Max Möbus (Moebus)

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Education & Research Experience

ETH Zurich, SIPLAB — *Zurich, CH*

Research Intern & PhD Student at the Sensing, Interaction & Perception Lab (SIPLAB) with Prof. Christian Holz — *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 via interpretable forecasting
    - ↳ I modeled incomplete and messy data with a low signal-to-noise ratio using generalized linear regression based on carefully engineered features
  - **Part II :** Modeling disease and mortality risk from biomedical time series on the UK Biobank (500k participants) using Cox-regression models
    - ↳ I developed novel signal processing and deep learning algorithms (e.g., for heart rate monitoring) to detect risk factors for stroke
  - **Part III:** Enhancing learning algorithms for irregular time series (Neural CDEs and Multi-Time Attention Networks) with a focus on interpretability
    - ↳ I developed a new technique for irregular time series saliency maps that also uncovers the effect of missing data (e.g., for GP & hospital records)
- **Teaching:** Designing lectures, exercises and exam as Head TA (100+ student course); mentored 17 student theses (6 contributed to paper submissions)

University of Oxford, Lincoln College — *Oxford, UK*

M.Sc. in Statistical Science — Final Result: Pass with Merit — *Oct 2020 - Sept 2021*

- **Thesis:** Model Comparison for Option Pricing in Lévy Stochastic Volatility Markets via Simulation of Stochastic Differential Equations (Result: Distinction)

University of Oxford, Saïd Business School — *Oxford, UK*

Graduate Research Assistant with Prof. Mari Sako and Prof. Matthias Qian — *March 2021 - Aug. 2021*

- Built BERT-based embedding and classification models to automate outsourced text annotation: collab. with OpenOcean VC led to a (short-lived) spin-off

University College London (UCL) — *London, UK*

B.Sc. in Statistical Science — Final Result: First Class Honours (79%), Undergraduate Project Prize — *Sept 2017 - July 2020*

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

Industry Experience

Goldman Sachs — *London, UK*

Summer Associate, Quantitative Strategist: Counterparty Credit Risk — *June 2025 - Aug 2025*

- Utilized Bayesian statistics to develop new probability of default (PD) model: reduced overestimation of PDs by up to 70% to lower capital requirements
- Engineered ETL workflow to integrate and assess the representativeness of external rating data to improve PD estimation in niche client segments

Amazon — *Hemel Hempstead, UK*

Intern, Business Analyst: European Transportation Team — *June 2020 - Sept 2020*

- Built analysis pipeline that tackled structural delays on courier routes responsible for 3 bn packages a year to automate 4 weekly person-hours and enable more large-scale controls (ETL in SQL, data wrangling in Python, statistical tests in R, PowerBI dashboard, automated external communication via VBA)

Auto1 Group — *Berlin, DE*

Intern, Business Analytics — *June 2019 - Sept 2019*

- Developed R Shiny web application to identify lucrative products that were undersupplied in the company's portfolio (COO picked up my analysis)
- Constructed logistic & k-NN regression models to forecast claim rates and severity to adjust country-wide budgets needed for future reimbursements

Skills & Interests

Statistics	(generalized) linear & non-linear models, statistical ML, stochastic processes, simulation methods (MCMC), Bayesian methods
Data Science & ML	**Time Series** [supervised learning, forecasting, regular & irregular], **Tabular** [interpretable modeling, causality, feature engineering], **Text** [NLP, classification, sentiment analysis, Huggingface], **Big Data** [local or in the cloud], **ETL** [efficient workflows in SQL or Python]
Wearables	**Signals** [extracting health metrics such as heart rate, physical activity & sleep stages from IMU, PPG, EDA, temperature, ECG,...]
Programming Languages	**Python** [Pandas, Polars, PyTorch, TensorFlow, Keras, NumPy, SciPy, Scikit-learn, etc.], **R** [data.table, MGCV, ggplot2], **SQL**, **Slang**, **VBA**
	German [native], **English** [fluent]
Interests	**Football** [central defender, Team Captain & Social Secretary at UCL Football Club, UCL Sports Colours Award], **Skiing** [basically compulsory in Switzerland], **Water Sports** [sailing, windsurfing], **Reading** [Weapons of Math Destruction, Algorithms to Live By]

Selected Publications

[1] **Max Moebus**, Björn Braun, and Christian Holz. "Contimask: Explaining Irregular Time Series via Perturbations in Continuous Time". In: *The Thirty-ninth Annual Conference on Neural Information Processing Systems*. 2025.

[2] **Max Moebus** and Christian Holz. "Beyond the hours slept: inconsistent sleep routines threaten mental health in 100,000 UK Biobank participants". en. In: *BMC Public Health* 25.1 (2025).

[3] **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 JBHI*. **Accepted as Oral at BHI (18%)**. 2025.

[4] **Max Moebus**, Julien Wolfensberger, and Christian Holz. "Predicting sleep quality via unsupervised learning of cardiac activity". In: *IEEE EMBC*. 2024.