

# Luca Modica, Msc Data Science & AI

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## Work Experience

10/25 – now **Deep Learning Researcher**, Zenseact, Sweden.  
Working in a research project in the area of Multimodal Large Language Models for End-to-End Planning.

12/22 – 10/25 **Research fellow (social computing group)**. Department of Computer Science, University of Turin, Italy. Project website: <https://www.firstlife.org/>.  
- Involved in driving user engagement by building a full-stack social platform that converted large-scale, unstructured user data into key behavioral insights, directly informing strategies to promote local initiatives.  
- Architected and implemented a production-ready backend, featuring a secure Oauth 2.0 authentication system and an internal management tool that improved the team's efficiency in handling and scaling user and initiative data projects.

03/25 – 06/25 **Teaching Assistant, Advanced Databases** course. Department of Computer Science and Engineering, Chalmers University of Technology, Sweden.  
- Mentored and graded assignments for 50+ students in advanced database concepts during laboratory sessions, including relational and non-relational/graph databases, leading to improved student comprehension and project success.

07/19 – 08/19 **System Engineer**, IFIS Bank, Italy. Company website: <https://www.bancaifis.it/en/>.

## Education

2023 – 2025 **M.Sc. Data Science and AI**, Chalmers University of Technology, Sweden.  
Thesis title: *Locating and interpreting factual associations in Speech Language Models*.

2019 – 2022 **B.Sc. Computer Science**, University of Turin, Italy.  
Thesis title: *Design and implementation of a gamification module for the FirstLife platform*.

## Projects

2025 **Master's thesis project, "Locating and interpreting factual associations in speech-language models"**. Investigated factual association circuits in multimodal speech language models using a mechanistic interpretability approach. Conducted with the NLP@AI research group ("Representation learning for Conversational AI" collaboration project), the research used Causal Mediation Analysis on the Spirit LM model to determine whether it recalls facts from spoken language and written text via the same neural pathways.

## Projects (continued)

- **Multimodal Understanding of Sentiments and Emotions (MUSE).** Emotions and sentiment recognition in conversations using the MELD dataset, comparing baseline architectures, alternated and joint multi-modal (text + speech) training strategies, and context modeling with RNN-based models (BiLSTM).
- 2024 ■ **Graph neural network-based Representation and Analysis of Product Embeddings (GRAPE):** a Comparative Analysis of Node Classification on the AmazonCo-Purchasing Graph on different GNN Architectures (Graph Convolutional Network, Graph Attention Networks, Graph Isomorphism Network and GraphSAGE) and Baseline Models.
- **Neural Interpretable Recommender Systems (NIRS):** a recommender system model based on Neural Collaborative Filtering and the Amazon Reviews dataset, with a focus on the interpretability of recommendations using clustering and embedding analyses approaches.
- 2022 ■ **Bachelor's thesis project, "Design and implementation of a gamification module for the FirstLife platform".** In collaboration with the social computing research group, I developed a customizable gamification module to incentivize user engagement on the FirstLife platform through game-like mechanics and rewards.

## Skills

Languages	■ Italian (C2), English (C1).
Data science and AI	■ <b>Deep learning, Machine Learning Interpretability, Natural Language Processing, multimodality</b> , Data analysis and Visualization, PyTorch (torch-vision, torch-audio, torch-geometric), Scikit-learn, Graph Neural Networks, speech-language models, recommender systems, Model Evaluation (Weights & Biases), PyTorch Lightning, Computer Vision
Coding	■ Java, C, c++, Python, R, L <sup>A</sup> T <sub>E</sub> X, Haskell
Databases	■ MySQL, PostgreSQL, MongoDB, SQLite, Neo4j (Cypher), ...
Web Dev	■ HTML, CSS, SCSS, JSON, XML, PHP, JavaScript, Typescript, Apache Web Server. Web frameworks: Express, Angular, NestJS, React.
DevOps	■ GIT, Docker.
Misc.	■ Academic research, team leadership, event organization, gamification design.

## Miscellaneous Experience

### Certification

- **Machine Learning Specialization.** Awarded by DeepLearning.AI.
- 08/2025 ■ **OxML summer school, Health & Bio.** Awarded by AI for Global Goals.
- **OxML summer school, Representation Learning & Gen.AI.** Awarded by AI for Global Goals.

## **Miscellaneous Experience (continued)**

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### **Volunteering**

08/2024 - now



**Phadder leader** for Chalmers International Reception Committee (CIRC), Göteborg, Sweden.