EVRIPIDIS GKANIAS

PhD student in Bio-inspired Robotics & Autonomous Systems

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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

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Research Associate in Computational Modelling

University of Edinburgh & University of Sheffield

📅 Mar 2017 – Aug 2018   📍 United Kingdom

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

⚙ 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

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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

PUBLICATIONS

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

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

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

📄 Stouraitis, T., **Gkanias, E.**, Hemmi, J. M. & Webb, B. *Predator Evasion by a Robocrab.* in 6th International Conference on Biomimetic and Biohybrid Systems (eds. Mangan, M. et al.) vol. 10384 428–439 (Springer, 2017)

EDUCATION

PhD in Bio-inspired Robotics & Autonomous Systems

University of Edinburgh

📅 Aug 2022 (exp)   📍 United Kingdom

📖 **Insect neuroethology of reinf. learning**

👤 Supervisor: **Prof. Barbara Webb**

🏆 Robotics and Autonomous Systems CDT

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**

🏆 EU/UK Masters Scholarship

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

ORAL PRESENTATIONS

- *How flies acquire, forget and assimilate memories: a computational perspective*. At the Mushroom body meeting. Jun 2021. Online

- *From skylight input to behavioural output: a computational model of the insect polarised light compass*. At the International Navigation Conference. Oct 2019. Edinburgh International Conference Centre, United Kingdom

- *Predator evasion by a Robocrab*. The Living Machines. July 2017. Stanford University, CA, USA

POSTER PRESENTATIONS

- *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

CONTINUOUS TRAINING

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

UNIVERSITY THESES

Insect Neuroethology of Reinforcement Learning
Thesis — Doctor of Philosophy

- 📅 Sep 2018 - Aug 2022 (expected)   📍 University of Edinburgh

We are looking for the underlying mechanism that allows reinforcement learning in insects. Based on findings on the function of dopamine in the fruit fly brain, we develop a novel plasticity rule that allows for a variety of memory dynamics, e.g., short- or long-lasting memories, depending on the circuitry. We identify an anatomically accurate circuit in the fruit fly brain for self-motivation, that explains a big volume of neural and behavioural data in olfactory conditioning. We challenge our plasticity rule using reinforcement learning benchmarks, and also use it for visual place recognition in natural environments.

Robocrab: data-driven adaptation of the evasion behaviour in fiddler crabs
Dissertation — Master of Science

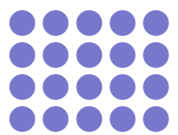- 📅 Jun 2016 - Aug 2016   📍 University of Edinburgh

We create a semi-supervised structure of neural network, inspired by the physiology of neurons in fiddler crabs, and train it to adapt the evasion behaviour of fiddler crabs on potential predators, solving a complicated visuomotor problem (developed in Python using the Theano/Tensorflow-based 'keras' library)

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