Fuda van Diggelen

PhD candidate,

Artificial Intelligence: Evolutionary Robotics

- 17-09-1993
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- Netherlands

Online Presence

- Personal website
- Google Scholar profile
- LinkedIn profile
- Github
- YouTube

Languages

- Dutch ● ● ● ● ●
- English ● ● ● ● ●
- Python ● ● ● ● ●
- C++ ● ● ● ● ○
- MATLAB ● ● ● ● ○

Hard Skills

- Mathematics, ML/Control Theory
- Robotics, Gazebo, ROS, openCV
- Machine Learning, Deep learning, Online-learning, Self-modelling
- Data analysis, Statistical modeling

Soft Skills

- Creative Thinking
- Communication
- Writing
- Problem Solving

About Me

As a third-year PhD candidate in evolutionary robotics, I have developed a deep interest in the fields of embodied intelligence, complex systems, and control theory. With dual masters in Human Movement Science and Mechanical Engineering, I bring a unique perspective to problem-solving, combining techniques from different fields to tackle challenging projects. My research focuses on exploring the integration of bio-inspired mechanisms in robotics and utilizing machine learning techniques for data-driven control of complex adaptive systems. I am a hands-on researcher who approaches projects with a thorough analytical approach while keeping the bigger picture in mind. Overall, I am a versatile and innovative researcher who is passionate about solving complex problems and exploring new ideas in the field of robotics.

Working Experience

2020 – Now   **PhD Candidate**   VU Amsterdam, *Computer Sciences*
Artificial Intelligence: Evolutionary Robotics

2022 – 2022   **Visiting Researcher**   Technology Innovation Institute
Autonomous drone swarm experiments using CrazieFly platform

2019 – 2020   **Research Internship**   VU Amsterdam, *Computer Sciences*
Conducting evolutionary robotics research for my master thesis.

2018 – 2018   **Teacher Assistant**   VU Amsterdam, *Behavioural and Movement Sciences*
Teaching during practicals in the course Physics and Measurements.

2014 – 2019   **Tutoring**   Bijlesnetwerk/Lyceo
High school students in mathematics, physics and biology.

Education

2018 – 2020   **MSc. & ME. Mechanical Engineering, *Biorobotics***   TU Delft
Focus: Analysis and application of bio-inspired design for robotic systems.

Master Thesis ($\varnothing 8.5$)
Title: *Adaptive Control for Evolutionary Robotics.*
Continuous learning for adaptive feedback control in evolvable robots using neural networks.

2017 – 2020   **MSc. Human Movement Science: Research** cum laude   VU Amsterdam
Focus: Integrating fundamental scientific research with relevant questions from clinical and sports practice.

Master Thesis ($\varnothing 8.5$)
Title: *The Role of Proprioceptive Feedback in Learning Locomotion.*
Testing the Internal Model Control hypothesis in bio-inspired robots that learn locomotion.

2014 – 2017   **BSc. Bewegingswetenschappen**   VU Amsterdam
Focus: Bio-physics on human movement and control.

Scientific Outreach

- **Youtube:** A video repository on past projects and an (un)published work [link].

- **Rijksmuseum Boerhaave, *brAInpower*:** PhD work was featured in a science museum exhibition [link].

- **De kennis van nu special, *de robot evolutie*:** PhD work was covered on Dutch national television [link].

- **Joint Lectures on Evolutionary Algorithms (JoLEA):** Presented in a lecture series on evolutionary algorithm [link].

Besides Work

Relaxing	Sports, reading books and meeting with friends.
Sports	Climbing/bouldering, football, and running.
Music	Writing songs, playing the guitar and going to festivals.
Gardening	Growing a vegetable garden.

Other Activities, Projects & Achievements

- **Extracurricular Courses/Summerschools**:

2023	Machine Learning Theory,	*UVA*
2022	IEEE RAS on Multi Robot Systems (MRS),	*CTU*
2021	Evolutionary Computing,	*VU*
2021	Deep Learning,	*VU*
2020	Data Mining Techniques,	*VU*
2020	Learning Machines,	*VU*

- **Nominated for best Master thesis award:** at Vrije Universiteit Amsterdam for my work *The Role of Proprioceptive Feedback in Learning*.

- **3rd Place in MRS competition:** IEEE RAS on Multi Robot Systems (MRS), summer school competition on multi-robot collaboration using drones.

- **Research Visit:** Developing Computer Vision based Model-Predictive control in racing drones (at ICRA) and swarm robotics experiments, at Technology Innovation Institute (TII) Abu Dhabi.

- **Master Programme Committee:** Representing students' interest and advising programme board to improve education.

- **Volunteering during COVID-19:** Helped build the *Dutch ICU Data Sharing* SQL pipeline, and developed reinforcement- and supervised- learning models to improve hospital policies.

- **Rotterdam marathon:** Completed the Rotterdam marathon in 3:24:55.

References

***prof. dr.* Guszti Eiben**
VU Amsterdam, Computer Science `a.e.eiben@vu.nl`
Relationship: Guszti Eiben is head of the Computational Intelligence group at the Vrije Universiteit Amsterdam, and my main supervisor during my PhD.

***dr. ir.* Eliseo Ferrante**
Technology Innovation Institute & VU Amsterdam, Computer Science `e.ferrante@vu.nl`
Relationship: Eliseo Ferrante is a senior director at the Technology Innovation Institute (TII), assistant professor at the Vrije Universiteit Amsterdam, and my daily supervisor during my PhD.

Publications

2023 **A model-free method to learn multiple skills in modular robots**
F. van Diggelen, N.P.A Cambier, E. Ferrante, A.E. Eiben
UNDER REVIEW https://fudavd.github.io/multi-skill-learning/

2023 **Comparing robot controller optimization methods on evolvable morphologies**
F. van Diggelen, E. Ferrante, A.E. Eiben
Evolutionary Computation. pp. 1-19
doi: 10.1162/evco_a_00334

2022 **Predicting responders to prone positioning in mechanically ventilated patients with COVID-19 using machine learning**
T.A. Dam, L.F. Roggeveen, F. van Diggelen, et al.
Annals Intensive Care 12(1). pp 1-9
doi: 10.1186/s13613-022-01070-0

2022 **Environment induced emergence of collective behaviour in evolving swarms with limited sensing**
F. van Diggelen, T. Karagüzel, J. Lo, E. Ferrante, N. Cambier, A.E. Eiben
In Proceedings of the Genetic and Evolutionary Computation Conference. pp. 31-39
doi: 10.1145/3512290.3528735

2021 **The Influence of Robot Traits and Evolutionary Dynamics on the Reality Gap**
F. van Diggelen, E. Ferrante, N. Harrak, J. Lo, D. Zeeuwe, A.E. Eiben
IEEE Transactions on Cognitive and Developmental Systems
doi: 10.1109/TCDS.2021.3112236

2021 **Large-scale ICU data sharing for global collaboration: the first 1633 critically ill COVID-19 patients in the Dutch Data Warehouse**
L.M. Fleuren, M. Tonutti, D.P de Bruin, et al.
Intensive care medicine 47(4). pp. 478–481
doi: 10.1007/s00134-021-06361-x

2021 **Comparing lifetime learning methods for morphologically evolving robots**
F. van Diggelen, E. Ferrante, A.E. Eiben
In Proceedings of the Genetic and Evolutionary Computation Conference Companion pp. 93-94
doi: 10.1145/3449726.3459530

2021 **Risk factors for adverse outcomes during mechanical ventilation of 1152 COVID-19 patients: a multicenter machine learning study with highly granular data from the Dutch Data Warehouse**
L.M. Fleuren, M. Tonutti, D.P de Bruin, et al.
Intensive care medicine experimental, 9(1). pp. 32
doi: 10.1186/s40635-021-00397-5

2021 **Learning Directed Locomotion in Modular Robots with Evolvable Morphologies**
G. Lan, M. De Carlo, F. van Diggelen, J. M. Tomczak, D. M. Roijers, and A.E. Eiben
Applied Soft Computing, 111. pp. 107688
doi: 10.1016/j.asoc.2021.107688

2020 **The Effects of Adaptive Control on Learning Directed Locomotion**
F. van Diggelen, R. Babuska, and A.E. Eiben
IEEE Symposium Series on Computational Intelligence (SSCI). pp. 2117-2124
doi: 10.1109/SSCI47803.2020.9308557