EVRIPIDIS GKANIAS

PhD student in Bio-inspired Robotics & Autonomous Systems

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WORK EXPERIENCE

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

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

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

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 (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

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 recent findings on how dopamine affects the synaptic weights in the fruit fly brain, we develop a novel plasticity rule that allows for the observed memory dynamics, e.g., primitive, flexible or long-lasting memories, depending on the circuitry. We identify an anatomically accurate self-motivated circuit in the fruit fly brain, that can explain a big volume of neural and behavioural data in olfactory conditioning. We now test the found plasticity rule for different benchmarks in reinforcement learning, with the ambition to apply it for autonomous navigation 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)

Deep learning algorithms for multi-label data

Honours Thesis — Bachelor of Science

📅 Oct 2012 - Jul 2013 📍 Aristotle University of Thessaloniki

We extended a Java library implementing Restricted Boltzmann Machines and Deep Belief Networks and we used it to examine how they perform in a variety of multi-label data-sets.

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

Research
Bio-accurate AI
Computational Modelling
Probab. Machine Learning
Information Theory
Computer Vision
Python
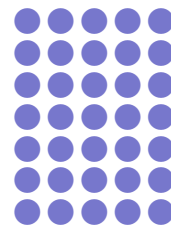
Reinforcement Learning | Robotics
OpenCV | C{#, ++}

TEACHING POSTS

Tutor, Demonstrator & Marker

University of Edinburgh

📅 Sep 2018 - 2022 📍 United Kingdom

📈 Introductory Applied Machine Learning

QA & Computer Vision Expert

University of Edinburgh

📅 Jan - Apr 2020 📍 United Kingdom

🔧 Systems Design Project

Tutor

University of Edinburgh

📅 Jan - Apr 2019 📍 United Kingdom

🤖 Reinforcement Learning

ACTIVITIES

Hacker

Junction Hackathon

📅 Nov 2016 📍 Helsinki, Finland

</> Winners: "Artificial Intelligence Driven Bots" challenge (Microsoft & Skype)