# FLORIAN SCHNEIDER

## 3<sup>RD</sup> AND FINAL YEAR PH.D. STUDENT, UNIVERSITY OF HAMBURG

- Language Technology, Universität Hamburg, Germany
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## EDUCATION

### PH.D. IN COMPUTER SCIENCE (DR. RER. NAT.)
UNIVERSITY OF HAMBURG
*Hamburg, Germany | 04/22 – present* **(expected graduation: 08/2025)**

**Supervisor:** Prof. Dr. Chris Biemann
**Research Focus:** Multimodal Transformer Models

- Transformer Encoders: Cross-modal representation learning and information retrieval for semantic search.
- Transformer Decoders: Training and Evaluation of multilingual and multicultural Large Vision-Language Models (LVLMs).
- Building scientific software tools powered by LVLMs that support text, image, audio, and video data.
- Enhancing research processes in the Digital Humanities and Computational Social Sciences by employing LLMs and LVLMs.

### MASTER OF SCIENCE (M.SC.)
UNIVERSITY OF HAMBURG
*Hamburg, Germany | 09/2017 – 07/2021*

**Special Focus:** Natural Language Processing and Computer Vision
**Final Grade:** 1.2 (excellent)
**Master's Thesis:**
Title: "*Self-supervised Multimodal Text-Image Retrieval Methods to Improve Human Reading*"
Grade: 1.0 (outstanding) | Won the GSCL Best Master's Thesis Award '21 – '23
1st Author Publications: NAACL'21 (SRW), SIGIR'22 (Demo), LREC'22 (Main)

### BACHELOR OF SCIENCE (B.SC.)
UNIVERSITY OF APPLIED SCIENCES ULM
*Ulm, Germany | 09/2012 – 03/2017*

**Special Focus:** Embedded Systems & General Software Engineering
**Final Grade:** 1.45 (excellent)
**Bachelor's Thesis:**
Title: "*Linking and Verification of Printed Documents on Blockchain-based File Systems using Cryptographic Hashes from OCR Analyses*"
Grade: 1.1 (excellent)

### SPECIALIZED HIGH SCHOOL DIPLOMA
NATURAL SCIENCE AND TECHNICAL ACADEMY ISNY
*Isny, Germany | 09/2010 – 07/2012*

**Special Focus:** General Computer Science Engineering
**Final Grade:** 1.9 (good)
**Final Project:**
Title: Design and Implementation of a Production-Ready Control Management System (CMS) in PHP and JavaScript.
Grade: 1.0 (excellent)

# WORK EXPERIENCE

### PH.D. RESEARCH INTERN MICROSOFT RESEARCH

*Bangalore, India | 11/23 – 03/24*

- Implemented an extensive evaluation suite for Large Multi-Modal Models (LMMs) to assess their multilingual capabilities using popular Python-based machine-learning frameworks.
- Created two multilingual text-image datasets, including a novel vision-language task.
- Experimented on extending the multilingual capabilities of LMMs using popular frameworks like PyTorch and PyTorch Lightning.
- ☆ Published the work as a first author at EMNLP 2024.

### PH.D. RESEARCH INTERN IBM RESEARCH

*New York, USA | 05/22 – 08/22*

- Started an Ontology Alignment research project and codebase from scratch involving programming languages like Python, Java, SQL, and SPARQL.
- Trained an efficient and zero-shot capable Ontology Alignment model based on a dual transformer encoder architecture.
- ☆ Published the work as first author at K-CAP 2023.

### STUDENT RESEARCH ASSISTANT UNIVERSITY OF HAMBURG

*Hamburg, Germany | 11/18 – 03/22*

- Assisted in the Natural Language For Web lecture as a tutor (winter term 18/19).
- Developed and designed the CodeAnno tool (an extension of WebAnno). This involved programming languages like Python, Java, SQL, HTML, CSS, and JavaScript.
- Designed and implemented a dynamic and modular machine-learning service for CodeAnno.
- ☆ Published to work at first author at EACL 2023.

### SOFTWARE DEVELOPER R&D ABSOLUTE REALITY

*Hamburg, Germany | 04/18 – 01/19*

- Conceptualized, designed, and implemented a full-stack application including a REST API and Web UI for automatic detection of PR and VINs on images of vehicle data carriers. This involved programming languages like Python, Java, SQL, HTML, CSS, and JavaScript.
- Implemented and applied traditional computer vision techniques and machine-learning-based object recognition and optical character recognition models.
- Evaluated and applied the machine-learning services of AWS, Google Could, and Azure Cloud.

### JUNIOR SOFTWARE DEVELOPER SAP

*Walldorf, Germany | 04/17 – 08/17*

- Worked as a junior software developer in C++ and JavaEE in the SAP HANA Core Developer Team.
- Implemented parts of a Java Spring REST API for data anonymization for SAP HANA via Differential Privacy and $k$-Anonymity.

### STUDENT RESEARCH INTERN FZI (RESEARCH CENTER FOR INFORMATION TECHNOLOGY), KIT

*Karlsruhe, Germany | 02/16 – 08/16*

- Implemented and evaluated different automatic white-balancing methods for video data in C++.
- Implemented various test cases for static program analysis in C.
- Refactored a C++ framework to simulate software execution times.

### STUDENT ASSISTANT UNIVERSITY OF APPLIED SCIENCES ULM

*Ulm, Germany | 04/14 – 02/17*

- Assisted in the C++ lecture as a tutor (winter term 2016/17).
- Implemented an extensive extension for Microsoft SharePoint applications and modules using Java, SQL, HTML, CSS, and JavaScript (winter term 2015/16).
- Assisted in the Math 1 lecture as a tutor (summer term 2014).

### INTERN SOFTWARE DEVELOPER AIRBUS GROUP (EADS)

*Friedrichshafen, Germany | 05/13 – 05/18*

- Implemented a prototypical thermal model for a LEO Satellite in Java.
- Implemented automatic transformations to convert UML to MS Word and XML Schema using JAVA and the EMF framework.

# HONORS AND AWARDS

## HONORABLE MENTION: DEMO NAACL 2024

*Mexico City, Mexico | July 2024*

We received the Honorable Mention Award for our System Demonstration Paper:

Fischer, T., **Schneider, F.**, Geislinger, R., Helfer, F., Koch, G. and Biemann, C., 2024, June. *Concept Over Time Analysis: Unveiling Temporal Patterns for Qualitative Data Analysis.* In Proceedings of the 2024 Conference of the North American Chapter of the Association for Computational Linguistics (NAACL 2024): Human Language Technologies (Volume 3: System Demonstrations) (pp. 148-157).

## BEST MASTER'S THESIS AWARD 2021–2023 GSCL

*Ingolstadt, Germany | September 2023*

Every two years, the German Society for Computational Linguistics and Language Technology (GSCL) awards two prizes worth €400 each for the best student undergraduate thesis and the best master's thesis in the field of language technology and computational linguistics.

I won with my master's thesis: *"Self-Supervised Multi-Modal Text-Image Retrieval Methods to Improve Human Reading"*!

# SELECTED PUBLICATIONS

*For a full and updated list of papers and citations, please refer to my* Google Scholar page

- **Schneider, F.**, and Sitaram, S. (2024): *M5 - A Diverse Benchmark to Assess the Performance of Large Multimodal Models Across Multilingual and Multicultural Vision-Language Tasks.* The 2024 Conference on Empirical Methods in Natural Language Processing (EMNLP Findings), Miami, Florida, USA.
- Hinck, M., **Schneider, F.**, Holtermann, C., Olson, M.L., Yu, S., Bhiwandiwalla, A., Lauscher, A., Tseng, S. and Lal, V., (2024): *Why do LLaVA Vision-Language Models Reply to Images in English?* The 2024 Conference on Empirical Methods in Natural Language Processing (EMNLP Findings), Miami, Florida, USA.
- **Schneider, F.**, Dash, S., Bagchi, S., Mihindukulasooriya, N., Gliozzo, A. M., (2023): *NLFOA: Natural Language Focused Ontology Alignment.* In Proceedings of the 12th on Knowledge Capture Conference (K-CAP 2023), Pensacola, Florida, USA.
- **Schneider, F.**, Fischer, T., Petersen-Frey, F., Eiser, I., Koch, G., Biemann, C. (2023): *The D-WISE Tool Suite: Multi-Modal Machine-Learning-Powered Tools Supporting and Enhancing Digital Discourse Analysis.* In Proceedings of the 61st Annual Meeting of the Association for Computational Linguistics (ACL 2023), System Demonstrations Track, Toronto, Canada.
- **Schneider, F.** and Biemann, C. (2023): *LT at SemEval-2023 Task 1: Effective Zero-Shot Visual Word Sense Disambiguation Approaches using External Knowledge Sources.* In Proceedings of the 17th International Workshop on Semantic Evaluation (SemEval-2023), Toronto, Canada. Association for Computational Linguistics (ACL).
- **Schneider, F.**, Yimam, S. M., Petersen-Frey , F., Biemann, C., von Nordheim, G., Kleinen-von Königslöw, K., (2023): **CodeAnno: Extending WebAnno with Hierarchical Document Level Annotation and Automation.** The 17th Conference of the European Chapter of the Association for Computational Linguistics (EACL 2023), System Demonstrations Track, Dubrovnik, Croatia
- Wiehe, A. O., **Schneider, F.**, Blank, S., Wang, X., Zorn, H. P., Biemann, C., 2022: *Language over Labels: Contrastive Language Supervision Exceeds Purely Label-Supervised Classification Performance on Chest X-Rays.* The 2nd Conference of the Asia-Pacific Chapter of the Association for Computational Linguistics and the 12th International Joint Conference on Natural Language Processing (AACL-IJCNLP 2022)
- **Schneider, F.**, and Biemann, C., 2022, *Golden Retriever: A Real-Time Multi-Modal Text-Image Retrieval System with the Ability to Focus*, In Proceedings of The 45th International ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR '22), System Demonstrations Track. ACM, New York, NY, USA, 5 pages.
- **Schneider, F.**, Alaçam, Ö., Wang, X., Biemann, C. (2021): *Towards Multi-Modal Text-Image Retrieval to improve Human Reading.* NAACL 2021 Student Research Workshop, Mexico City, Mexico (online)

# LARGER SOFTWARE PROJECTS

**DATS – DISCOURSE ANALYSIS TOOL SUITE | GITHUB.COM/UHH-LT/DATS**

- Full-stack Web-App to enhance research processes for the digital humanities using machine-learning-powered technologies
- Technical lead and designer of the Python backend architecture and the data model
- Used frameworks, libraries, and technologies such as FastAPI, SQLAlchemy, Alembic, PostgreSQL, Weaviate, ElasticSearch, Redis, RabbitMQ, Celery, Ray, HF Transformers, Pandas, PyTorch, Scrapy, Docker and Docker-Compose, pytest, GitHub Actions for CI/CD, etc.

**CODEANNO | GITHUB.COM/UHH-LT/CODEANNO**

- Substantial extension of the Java-based WebAnno tool for hierarchical codebook annotations for social science researchers
- Designed, implemented and deployed CodeAnno from a fork of the WebAnno project
- Design, implementation, and integration of an external service to dynamically train and use neural classifiers for codebook annotations
- Used frameworks, libraries, and technologies such as: Java Spring (Boot), JPA, Hibernate ORM, Lombok, Maven, DKPro, UIMA, Wicket, Tensorflow, Pandas, FastAPI, Redis, NuxtJS, Bootstrap, Docker and Docker-Compose, etc.

**CARCODE EXTRACTOR | (PROPRIETARY PRODUCT)**

- RESTful API and Web-App (microservices architecture) to automatically extract Vehicle Identification Numbers (VIN) and PR codes from images of vehicle data carriers using Optical Character Recognition (OCR).
- Designed, implemented, deployed, and integrated the service and it's architecture from scratch.
- Used frameworks, libraries, and technologies such as: Tesseract OCR, OCR services from AWS, Google Cloud, and Azure, OpenCV, Flask, Swagger, SkLearn for DBScan clustering, pandas, NumPy, Docker and Docker-Compose, Redis, Microsoft SQL Server, etc.

# SUPERVISION

## Master's Theses

- **Jan Strich, M.Sc.**, University of Hamburg, 06/2024
  Thesis Titel: *Improving Large Language Models in Repository Level Programming through Self-Alignment and Retrieval-Augmented Generation*
  Publication:
  Jan Strich, Florian Schneider, Irina Nikishina, and Chris Biemann. 2024. *On Improving Repository-Level Code QA for Large Language Models*. In Proceedings of the 62nd Annual Meeting of the Association for Computational Linguistics (Volume 4: Student Research Workshop), pages 209–244, Bangkok, Thailand. Association for Computational Linguistics.

- **Jannis Meissner, M.Sc.**, University of Hamburg, 07/2023
  Thesis Titel: *Few-Shot Learning Methods for Semi-Automated Annotations of Large Text Corpora*

- **Ambin Kasipour, M.Sc.**, University of Hamburg, 05/2023
  Thesis Titel: *On the Potential of CLIP for Multi-Modal Image Retrieval and Object Detection.*

- **Fabian Meyer, M.Sc.**, University of Hamburg, 04/2023
  Thesis Titel: *On the Potential and Limits of Zero-Shot Out-of-Distribution Detection*

- **Anton Wiehe, M.Sc.**, University of Hamburg, 07/2022
  Thesis Titel: *Domain Adaptation for Multi-Modal Foundation Models*
  Publication:
  Anton Wiehe, Florian Schneider, Sebastian Blank, Xintong Wang, Hans-Peter Zorn, and Christian Biemann. 2022. *Language over Labels: Contrastive Language Supervision Exceeds Purely Label-Supervised Classification Performance on Chest X-Rays*. In Proceedings of the 2nd Conference of the Asia-Pacific Chapter of the Association for Computational Linguistics and the 12th International Joint Conference on Natural Language Processing: Student Research Workshop, pages 76–83, Online. Association for Computational Linguistics.