patients With Multiple Sclerosis: Observation Study”. In: *JMIR Neurotechnology* (2024).
- [3] **Max Moebus**, Julien Wolfensberger, and Christian Holz. “Predicting sleep quality via unsupervised learning of cardiac activity”. In: *IEEE EMBC*. 2024.
- [4] **Max Moebus**, Shkurta Gashi, Marc Hilty, Pietro Oldrati, and Christian Holz. “Meaningful Digital Biomarkers Derived From Wearable Sensors to Predict Daily Fatigue in Multiple Sclerosis Patients and Healthy Controls”. In: *iScience* (2024).