

# Alperen Tercan

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## EDUCATION

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### Colorado State University

Fort Collins, CO

*Master of Science in Computer Science - 4.00/4.00*

*Aug. 2019 – Sep. 2022*

- Co-Advisors: Prof. Vinayak Prabhu and Prof. Charles Anderson
- Thesis: Solving MDPs with Thresholded Lexicographic Ordering Using Reinforcement Learning

### Bilkent University

Ankara, Turkey

*Bachelor of Science in Electrical and Electronics Engineering - 3.84/4.00*

*Aug. 2015 – May 2019*

### University of Oklahoma

Norman, OK

*Exchange Student in Electrical and Computer Engineering - 4.00/4.00*

*Jan. 2018 – May 2018*

## RESEARCH ROLES

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### Research Intern

06/2021 – Present

*Max Planck Institute for Software Systems*

*Saarbrücken, Germany*

- Research on task decomposition for block-based visual programming tasks and using large language models for programming
- Advisor: Dr. Adish Singla

### Graduate Research Assistant

08/2020 – 05/2021

*Colorado State University*

*Fort Collins, CO*

- Research on multi-objective RL and using formal languages for reward specifications.
- Advisor: Prof. Vinayak Prabhu

## TEACHING ROLES

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### Graduate Teaching Assistant

08/2019 – 05/2020 & 01/2022 – 05/2022

*Colorado State University*

*Fort Collins, CO*

- Taught recitations for sophomore level Discrete Mathematics course in Computer Science Department
- Graded exams and assignments

## PUBLICATIONS

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**A. Tercan** and C. W. Anderson, "Increased Reinforcement Learning Performance through Transfer of Representation Learned by State Prediction Model" 2021 International Joint Conference on Neural Networks (IJCNN), 2021, pp. 1-8

## UNDER REVIEW

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**A. Tercan** and V. Prabhu. "Thresholded Lexicographic Ordered Multi-Objective Reinforcement Learning" | ICLR'23

**A. Tercan**, A. Ghosh, H. F. Eniser, M. Christakis, and A. Singla. "Synthesizing a Progression of Subtasks for Block-Based Visual Programming Tasks" | TMLR

## AWARDS

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- **Scholarship of the Turkish Prime Ministry(2015-2019):** Awarded monthly stipend during the BSc program (given to those who rank in first 100 among 1.8 million students in nationwide university entrance exam)
- **Bilkent University Comprehensive Scholarship(2015-2019):** Full tuition waiver & stipend during the BSc program
- **Nationwide University Entrance Exam (2015):** Ranked 25<sup>th</sup> among 1.8 million students in Turkey
- **Akdeniz University Mathematical Olympiad Silver Medal(2012)**

## ENGINEERING ROLES

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### Engineering Intern

06/2018 – 09/2018

*Fraunhofer IIS*

*Nuremberg, Germany*

- Implementation of Record and Replay functionalities of GOOSE receiver
- VHDL design of the components on FPGA
- Python programming on ARM processor for request processing
- C programming for FX3 USB3.0 interfacer

### Summer Intern

06/2017 – 07/2017

*Karel Electronics*

*Ankara, Turkey*

- Embedded C Programming on 8051 microcontrollers for the interface of a communication product. It takes input from the user through serial port and adjusts components. SPI and I2C protocols are used.
- Tested the product software above and revised it according to client feedback.

## PROJECTS

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### Distributed Generative Adversarial Networks | *PyTorch, Horovod*

2022

- Distributed training of a generative model that can create artificial paintings.

### User Study Platform for Block Based Programming | *JavaScript, Django*

2021

- Created a website to be used in the user studies for our paper.

### Stateful Next Generation Access Control for Fire Response Control | *Alloy*

2021

- Augmented NGAC framework with multi-level rule hierarchy and stateful policies.
- Showed how Alloy can be used to analyze an NGAC policy with an environment model.

### Software Optimizations for Reinforcement Learning | *Tensorflow*

2020

- Investigated effects of weight clustering in RL

### Reinforcement Learning for Combinatorial Optimization over Graphs

2020

- Surveyed several papers in this field with a focus on possible future research directions

### Implementation of Ranking-Critical Training for Collaborative Filtering | *PyTorch*

2020

- A personal project to better understand the use of RL for recommender systems.

### Policy Gradient Methods and Hierarchical RL for Robotic Control Tasks | *PyTorch*

2019

- Implemented DDPG, HER, Option-Critic, Modulated Policy Hierarchies
- Experimented on Mujoco Environments to test benefits of Hierarchical Reinforcement Learning.

### Detection and Jamming of Wide Band FHSS Radio Signals | *MATLAB, C, Bash*

2019

- Works on a Zynq-7000 board and controlled via a computer GUI
- Quickly detects active bands in FHSS communication and generates the signal to jam it.

### Image Reconstruction in cr-MREPT via Iterative Methods | *MATLAB*

2018

- Implemented genetic algorithms and gradient descent for matrix optimization in MREPT domain
- Investigated benefits of iterative methods in reconstructing Low Convection Field(LCF) regions

### Playing Tetris using Evolutionary Algorithms and Reinforcement Learning | *Python*

2018

- Implemented Q-learning and a genetic algorithm agents that learn to play Tetris.

### Race Bias in NY Mortgage Decision Data by Feature Importance Analysis | *Tensorflow*

2018

- Fitted several models to the mortgage decision data to model decision process.
- Used permutation feature importance to measure importance of various applicant data in Mortgage decisions and tested if race was a significant factor in the decisions.

### Empirical Study on CAPM with Traditional and Machine Learning Methods | *MATLAB*

2018

- Tested performance of CAPM on stock prices with covariance-based, regression-based, and reported betas.

### Maze Solving Robot using 8051 Microcontroller | *Assembly*

2017

- Robot uses proximity sensors to perform a tree search in a maze
- Keeps track of the movements via Hall sensors and draws the explored maze on a LCD screen

### Tic-Tac-Toe Game with Rule Based Bot | *VHDL*

2016

- A Tic-Tac-Toe game with VGA that runs on BASYS3 board.
- Rule-based bots with three different difficult levels.