Max Möbus (Moebus)

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Education

SIPLAB, ETH Zurich — *Zurich, CH*

PhD in Computer Science at the Sensing, Interaction & Perception Lab with Prof. Christian Holz — *Apr 2022 - present*

- **Research focus:** Biomedical Time Series for Mobile and Predictive Health
  - **Part I :** Identifying drivers of subjective health (e.g., fatigue ratings) from wearable sensor data in intensive longitudinal studies [95% done]
  - **Part II :** Modeling disease and mortality risk from multimodal biomedical time series data on the UK Biobank (500k participants) [50% done]
  - **Part III:** Enhancing statistical methods for irregular and multimodal time series with a focus on interpretability [just started]
- Organized courses with 100+ students per year as Head Teaching Assistant
- Supervised and mentored 17 student theses

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 via simulation (Result: Distinction)
- **Core Modules:** Computational Statistics, Statistical Machine Learning, Bayesian Simulation Methods, Applied Statistics

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

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

- **Prizes:** Undergraduate Project Prize for final year thesis (82.6%), UCL Sports Colours Award for UCLFC engagement
- **Thesis:** Applications of Optimal Transport Theory in Machine Learning (e.g., Wasserstein GANs)
- **Core Modules:** Statistical Inference, Stochastic Methods in Finance, Decision & Risk, Operations Research, Forecasting
- Held tutorial sessions about Probability and Inference during my final year for Prof. Yvo Pokern

Otto-Hahn-Gymnasium Bensberg — *Cologne, DE*

Abitur – Final Result: 840 points, Top of Class and Top 1% in Germany, Student Representative — *Aug 2008 - Jul 2016*

Work Experience in Academia

SIPLAB, ETH Zurich — *Zurich, CH*

Research Assistant at the Sensing, Interaction & Perception Lab with Prof. Christian Holz — *Oct 2021 - March 2022*

- Analyzed wearable sensor data to identify objectively measurable predictors of subjective health in MS patients

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

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

- Constructed customizable NLP models for the Oxford Sentence Annotator: a smart text annotator built in collaboration with OpenOcean VC
- Analyzed US and UK legal-tech industry as part of 2021 SRA report: Technology and Innovation in Legal Services

Work Experience in Industry

Amazon — *London, UK*

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

- Created automated statistical tests to detect improvements on poor performing lanes (used for 3bn packages a year)
- Built fully automated analysis process to tackle regularly low performing routes (root cause analysis in PowerBI based on custom scripts witten in R, ETL data pipeline in SQL, validation & upload of data using Python, automated email communication with carriers using VBA)

Auto1 Group — *Berlin, DE*

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

- Constructed predictive models that forecast claim rates to adjust country-wide budgets (logistic & kNN-regression)
- Developed KPI-dashboards to redefine sales strategy for 26 European countries –– worth £2.5bn of annual revenue
- Built R Shiny web application to identify and analyze underrepresented car types in the company's portfolio

Talanx Group — *Düsseldorf, DE*

Intern, Actuarial Management and Product Development — *June 2018 - Sept 2018*

- Built Excel-Tools to calculate premiums and costs for new private savings and investment products
- Recalculated special customer requests to optimize the performance of newly implemented IT-Systems

Kienbaum Consultants International — *Düsseldorf, DE*

Intern, Management Consulting — Process Excellence Division — *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

Extracurricular Activities

UCL-Football Club (UCLFC) *London, UK*

Social Secretary *July 2019 - June 2019*

- Tackled mental health issues at UCL and increased wellbeing of club with 175 active members through weekly social events

Team Captain of the fifth Team *July 2018 - June 2018*

- Coordinated trials, training, and games to finish first and secure promotion in London University Sports League (LUSL)

Skills & Interests

Programming Languages **Python** [Pandas, Polars, PyTorch, NumPy, ScipPy, Scikit-learn, etc.], **R** [data.table, MGCV, ggplot2], **SQL**

German [native], **English** [fluent]

Interests **Football** [played competitively for 17 years as a central defender or defensive midfielder], **water sports** [sailing and windsurfing in the Mediterranean Sea or Scandinavia], **skiing** [basically a compulsory hobby if in Switzerland], **reading** [The Swarm: A Novel of the Deep, Weapons of Math Destruction, Algorithms to Live By]

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-EMBS International Conference on Biomedical and Health Informatics*. 2024.

[2] Björn Braun, Daniel McDuff, Tadas Baltrusaitis, Paul Streli, **Max Moebus**, and Christian Holz. "SympCam: Remote Optical Measurement of Sympathetic Arousal". In: *IEEE-EMBS International Conference on Biomedical and Health Informatics*. 2024.

[3] Lukas Teufelberger, Xintong Liu, Zhipeng Li, **Max Moebus**, and Christian Holz. "Demonstrating LLM-for-X: Application-agnostic Integration of Large Language Models to Support Writing Workflows". In: *Adjunct Proceedings of the 37th Annual ACM Symposium on User Interface Software and Technology*. 2024.

[4] **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).

[5] **Max Moebus**, C Holz, and J Wolfensberger. "Predicting sleep quality via unsupervised learning of cardiac activity". In: *Proceedings of the 46th Annual International Conference of the IEEE Engineering in Medicine & Biology Society*. 2024.

[6] **Max Moebus** and Christian Holz. "Personalized interpretable prediction of perceived sleep quality: Models with meaningful cardiovascular and behavioral features". In: *Plos one* (2024).

[7] Shkurta Gashi, Pietro Oldrati, **Max Moebus**, Marc Hilty, Liliana Barrios, Firat Ozdemir, PHRT Consortium, Veronika Kana, Andreas Lutterotti, Gunnar Rätsch, et al. "Modeling multiple sclerosis using mobile and wearable sensor data". In: *npj Digital Medicine* (2024).

[8] **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).

[9] Andreas Fender, Derek Alexander Witzig, **Max Moebus**, and Christian Holz. "PressurePick: Muscle Tension Estimation for Guitar Players Using Unobtrusive Pressure Sensing". In: *Proceedings of the 36th Annual ACM Symposium on User Interface Software and Technology*. 2023.

[10] Tiffany Luong, Yi Fei Cheng, **Max Moebus**, Andreas Fender, and Christian Holz. "Controllers or Bare Hands? A Controlled Evaluation of Input Techniques on Interaction Performance and Exertion in Virtual Reality". In: *IEEE Transactions on Visualization and Computer Graphics* (2023).

[11] Tiffany Luong, Adela Pléchata, **Max Moebus**, Michael Atchapero, Robert Böhm, Guido Makransky, and Christian Holz. "Demographic and behavioral correlates of cybersickness: A large lab-in-the-field study of 837 participants". In: *2022 IEEE International Symposium on Mixed and Augmented Reality (ISMAR)*. 2022.