

# Abhishek Sharma

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## Summary

Ph.D. candidate in Mechanical Engineering and M.S. in [Applied Mathematics](#) at U.W. Seattle, with over **4 years** of experience in collection of **multi-modal** human subject datasets, and training **machine learning** models using the data. **6 years** of research experience with **6 published papers** and 2 journal papers in review. My PhD bridges the gap between advances in **Computer Vision** and **Machine Learning**, Human Movement Analysis and Assistive Devices. Interested in the intersection of Machine Learning, Bionics, Wearable Technology, and Embodied A.I.

## SKILLS

### Machine Learning

Representation Learning • Style Transfer • Time-series Modeling • Video Understanding • Autoencoders • CNN • RNN/LSTM

### Programming

Python • MATLAB • C++ • SQL • Shell

### Libraries/Frameworks

Pytorch • Scikit-learn • Matplotlib • NumPy • Tensorflow • Pandas • Pillow • Keras • Plotly • OpenMP • Open-MPI

### Software/Tools

Git • Docker • Xsens MVN • Pupil • SolidWorks • Simulink • Mathematica • AutoCAD

## EDUCATION

### PhD. in Mechanical Engineering

University of Washington, Seattle, U.S.  
Sep 2017 - Present

### M.S. in Applied Mathematics

University of Washington, Seattle, U.S.  
Apr 2022 - Aug 2022

### B.Tech & M.Tech in Mech. Eng. ([Thesis](#))

IIT Bombay, Mumbai, India  
Jul 2012 - Jun 2017

Minor: Electrical Engineering

## ADDITIONAL EXPERIENCE

### Academic Paper Reviewer

[Web of Science](#), Jan '22 - present

### Mentorship

1 Ph.D. student in UW ME, Sep '21 - Jun '22  
2 UG students in UW ECE, Jun '19 - Sep '19

### Teaching Assistant (50+ students)

University of Washington, Sep '17 - Jun '19  
IIT Bombay, Jul '16 - May '17

## EXPERIENCE

Mar 2022 - Present

### PhD Candidate

📍 Seattle, U.S.

*Rombolabs, University of Washington*

- Proposed a novel **Style Transfer** framework for **automated personalization** of assistive devices. **Neural Networks** were used to extract person-specific features from gait samples.
- Generative models** used these features to generate person-specific reference trajectories for control of assistive devices. Further, developed methods that **improved** generated gait by about **100 percent**, over the base model. [Paper in review](#).

Sep 2019 - Mar 2022

### Research Assistant

📍 Seattle U.S.

*Rombolabs, University of Washington*

- Conceived and collected a **novel dataset** of full body motion capture, egocentric vision and gaze from human locomotion in out-of-the-lab environments. [Paper in review](#).
- Demonstrated that **egocentric vision** can be used to predict future knee and ankle joint kinematics. Optical flow features extracted from a neural network trained on the synthetic MPI-Sintel dataset, showed **8 and 7 percent improvement** for knee and ankle prediction RMSE, respectively. [Journal Paper](#)
- Developed guidelines to assess the **complexity of human gait** for the proliferating out-of-the-lab gait datasets. [Journal Paper](#)
- Worked on the development of a **novel deep-learning based framework** for unified and continuous control of lower-limb assistive devices. [Journal Paper](#)

Apr 2018 - Sep-2019

### Research Engineer

📍 Seattle, U.S.

*Center for Limb Loss and Mobility, Veteran Affairs*

- Created **design docs**, worked on the development of **machine learning pipeline**, and **optimized** the code to effectively use **GPUs**, which enabled us to meet publication deadlines. [Conference Paper 1](#), [Conference Paper 2](#)
- Worked on **software integration**, integrating Xsens motion capture to work with Open Source Leg (OSL) prosthesis, in real-time.

May 2016 - Jun-2017

### Student Researcher

📍 Mumbai, India

*Mechanical Engineering Department, IIT Bombay*

- Conceptualized, designed and fabricated a novel compliant robotic hand, with a tendon mechanism to alter the end-point stiffness, and an ability to grasp objects of different geometries. Used **Principal Component Analysis on human grasp data** to determine the effective degrees of freedom, in order to reduce computational and mechanical complexity of the hand design.
- Developed MATLAB simulations to understand finger dynamics under collision with walls of varying stiffness, end-point impedance control and disturbance rejection. [Thesis](#)

May 2015 - Jul-2015

### Research and Development Intern

📍 Pune, India

*Whirlpool India Ltd.*

- Evaluated the feasibility of using rice husk as a low cost alternative to polyurethane foam based insulation in refrigerators.
- Determined the process map for forming insulation slab from core material (rice husk), experimenting with several binder types and their percentage content. Defined the process map for forming rice husk and PU Foam composite slab which gave promising results for thermal conductivity of the insulation.
- Designed tests to measure the thermal conductivity of insulation slab made of core material and PU Foam mixture.
- Demonstrated that about 20% rice husk mixed with PU foam would lead to about 20% cost reduction of the insulation.