

# EVRIPIDIS GKANIAS

## Research Scientist in Computational Neuroethology

✉ ev.gkaniias@ed.ac.uk

🌐 evgkaniias

🌐 uk.linkedin.com/in/evgkaniias

📍 University of Edinburgh, UK

## 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 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

## PUBLICATIONS

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

📄 **Gkaniias, 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., **Gkaniias, 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

📅 Mar 2023

📍 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

- 📄 *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

## 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

## DOCTORAL THESIS

### Insect Neuroethology of Reinforcement Learning

Thesis – Doctor of Philosophy

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

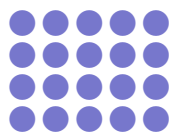
We are looking for the underlying mechanism that allows reinforcement learning in insects. Based on findings on the function of dopamine in the fruit fly brain, we develop a novel plasticity rule that allows for a variety of memory dynamics, e.g., short- or long-lasting memories, depending on the circuitry. 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.

## 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