Omer Yuval

I am a computational neuroscientist interested in bridging the gap between neural dynamics and animal locomotion. I have recently started a post-doctoral position after completing my PhD at the School of Computing in Leeds University. I have been working on projects involving 3D motor control of animal locomotion and navigation, computer vision, reinforcement learning, mechanical modelling, mathematical modelling of biological neural networks, microscopy, and multi-objective optimization. My interdisciplinary background and experience collaborating with groups across fields, provide me with a wide view of problems. I am keen to continue expanding my knowledge and developing my skills at the interface of neuroscience and computer science.

Education and employment

Postdoctoral researcher (April 2023 - current)

- Faculty of Life Sciences, Tel Aviv University, Israel.
- Subject: Mechanical modelling of insect control of locomotion using model-free reinforcement learning.

Research assistant in Intelligent Transport Systems (July 2022 - November 2022)

- Institute for Transport Studies, University of Leeds, UK.
- Subject: Multi-objective optimisation of vehicle speed profile for reducing emission and fuel consumption.
- Part-time.

Teaching online programming lessons for kids (April 2022 - April 2023)

- Cypher Coders, UK.
- Subject: Using javascript to develop 2D and 3D games.
- Part-time.

PhD in computational neuroscience (2017- January 2022)

- School of Computing, Faculty of Engineering, University of Leeds, UK.
- Subject: The neuromechanical mechanisms underlying the locomotion of the microswimmer *C. elegans* in 3D environments.
- University funded.

Master's degree in computational neuroscience (2014 - 2016)

- Faculty of biology, Technion, Haifa, Israel.
- Subject: Segmentation and morphological analysis of a highly-branched neuron in *C. elegans*, used to study the interconnection between neuronal structure and function.
- University funded.

Bachelor's degree in biology (2010 - 2014)

- Faculty of biology, Technion, Haifa, Israel.

Experience

- **Programming languages**: Python, Javascript (inc. React.js and Node.js), MATLAB, HTML, PHP and SQL.
- **Academic projects**: Motor control, Mechanical modelling, Reinforcement learning, Navigation, 3D Computer vision, Image segmentation, 3D Object tracking, multi-objective optimisation, Mathematical modelling of neuronal dynamics, Multi-camera calibration, Parallel computing, HPC (CPU/GPU), Linux, Windows, Graphical user-interface.
- **Teaching assistant**: Machine learning (Python), Procedural programming (C), Object-oriented programming (Java), Bioinformatics practicals (python and statistics), Experimental skills in neuroscience (Java and fiji/imageJ), Intermediate Skills for Professional and Academic Development (C++).
- **Laboratory work**: 3D imaging and calibration, Confocal microscopy, Locomotion and navigation assays, Optogenetics, Calcium-imaging.
- **Army service** in the 8200 intelligence unit in the Israel Defense Forces (2006-2010). During my service I was responsible for a group of 10 people. My responsibility included personal and professional supervision, as well as teaching.

Publications and Projects

- **The neuromechanical control of *C. elegans* head motor behaviour in 3D environments**. Manuscript in preparation.
- **Bistable head motor neurons underlie spontaneous gait selection during chiral forward locomotion.** Manuscript in preparation.
- **The neuromechanical control of *Caenorhabditis elegans* head motor behaviour in 3D environments.** PhD thesis, University of Leeds (2022).
- **Neuron tracing and quantitative analyses of dendritic architecture reveal symmetrical three-way-junctions and phenotypes of git-1 in *C. elegans***. PLOS Computational Biology (2021). DOI: 10.1371/journal.pcbi.1009185**.**
- **Inhibition underlies fast undulatory locomotion in *C. elegans***. *eNeuro* (2020). DOI: 10.1523/ENEURO.0241-20.2020.
- **Markerless 3D spatio-temporal reconstruction of microscopic swimmers from video**. 25th International Conference on Pattern Recognition (ICPR 2020), 10-15 Jan 2021, Milan, Italy. IEEE. (In Press).
- **Semantic representation and matching of LaTeX expressions**. Manuscript in preparation. Demo: https://omer1yuval1.github.io/LaTeXs/.

Conferences and demonstrations

- Talk at the **27th International Congress of Entomology** (ICE2024 Kyoto, August 2024).
- Poster presentation at the **European Worm Meeting** (2020 and 2022).
- Poster presentation at the **UK Worm Meeting** (2018, Leeds University and 2019, Imperial College London).
- Poster presentation at the **International Worm Meeting** (2015 and 2019, UCLA).
- Poster presentation at the **UK Computational Worm Meeting** (2018, The Royal Society, London).
- Conference presentation at the **annual Biology faculty retreat** (2014, Israel).
- Laboratory demonstrations for master's students in biology (2018-2019).
- Organisation of a stall for an **outreach event** (Leeds city museum, 2019).
- Participation in a **fire-fighting robot contest** (2006 and 2007, Israel).