

# MD FERDOUS ALAM

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## EDUCATION

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### **The Ohio State University, USA**

*September 2018 - 2023 (expected)*

PhD in Mechanical Engineering

Advisor: David J. Hoelzle

Concentration: Autonomous system, reinforcement learning, optimal control

### **Bangladesh University of Engineering and Technology, Bangladesh**

*May 2010 - Sep. 2015*

B.Sc. in Mechanical Engineering

Advisor: Md. Ashiqur Rahman

Undergraduate research: Molecular Dynamics simulation, Heat transfer, Computational mechanics

## RESEARCH INTERESTS

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Control, Optimization, Reinforcement Learning, Physics based machine learning and transfer learning

## EXPERIENCE

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### **Graduate Research Associate**

Sep. 2018 - Present

*Department of Mechanical and Aerospace Engineering, OSU*

- Development of learning algorithms for environments with expensive data
- Building autonomous additive manufacturing system with in-situ printing and characterization unit
- Supervising undergraduate students

### **Lecturer**

March. 2016 - Aug. 2018

*Shahjalal University of Science and Technology, Bangladesh*

- Teaching theoretical courses and taking laboratory sessions

### **Intern**

May 2015 - July 2015

*Electricity Generation Company of Bangladesh, Bangladesh*

- Working on control and operation of gas turbine power plant

## PUBLICATIONS

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### **PhD research**

- Md Ferdous Alam, Max Shtein, Kira Barton & David J. Hoelzle, “Accelerated online learning using inaccurate physics model and temporal abstraction”, (to be submitted at CDC 2021)
- Md Ferdous Alam, Max Shtein, Kira Barton & David J. Hoelzle, “A physics guided reinforcement learning framework for an autonomous manufacturing system”, (accepted at ACC 2021)
- Md Ferdous Alam, Max Shtein, Kira Barton & David J. Hoelzle, “Autonomous Manufacturing Using Machine Learning: A Computational Case Study With a Limited Manufacturing Budget”, (MSEC 2020). **Best paper award**

### **Undergraduate research**

- Md Ferdous Alam, Muhammad Rubayat Bin Shahadat, AKM M Morshed, Titan C Paul, “A Molecular Dynamic Study of Boiling on a Nano Dot Decorated Solid Surface”, 3rd Thermal and Fluids Engineering Conference (TFEC), 2018

- Md Ferdous Alam, Muhammad Rubayat Bin Shahadat, “Temperature and strain rate dependent mechanical properties of ultrathin metallic nanowires: a molecular dynamics study”, ICME 2017
- Md Alamgir Kabir, Md Ferdous Alam, Md Ashraf Uddin, “A numerical study on the effects of reynolds number on blood flow with spiral velocity through regular arterial stenosis”, Chiang Mai J. Sci. 2018

## PROJECTS

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### OptKit

2020 - Present

- An open-source mathematical optimization library written in python
- Implementing first order, second order, gradient free, Bayesian optimization algorithms
- Visualizing optimization problems in 1D/2D and exporting animations

### Machine Learning Project

Jan. 2019 - Apr. 2019

*Statistical learning based analysis and prediction of Airline On Time Performance Data*

- Exploratory data analysis (EDA) of USA airlines data
- Predicting on-time performance using various regression algorithms

### Applied Machine Learning tutorials

Sep. 2018 - Dec. 2018

- Implementing classical Machine Learning algorithms (Regression, LDA, QDA, PCA, SVM etc.)
- Using scikit-learn library for analysis of data

## KEY TECHNICAL SKILLS

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Programming Languages:	Python, C/C++, MATLAB/Simulink
Software Packages:	Pytorch (Machine Learning), Google Tensorflow (Machine Learning)
Version Control	Git
Platforms	Linux, Windows
CAD software	SolidWorks, AutoCAD

## RELEVANT COURSES

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Machine Learning/Optimization	Statistical Machine Learning, Reinforcement Learning, Advanced Nonlinear Optimization, Optimization in Mechanical Design, Probability and random variables
Control/Dynamical System	Linear System Theory, Optimal Control theory, Robust Control, Random Dynamical System, Design and Control of Mechatronics system, Digital Signal Processing
Certification	Deep Learning Specialization (Coursera)

## HONORS AND AWARDS

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- Best paper award, Manufacturing Science and Engineering Conference, USA (2020)
- Dean's List Scholarship for undergraduate academic excellence, Bangladesh University of Engineering and Technology, (2010)
- Dean's List Scholarship for undergraduate academic excellence, Bangladesh University of Engineering and Technology, (2013)
- Board scholarship for higher secondary academic excellence, Dhaka Education Board (2009)
- Board scholarship for secondary academic excellence, Dhaka Education Board (2007)

## ACADEMIC & PROFESSIONAL ACTIVITIES

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### **Reviewer of scholarly articles**

- 2021 American Control Conference, Louisiana, USA
- 2020 North American Manufacturing Research Conference (NAMRC), USA
- 2020 Manufacturing Science and Engineering Conference MSEC, USA
- Mechatronics (Elsevier journal)

### **Teaching**

*Shahjalal University of Science and Technology, Bangladesh*

- C programming, MATLAB, AutoCAD
- Engineering Mechanics, Measurement and Instrumentation

### **Affiliation**

- Student Member, Institute of Electrical and Electronics Engineers (IEEE)
- Student Member, American Society of Mechanical Engineers (ASME)