

# Lukas Schäfer

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## SKILLS

### Programming

Competent  
Python • C++ • SML  
Familiar  
C • Java • Rust • HTML • CSS • Matlab • Bash

### Technologies and Tools

TensorFlow • Keras • NumPy • UNIX • Git • Vim

### Languages

Native in German • Fluent in English • advanced in French • beginner in Japanese

## EDUCATION

### M.Sc. Informatics

University of Edinburgh

09/2018 – Present

Edinburgh, United Kingdom

- Expected graduation in August 2019
- Specialisation in Machine Learning and Reinforcement Learning
- DAAD (German Academic Exchange Service) graduate scholarship
- Modules include: Reinforcement Learning, Algorithmic Game Theory and its Applications, Machine Learning and Pattern Recognition, Probabilistic Modelling and Reasoning, Decision Making in Robots and Autonomous Agents

### B.Sc. Computer Science, minor subject Japanese

Saarland University

10/2015 – 08/2018

Saarbrücken, Germany

- Degree classification: grade of 1.2 (German scale) equivalent to UK 1<sup>st</sup> class honours
- BSc thesis: Domain-Dependent Policy Learning using Neural Networks in Classical Planning
- Modules include: Automated Planning, Admissible Search Enhancements, Neural Networks: Implementation and Application, Information Retrieval and Data Mining, Software Engineering, Modern Imperative Programming Languages

### Abitur - Secondary School

Warndtgymnasium Geislautern, Völklingen

08/2008 – 07/2015

Geislautern, Germany

- Graduated Abitur 1.0 with examination subjects:  
Mathematics - 15, English - 12, Computer Science - 14, German - 15, History - 15
- Prizes received:
  - Year's best student award of the Warndtgymnasiums Geislautern
  - Computer science and mathematics award 2015 of Saarland University

## PROJECT EXPERIENCE

### Autonomous Robot Localisation, University of Edinburgh

Group Project for Robotics: Science and Systems Lecture

09/2018 – 12/2018

- Constructed a four-wheel differential steering mobile robot as group of three for autonomous localisation in a known environment using LEGO aside of technical components including a Raspberry Pi computer
- Implemented particle-filter localisation and obstacle avoidance based on IR and sonar sensors
- Robot successfully managed to navigate through the constructed arena, detect and communicate points of interest using light sensors and return back to its deployment location

### Galaxy-based Search, University of Edinburgh

Group Project for Natural Computing Lecture

09/2018 – 12/2018

- Implemented the Galaxy-based Search Algorithm (GbSA) and Particle Swarm Optimisation (PSO) baseline for PCA approximation as metaheuristic optimisation algorithms
- Evaluated and analysed GbSA and its foundational research paper, outlined limitations, proposed adjustments to the algorithm and showed their positive impact on performance in an evaluation

## Plagiarism Detection Tool, Saarland University

04/2017 – 07/2017

Group Project for Software Engineering Lecture

- Researched, planned and built a reliable similarity detection for text & code in Python with language-specific analysis for Python and C as a group of five
- Designed and implemented a web-based output creation, highlighting similar submissions and plagiarism
- Our software is now successfully used in our customer's lectures to detect plagiarism cases on Python code

## Concurrent CDCL SAT-Solver, Saarland University

07/2017 – 09/2017

Group Project for Modern Imperative Programming Languages Seminar

- Planned and implemented a concurrent Conflict-Driven Clause Learning SAT-Solver using Rust
- Optimised literal assignment using multiple heuristic strategies, pure variable detection and handling

## RESEARCH

### Reinforcement Learning for Video Game Playing, University of Edinburgh

09/2018 – 01/2019

Informatics Research Review

- Reviewed the development of reinforcement learning research for game playing and the challenge from board games Backgammon, Chess and Go to video games focusing on Atari and StarCraft
- Outlined the development of common reinforcement learning approaches and highlighted the challenge of multi-agent tasks, particular in partially-observable environments and proposed recent, promising ideas

### B.Sc. Dissertation, Saarland University

04/2018 – 07/2018

Foundations of Artificial Intelligence (FAI) Group

- Transferred policy-learning neural network architecture of Action-Schema Networks to classical automated planning
- Implemented the network using Keras, adjusted its training for classical planning and extended the FastDownward planning framework with policy capabilities
- Extensive evaluation and analysis was conducted on IPC domains of varying complexity identifying limitations in generalisation, scalability and training stability
- Received grade 1.0 from both reviewers Prof. Dr. Jörg Hoffmann and Dr. Mario Fritz

## TEACHING EXPERIENCE

### Voluntary Lecturer and Coach, Saarland University

09/2017 – 10/2017

Mathematics Preparation Course

- Assisted the organization of the mathematics preparation course for upcoming computer science students
- Explained importance of mathematics for CS, formal languages and predicate logic to  $\sim 250$  participants in daily lectures of the first week
- Supervised two groups to provide feedback and further assistance in daily coaching-sessions
- The course received BESTE-award for special student commitment 2017 of Saarland University

### Programming 1 Teaching Assistant, Saarland University

10/2016 – 03/2017

Dependable Systems and Software Group

- Taught first-year students fundamental concepts of functional programming, basic complexity theory and inductive correctness proofs in weekly tutorials and office hours
- Marked weekly tests as well as mid- and endterm exams
- Collectively created learning materials and discussed student progress as part of the whole teaching team

## VOLUNTEERING

### Navigation Team Member, University of Edinburgh

09/2018 – Present

HYPED – University of Edinburgh Hyperloop Society

- Working on navigation of Poddy III Hyperloop prototype including sensor filtering and processing to estimate location, orientation and speed of the pod
- Preliminary Design Briefing of Poddy III was approved by SpaceX for their 2019 Hyperloop competition

### School Year Representative, Warndtgymnasium

08/2013 – 07/2015

- Elected committee member representing school year; involved in organisation of school events and sponsor negotiations