EVRIPIDIS GKANIAS

Research Scientist in Computational Neuroethology

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WORK EXPERIENCE

Research Associate in Comp. & Neuromorphic Modelling

University of Edinburgh & University of Groningen

June 2022 – present | United Kingdom & Netherlands

Advisors: **Prof. Barbara Webb** & **Prof. Elisabetta Chicca**

Explore the effectiveness of different forms of working memory constrained by the biology and nanotechnology hardware

Build an anatomically-accurate polarised light compass circuit

Research Associate in Computational Modelling

University of Sheffield & University of Edinburgh

Mar 2017 – Aug 2018 | United Kingdom

Advisors: **Dr Michael Mangan** & **Prof. Barbara Webb**

Investigate the celestial properties in context of animal navigation

Design a novel anatomically-constrained celestial compass

Research Assistant in Bio-robotics

University of Edinburgh

Sep 2016 – Feb 2017 | United Kingdom

Advisor: **Prof. Barbara Webb**

Study the learning mechanism of *Drosophila* larva

Build a robot that tries to find the gustatory source following the gradients of the associated odour

Research Assistant in Machine Learning

Centre for Research and Technology - Hellas (CERTH)

June 2014 – Aug 2015 | Greece

Advisor: **Dr Petros Daras**

Real-time evaluation of athletes' technique from gestures captured using multiple Microsoft Kinects and WIMUs or the Vicon system

Integrate into a video game using C# and Unity3D

SELECTED PUBLICATIONS

Gkanias, E., Mitchell, R., Stankiewicz, J., Khan, S. R., Mitra, S., & Webb, B. 2023. *Celestial compass sensor mimics the insect eye for navigation under cloudy and occluded skies*. Commun Eng 2, 82.

Gkanias, E., McCurdy, L. Y., Nitabach, M. N. & Webb, B. 2022. *An incentive circuit for memory dynamics in the mushroom body of Drosophila melanogaster*. eLife 11, e75611.

Schwarz, S., Clement, L., **Gkanias, E.** & Wystrach, A. 2020. *How do backward-walking ants (Cataglyphis velox) cope with navigational uncertainty?* Anim Behav 164, 133–142.

Gkanias, E., Risse, B., Mangan, M. & Webb, B. 2019. *From skylight input to behavioural output: a computational model of the insect polarised light compass*. PLoS Comput Biol 15, e1007123.

EDUCATION

PhD in Bio-inspired Robotics & Autonomous Systems

University of Edinburgh

Mar 2023 | United Kingdom

Insect neuroethology of reinforcement learning

Supervisor: **Prof. Barbara Webb**

MSc in Artificial Intelligence

University of Edinburgh

Aug 2016 | United Kingdom

with **Distinction**

Data-driven adaptation of the evasion behaviour in fiddler crabs

Supervisor: **Prof. Barbara Webb**

BSc (Hons) in Computer Science

Aristotle University of Thessaloniki

Jul 2013 | Greece

Grade: **first-class**

Deep learning algorithms for multi-label data

Supervisor: **Prof. Grigorios Tsoumakas**

FUNDING & AWARDS

Percy Sladen Memorial Fund Grant

The Linnean Society of London

Jun 2019 | Seville, Spain

Fieldwork experiments on desert ants

Test for vector-sequence memories during path integration

Robotics and Autonomous Systems - Centre for Doctoral Training Grant

Engineering and Physical Sciences Research Council (EPSRC)

Sep 2018 | Edinburgh, UK

Awarded to the top 10 applicants

UK/EU Master's Scholarship

University of Edinburgh

Sep 2015 | Edinburgh, UK

Awarded to the top 100 UoE entries

SELECTED ORAL PRESENTATIONS

- *Multimodal skylight information improves the estimation of the celestial compass: insights from a hardware implementation*. At the International Conference on Invertebrate Vision. August 2023. Bäckaskog Slott, Sweden
- *Memory dynamics in Drosophila's mushroom body: a computational view*. At the Neural Circuits and Behaviour of Drosophila. June 2023. Orthodox Academy of Crete, Greece
- *How flies acquire, forget and assimilate memories: a computational perspective*. At the Mushroom body meeting. June 2021. Online
- *From skylight input to behavioural output: a computational model of the insect polarised light compass*. At the International Navigation Conference. October 2019. Edinburgh International Conference Centre, United Kingdom
- *Predator evasion by a Robocrab*. The Living Machines. July 2017. Stanford University, CA, USA

SELECTED POSTER PRESENTATIONS

- *How the fan-shaped body can integrate differential familiarity for route following in desert ants*. At the conference on Structure and function of the insect central complex. October 2022. Janelia Research Campus, VA, USA
- *How could the mushroom body and central complex combine for visual homing in insects*. At International Congress of Neuroethology. July 2022. Lisbon, Portugal
- *An anatomically accurate circuit for short- and long-term motivational learning in fruit flies*. At the Cosyne Conference. March 2022. Lisbon, Portugal
- *The incentive circuit of the fruit fly brain: a computational perspective*. At the Bernstein Conference. September 2021. Online
- *Robustness of a model of the insects' celestial compass in realistic conditions*. At the International Conference on Invertebrate Vision. August 2019. Bäckaskog Slott, Sweden
- *Imitating the Drosophila larval learning behaviour on a robot*. At the Maggot Meeting. October 2018. University of Edinburgh, United Kingdom

SELECTED TRAINING

Workshop on Insect Bio-inspired Technologies

Royal Society of Edinburgh

17-18 Nov 2022 — Edinburgh, United Kingdom

ASAB Winter 2022: Animal Movement

Society for the study of Animal Behaviour

6-7 Dec 2022 — Edinburgh, United Kingdom

CapoCaccia: Neuromorphic Engineering Workshop

University of Zurich, ETH Zurich and the iniForum

Apr 2018 – May 2018 — Sardinia, Italy

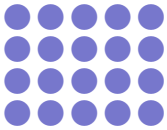
- Work on the neuromorphic SLAM project using Brian2
- Attach a DYNAPs neuromorphic chip on a robot and programme it to learn a map using a bumper sensor

RESEARCH INTERESTS

- Biologically plausible mechanisms of **learning** and **memory** that allow interpretive **behaviour** in artificial agent
- **Computational intelligence** that allows artificial agents to **navigate** in the challenging real-world
- Processing **perception** in order to **maximise information** and create **hierarchical representations**

STRENGTHS

Bio-accurate AI
Computational Modelling
Information Theory
Python



Probabilistic Machine Learning
Reinforcement Learning | Robotics
Computer Vision | OpenCV | C{#, ++}

TEACHING POSTS

Supervision of BSc & MSc projects

University of Edinburgh

Sep 2016 - present — United Kingdom

- **Jiewen Deng** (BSc - 2021, MInf - 2022): "*Building a hexapod robot platform to test a vision-based insect navigation algorithm*" — co-supervised
- **Xuechun Qiao** (MSc - 2020): "*Building a hexapod robot simulation to test vision-based insect navigation algorithms*" — co-supervised
- **Yijie Chen** (MSc - 2020): "*Classifying individual ants from raw video data*"
- **Komal Afzal** (MSc - 2019): "*Mimicking visual motion processing model of escape behaviour of a fiddle crab*" — co-supervised

Tutor, Demonstrator & Marker

University of Edinburgh

Sep 2018 - 2022 — United Kingdom

- Introductory Applied Machine Learning
- Reinforcement Learning

QA & Computer Vision Expert

University of Edinburgh

Jan - Apr 2020 — United Kingdom

- Systems Design Project