Ashutosh Mukherjee

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[*Projects Website*](#)
[*Github*](#)

Education

$10/2021 - 4/2024$	M.Sc. Computer-Aided Conception of Machines in Mechanical Engineering *RWTH Aachen*	CGPA : $1,6$
$8/2016 - 6/2020$	B.Tech in Mechanical Engineering *Punjab Engineering College, Chandigarh*	CGPA : $8.3/10$
$4/2014 - 3/2016$	High School (10+2) *Bhavan Vidyalaya, Chandigarh*	Percent : 94.4%

Work Experience

Master Thesis Student/Working Student   **October 2023 - Ongoing**
Rheinmetall Technology Centre - New Technologies, Rheinmetall AG, Neuss, Germany

- Development of a localization algorithm for a swarm of GPS-denied UAVs using Ultra-wideband (UWB) sensors.

- Embedding the developed localization algorithm into Arducopter, an open-source auto-pilot for UAVs, in order to facilitate verification of the algorithm through flight tests.

- Development of a simulation model of an integrated flight control system for a single UAV, including a flight controller, 6 degree-of-freedom UAV dynamic model, IMU, Magnetometer, Barometer and GPS sensor models and an Extended Kalman Filter for attitude estimation.

Werkstudent (Working Student)   **June 2022 - September 2023**
Rheinmetall Technology Centre - New Technologies, Rheinmetall AG, Neuss, Germany

- Development of a mathematical model for the force analysis of a flexible electrostatic synchronous actuator based on the concept of *Method of Moments*, a discretization technique for electric fields.

- Maintainance of the developed mathematical model code-base, making use of software engineering principles like object orientation, version control and comprehensive code documentation

Project Assistant   **October 2022 - April 2023**
Institut für Getriebetechnik, Maschinendynamik und Robotik (IGMR), RWTH Aachen

- Scripting Multi-Body simulation models of a standard mountain bike in Simpack using the *Semi-Analytical Approach* where the multibody model partly depends on real-time sensing of loads on the actual bike.

- Setting up co-simulation between Simpack and Simulink in a closed loop simulation for stabilizing the multibody model of the bike excited by the measured loads.

- The work in this project culminated in a mini-thesis worth 9 ECTS, which can be accessed [*here*](#).

Research Assistant   **September 2020 - July 2021**
Thapar Institute of Engineering and Technology, Patiala, India

- Dynamic modeling of a strength augmentation exoskeleton designed by *Defence Bio-Engineering and Electro-Medical Laboratory* (DEBEL), India

- Reduced-order modeling of Human and Lower Extremity Exoskeleton in the form of a coupled multi-body system.

- Development of a Computed Torque Control algorithm for strength augmentation.

- All published work output from this project can be referred from *Conference Presentations and Publications* section.

Teaching Assistant   **February 2021 - June 2021**
Thapar Institute of Engineering and Technology, Patiala, India

- Teaching Assistant for the graduate level course *Modern Control of Dynamic Systems*, which covers basic and advanced topics in linear systems theory like state-space representations, canonical forms, controller and observer design using pole-placement, and some concepts of optimal control theory.

- Helped set mid-term examinations and quizzes, and grade them as part of assitantship duties.

Technical Skills

Programming	Computational Techniques
1. **Scripting Languages** - MATLAB & Simulink - Python 2. **Programming Languages** - C++ - Java 3. **General** - Object-Oriented Programming - Version Control using Git	1. State Estimation using Extended-Kalman Filters 2. Strapdown Algorithms for Inertial Navigation 3. Sensor Fusion 4. Sensor Noise Parameter Identification using Allan-Deviation Anaylsis 5. Unconstrained Non-linear Optimization using Gauß-Newton and Quasi-Newton methods 6. Regression and Classification using Neural Networks 7. Multi-Body Dynamics 8. Finite Element Analysis (Static and Dynamic) 9. Method of Moments in Electrostatics

Conference Presentations and Publications

1. Chander, S., Mukherjee, Shivling, V.D., and Singla, A. (June 24, 2024). Enhanced Euler-Lagrange Formulation for Analyzing Human Gait with Moving Base Reference, *ASME Journal of Mechanisms and Robotics*. January 2025; 17(1): 011006, DOI, PDF.

2. Chander, S., Mukherjee, A., & Singla, A. (2023, July). *Estimation of Ground Reaction Force for Coupled Dynamic Modelling and Control of the Lower-Limb Exoskeleton*, AIR 2023: Proceedings of the 2023 6th International Conference on Advances in Robotics, July 2023, Article No.: 37, Pages 1-8, DOI

3. Chander, S., Mukherjee, A., Shivling, V., & Singla, A. (2022, October 16-20). *Modelling and Validation of Human Gait Dynamics using Modified Euler-Lagrange Approach* [Paper Presentation], 6th Joint International Conference on Multibody System Dynamics and 10th Asian Conference on Multibody Dynamics, New Delhi, India, URL