MUKESH GHIMIRE

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RESEARCH INTERESTS

I am focused on developing efficient algorithms for incomplete/imperfect information games with continuous actions. My research interests include reinforcement learning, control theory, and game theory. I aim to advance both theoretical foundations and practical applications in these areas to solve complex, real-world problems.

RELEVANT EXPERIENCE

Arizona State University
Ph.D. Researcher, 06/2021 - today
-Proposed an algorithm to solve one-sided incomplete information differential game with an emphasis on explainable strategies [1].
- Modeled vehicle interaction as general-sum complete (and incomplete) information differential games to generate safe equilibrial policies for autonomous vehicle agents [2, 3, 5] and swarms [4].
- Proposed RL-based controller to reduce the frequency of inference in incomplete information interaction between a human and an autonomous driver.

Arizona State University
Teaching Assistant, 01/2023 - 05/2024
Teaching assistant for the graduate courses - MAE 501: Partial Differential Equations, and MAE 547 Modeling and Control of Robots at ASU.

Thyssenkrupp Elevator
Engineering Intern, 08/2019 - 08/2020
-Interned across different departments (quality, manufacturing, operations) in the TKE elevator manufacturing plant to shift the focus from configure-to-order model to standard-offerings model.
-Reduced data pre-processing time by more than 50% by implementing an automated Python process.
-Successfully reduced elevator cab assembly inefficiencies through process improvements.

SKILLS

PROGRAMMING: Python (Jax, NumPy, PyTorch), LaTeX(PGFPlots, TiKZ), Matlab, Scikit-Learn, Linux, Julia, Java

TOOLS: Optimization, Optimal Control, Model Predictive Control, Physics-Informed Machine Learning, Reinforcement Learning.

Last Updated: May 31, 2024

EDUCATION

Arizona State University
Tempe, AZ, USA
Ph.D. Mechanical Engineering, *GPA: 4.0/4.0*
2021 - 2025 (Anticipated)

University of Mississippi
Oxford, MS, USA
B.Sc. (Hons) Mechanical Engineering, *GPA: 3.98/4.0*
Minors: Computer Science, Mathematics
Thesis: *A Study of Deep Reinforcement Learning in Autonomous Racing Using DeepRacer Car.*
2016 - 2021

RELEVANT COURSEWORK

Game Theory, Causal Inference, Stochastic Processes, Convex Optimization, Advanced Modern Control, Numerical Methods for PDEs, Reinforcement Learning

SELECTED AWARDS & HONORS

Experiential Learning Grant 2023, 2024
GPSA Travel Grant Award 2023
ICRA Travel Grant 2023
SMBHC Research Fund Award 2020

SELECTED PUBLICATIONS

[1] **M. Ghimire**, L. Zhang, Z. Xu, Y. Ren. *State-Constrained Zero-Sum Differential Games with One-Sided Information.* ICML'24.

[2] L. Zhang, **M. Ghimire**, W. Zhang, Z. Xu, Y. Ren. *Value Approximation for Two-Player General-Sum Differential Games with State Constraints.* TRO'24.

[3] L. Zhang, **M. Ghimire**, Z. Xu, W. Zhang, Y. Ren. *Pontryagin Neural Operator for Solving Parametric General-Sum Differential Games.* L4DC'24.

[4] **M. Ghimire**, L. Zhang, W. Zhang, Y. Ren, Z. Xu. *Solving Two-Player General-Sum Games Between Swarms.* ACC'24.

[5] L. Zhang, **M. Ghimire**, W. Zhang, Z. Xu, Y. Ren. *Approximating discontinuous nash equilibrial values of two-player general-sum differential games.* ICRA'23.

Full list on Google Scholar.

ACADEMIC ACTIVITIES

TALKS: Sparky's Cup Education - Lightning Talk on Game-Changing AI Applications in Sport

REVIEWING: International Symposium on Distributed Autonomous Robotic System (DARS)