

Niklas Lauffer

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Education

University of California, Berkeley

Berkeley, CA

PH.D. IN COMPUTER SCIENCE (ARTIFICIAL INTELLIGENCE)

Fall 2021 - Present

- Researching how to develop autonomous learning and decision making systems that are provably safe.
- Co-advised by Stuart Russell and Sanjit Seshia. Member of the Berkeley Artificial Intelligence Research (BAIR) lab.

University of Texas at Austin

Austin, TX

B.S. COMPUTER SCIENCE HONORS AND B.S. MATHEMATICS - 3.96/4.0 GPA

May 2021

- Dean's Honored Graduate - the highest honor awarded to 1% of graduating students in the College of Natural Science.
- Thesis: "Online learning in Dynamic Stackelberg Games", supervised by Ufuk Topcu.
- Member of the Turing Scholars (CS) and Dean's Scholars (Math) honors programs.

Experience

NASA Ames Research Center

Mountain View, CA

RESEARCH INTERN

May 2020 - August 2020

- Research at NASA Ames Research Center in the Automated Planning and Scheduling group, part of the Autonomous Systems and Robotics area.
- Formulated the theory behind dynamic rescheduling policies for Expected Value Probabilistic Simple Temporal Networks (EvPSTNs).
- Implemented dynamic rescheduling simulations for EvPSTNs to evaluate the effectiveness of different rescheduling policies.
- Developed a method for exactly solving the Dynamic Controllability problem for EvPSTNs using factored Markov Decision Processes.

RESEARCH INTERN

May 2019 - August 2019

- Formulated the theory behind and wrote an efficient mixed integer linear program for calculating the greatest expected value schedule of a Probabilistic Simple Temporal Network. Implementation was done in Python using the Gurobi solver.
- Helped develop planning algorithms for quantum circuit compilation.

Autonomous Systems Research Group

University of Texas at Austin

UNDERGRADUATE RESEARCHER

Fall 2017 - Spring 2021

- A member of Ufuk Topcu's research group in the Institute for Computational Engineering and Science.
- Developed the first no-regret algorithm for learning in dynamic Stackelberg games.
- Led a NASA funded project to develop automated methods for scheduling aboard the International Space Station. Used the Z3 Satisfiable Modulo Theory solver to implement deterministic and dynamic scheduling strategies and techniques.
- Developed methods for verifying the correctness of policies for Partially Observable Markov Decision Processes that make use of a neural network classifier in-the-loop.

Publications

- [N. Lauffer](#), M. Ghasemi, A. Hashemi, Y. Savas, and U. Topcu. No-regret Learning in Dynamic Stackelberg Games. (Under review at TAC).
- [N. Lauffer](#), W. Lassiter, and J. Frank. On Expected Value Strong Controllability. (Under review at JAIR).
- [N. Lauffer](#), B. Yalcinkaya, M. Vazquez-Chanlatte, A. Shah, S. Seshia. Learning Deterministic Finite Automata Decompositions from Examples and Demonstrations. 2022 FMCAD.
- C. Neary, M. Cubuktepe, [N. Lauffer](#), X. Jin, A. Phillips, Z. Xu, D. Tong, U. Topcu. Multiscale Heterogeneous Optimal Lockdown Control for COVID-19 Using Geographic Information. 2022 Scientific Reports.
- D. Raju, [N. Lauffer](#), U. Topcu. Reachability games for optimal multi-agent scheduling of tasks with variable durations. 2020 COCOA.
- H. Poonawala, [N. Lauffer](#), and U. Topcu. Training classifiers for feedback control with safety in mind. 2021 Automatica.
- [N. Lauffer](#), and U. Topcu. Human-understandable explanations of infeasibility for resource-constrained scheduling problems. 2019 ICAPS XAIP.
- H. Poonawala, [N. Lauffer](#), and U. Topcu. Training classifiers for feedback control. 2019 IEEE ACC.
- M. Ornik, J. Fu, [N. Lauffer](#), K. W. Perera, M. Alshiekh, M. Ono, and U. Topcu. Expedited learning in mdps with side information. 2018 IEEE CDC.
- I. Papusha, U. Topcu, S. Carr, and [N. Lauffer](#). Affine multiplexing networks: System analysis, learning, and computation. arXiv 2018.

Projects and Authored Software

Expected Value Strong Controllability Toolbox

(not public yet)

Python toolbox for optimizing the expected value of schedules for Probabilistic Simple Temporal Networks

AMNET

(<https://github.com/ipapusha/amnet>)

Python toolbox for affine multiplexing networks

Quadcopter Flight Software

(<https://github.com/AGNC-Lab/Quad>)

Software and controller written in C and C++

Awards and Honors

- University of Texas Dean's Honored Graduate - the highest honor awarded to 1% of graduating students in the College of Natural Science.
- National Science Foundation (NSF) Honorable Mention (2021).
- Hertz Fellowship Finalist (2022).
- Finalist for Turing Scholars' Best Undergraduate Thesis Award.
- BAIR first-year ignition award.