

# Mukesh Ghimire

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## EDUCATION

**ARIZONA STATE UNIVERSITY**  
**PHD IN MECHANICAL ENGINEERING**  
2021 - 2025 | Tempe, AZ  
GPA: 4.0 / 4.0  
Advisors: Yi Ren, Zhe Xu

**UNIVERSITY OF MISSISSIPPI**  
**BS IN MECHANICAL ENGINEERING**  
Minors: Computer Science, Math  
May 2021 | Oxford, MS  
GPA: 3.98 / 4.0

## LINKS

Github:// [ghimiremukesh](#)  
LinkedIn:// [mukesh-ghimire-np](#)

## COURSEWORK

### GRADUATE

Reinforcement Learning (w/ Prof. Dimitri Bertsekas)  
Advanced Modern Control  
Game Theory  
Convex Optimization  
Causal Inference  
Numerical Methods for PDEs

## SKILLS

### PROGRAMMING

Proficient:  
Linux • Java • Shell • Python  
Matlab • CUDA • PyTorch  
Tensorflow • Scikit-Learn •  $\text{\LaTeX}$   
Familiar:  
C • C++ • Julia

### AI AND ROBOTICS

Optimization  
Optimal Control  
Reinforcement Learning  
Model Predictive Control  
Human-Robot Interaction  
Modeling, Perception and Planning  
Physics-Informed Machine Learning

## INVITED TALKS

### SPARKY'S CUP EDUCATION

Lightning Talk on Game-Changing AI Applications in Sport

## EXPERIENCE

### DESIGN INFORMATICS LAB | GRADUATE RESEARCH ASSOCIATE

Jun 2021 - Present | Tempe, AZ

- Lead researcher in general-sum incomplete-information differential games.
- Modeled vehicle interactions as general-sum complete-information differential games to generate safe equilibrial policies for autonomous vehicle agents.
- Extended the current state-of-the-art methods of approximating continuous values of zero-sum games to discontinuous values of general-sum games via physics-informed machine learning.
- Used PyTorch and CUDA extensively to construct physics-informed neural networks with Hamilton-Jacobi-Isaacs as the governing equation.

### THYSSENKRUPP ELEVATOR | PRODUCT DEVELOPMENT INTERN

Aug 2019 - Aug 2020 | Middleton, TN

- Successfully reduced manufacturing costs of the elevator cab by 10% through process improvements.
- Developed over 100 Configure-To-Order (CTO) prints using Creo while adhering to the customer and regulatory requirements.
- Reduced data pre-processing time for sheet metal shearing jobs by more than 50% through implementing an automated process using Python.
- Trained incoming engineering interns on the day-to-day responsibilities of an engineer.

## RESEARCH PROJECTS

### SOCIALLY ADEPT SELF-DRIVING

Jun 2021 - Jan 2022 | Tempe, AZ

Collaborated with researchers from the RISE Lab to further the research in socially adept self-driving vehicles. Designed and trained a reinforcement learning agent using Soft Actor-Critic-Discrete algorithm. The agent learned to trigger intent-inference whenever necessary instead of running the inference algorithm throughout the interaction saving the computational costs by 59%.

### REINFORCEMENT LEARNING IN AUTONOMOUS RACING

Sep 2020 - Apr 2021 | Oxford, MS

Used Proximal Policy Optimization (PPO) algorithm to train a Deep Reinforcement Learning (DRL) agent for Amazon's DeepRacer car. The agent was trained offline using Gazebo as the physics engine. The trained model was deployed in the 1/18 scale model of the DeepRacer car which was able to complete the race track successfully.

## AWARDS

2020	SMBHC Research Fund Award (\$1,000)
2019-2020	Co-op Scholarship (\$678 per semester)
2016-2021	Academic Excellence Award (\$22,000 per semester)

## PUBLICATIONS

- [1] S. Amatya, M. Ghimire, Y. Ren, Z. Xu, and W. Zhang. When shall i estimate your intent? costs and benefits of intent inference in multi-agent interactions. In *2022 American Control Conference (ACC)*, pages 586–592, 2022.
- [2] L. Zhang, M. Ghimire, W. Zhang, Z. Xu, and Y. Ren. Approximating discontinuous nash equilibrial values of two-player general-sum differential games. In *ICRA*, 2023.