

Ashutosh Mukherjee

Email: ashutosh.mukherjee@rwth-aachen.de

Phone: +4915901950326

[Projects Website](#)

Education

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

Work Experience

Master Thesis Student

October 2023 - March 2024

Rheinmetall Technology Centre - New Technologies, Rheinmetall AG, Neuss, Germany

Distributed Data-Fusion and Control over a network of Unmanned Aerial Vehicles

- 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.
- Design of an attitude estimation filter based on attitude error rotation vector dynamics.
- Development of a localization algorithm for a network of GPS-denied UAVs using Ultra-wideband (UWB) sensors.

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.
- Maintenance 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, 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)*, a branch of *Defence Research and Development Organization (DRDO)*, India

- Modeling of Human and Lower Extremity Exoskeleton in the form of a coupled multi-body system with the human as leader and the exoskeleton as follower.
- Development of a Computed Torque Control algorithm for strength augmentation.
- Various sections of the work done for this project are being submitted in various journals and conferences related to Biomechanics and Multi-Body Dynamics, and all published work 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 assistantship duties.

Technical Skills

Programming	Computational Techniques
<ol style="list-style-type: none"> Scripting Languages <ul style="list-style-type: none"> • MATLAB & Simulink • Python Programming Languages <ul style="list-style-type: none"> • C++ • Java Markup Languages <ul style="list-style-type: none"> • HTML • LaTeX General <ul style="list-style-type: none"> • Object-Oriented Programming • Version Control using Git 	<ol style="list-style-type: none"> Multi-Body Dynamics Finite Element Analysis (Static and Dynamic) Regression and Classification using Neural Networks Boundary Element Method in Electrostatics (Method of Moments) Strapdown Algorithms for Inertial Navigation State Estimation using Extended-Kalman Filters Numerical Integration and Differentiation using implicit and explicit schemes and stability analysis of explicit techniques

Conference Presentations and Publications

- 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](#)
- 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 Dehli, India, [URL](#)