

RISHABH VERMA

Embedded AI & Machine Learning Engineer

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in rishabh7

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📍 Freiburg, Germany

EXPERIENCE

Institute of Physiology, University of Freiburg

Wissenschaftlicher Mitarbeiter (Research Associate)

📅 2025 – present

📍 Freiburg, Germany

- Run and maintain the two-photon imaging and Neuropixels analysis pipeline: Suite2p and Cellpose for extraction and segmentation, plus deep learning methods for 3D volume registration and microglia segmentation and tracking.
- Design and build closed-loop behavioural rigs and two-photon imaging hardware: Blender VR maps, synchronised multi-camera Basler acquisition, microcontroller-based reward and stimulus control, Optotune tunable lens integration.

Institute of Physiology, University of Freiburg

Wissenschaftliche Hilfskraft (Research Assistant)

📅 Oct 2022 – 2025

📍 Freiburg, Germany

- Developed acquisition and simulation tools for imaging and electrophysiology experiments, including hardware and software for two-photon and Neuropixels experiments.

Centre For Airborne Systems, DRDO

Junior Research Fellow

📅 2019 – 2022

📍 Bengaluru, India

- Developed a single-shot CNN RADAR detector outperforming conventional techniques such as CFAR, and LSTM-based modular tracking robust to unknown clutter density and detection probability.
- Published three peer-reviewed papers on radar detection, tracking and IFF mode code detection.

EDUCATION

Albert-Ludwigs-Universität Freiburg

M.Sc. Embedded Systems Engineering, specialisation in AI

📅 2022 – 2025

📍 Freiburg, Germany

- Thesis: *3D Scene Graph Filtering using Graph Neural Networks*

Jaypee Institute Of Information Technology

B.Tech. Electronics and Communication Engineering

📅 2014 – 2018

📍 Noida, India

SKILLS

Machine Learning & Imaging: PyTorch, TensorFlow, Suite2p, Cellpose, 3D registration & segmentation

Programming & Tooling: Python, C/C++, MATLAB, Linux, Git, ROS, ARM Cortex-M, ESP32, Raspberry Pi

PROJECTS

Learned 3D Registration for Volumetric Microscopy

- Developing a 3D registration pipeline for cross-session and cross-modality alignment between two-photon and confocal volumes, using learned patch descriptors with RANSAC-based correspondence estimation.

Microglia Segmentation and Tracking in Two-Photon Microscopy

- Segmenting microglia and tracking their motility and interactions with blood vessels and neurons in *in vivo* two-photon time-series data.

Facial Kinematics as a Correlate of Behaviour and Neural Activity

- Designing a multi-stream analysis of head-fixed mouse facial video, pairing dense optical flow with landmark tracking to relate facial dynamics to reward, stimulus and neural signals.

M.Sc. Thesis — 3D Scene Graph Filtering using Graph Neural Networks [↗](#)

- Designed and trained a GNN-based filtering method for 3D scene graphs given a user query before interfacing with Large Language Models, reducing hallucinations in downstream scene reasoning.

Robot Air Hockey Challenge 2023

- Developed Model Predictive Control and Reinforcement Learning-based agent trained to play air hockey by controlling a 7DOF KUKA iiwa14 in MuJoCo based simulation game.

ACHIEVEMENTS

- DL'22 Competition: 1st Place, Tree Segmentation Challenge; 3rd Place, Large Networks Track
- Winner (Automation & Optimizations) – Voice AI Hardware Challenge (Hackster.io)

PUBLICATIONS

- T. M. Dhipu, R. Verma and R. Rajesh, "Identification Friend or Foe Mode Code Detection Using Deep Pulse Detector Network," *Journal of Aerospace Information Systems*, vol. 20, no. 1, pp. 17–24, 2023.
- R. Verma, R. Rajesh and M. S. Easwaran, "Modular Multitarget Tracking Using Long Short-Term Memory Networks," *Journal of Aerospace Information Systems*, vol. 18, no. 10, pp. 751–754, 2021.
- T. M. Dhipu, R. Verma, R. Rajesh and S. Varughese, "Single Shot Radar Target Detection and Localization using Deep Neural Network," *IEEE CONECCT*, Bangalore, India, 2022.
- R. Verma, S. J. Darak, V. Tikkiwal, H. Joshi and R. Kumar, "Countermeasures Against Jamming Attack in Sensor Networks with Timing and Power Constraints," *11th International Conference on Communication Systems & Networks (COMSNETS 2019: Poster)*, India, Jan. 2019.