Ashutosh Mukherjee

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Github Page

Projects Website

Education

10/2021 – *Ongoing*	M.Sc. CAME *RWTH Aachen University, Aachen*	CGPA : 2, 0
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%

Research Experience

Research Associate **September 2020 - July 2021**

Thapar Institute of Engineering and Technology, Patiala, India

Dynamic Modelling and Control Design of Augmentative Lower Extremity Exoskeleton

- Dynamic modelling 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 coupled multi-body systems in which the Human is the master and the exoskeleton is the slave.
- Development of a Model-Based control algorithm making use of Control Partitioning for Strength Augmentation of the Pilot wearing the Lower Extremity Exoskeleton.

Professional Experience

Intern, Order Management and Assembly Department **January 2019 - June 2019**

Siemens Ltd., Vadodara, India

- Developed a solver in C for allocation of jobs (processes) to different machines present in the shop floor in order to optimize the aggregate machining lead times
- Designed an induction heating apparatus for heating of rotor wheel discs of steam turbines
- Increased robustness of fixtures for machining of stator guide blade carriers of steam turbines
- Redesigned and fabricated a machining and blading stand for rotor wheel discs of steam turbines

Other Relevant Experience

Undergraduate Thesis Project **September 2019 - May 2020**

1. **Development of a Test Rig for measuring propeller thrust**
   - Built a test stand acting as an alternative to the wind tunnel for measuring the thrust produced by a propeller mounted on it.
   - Implemented Arduino Uno controlled circuits for driving the propeller motor using a brush-less DC motor and capturing and displaying the speed of the propeller using an IR sensor based tachometer.

2. **Design and Analysis of a propeller for slow-flying Quad-copters**
    - Generated and modified propeller designs iteratively based on required flying conditions and propeller thrust using QMIL, a first order propeller design tool
    - Used QPROP, a solver for calculating propeller performance to generate propeller efficiency and thrust curves for the designed propellers and reiterated the designing process until a design giving desirable propeller performance was achieved.
    - Assisted in second order design validation using computational fluid dynamics (CFD) once the propeller design showed better performance than a market standard propeller.
    - Developed a solver acting as an alternative to QPROP in MATLAB for calculating the performance characteristics of a propeller based on Blade Element Momentum Theory.

Relevant Independent Projects

1. **Impact Location Prediction for Structural Health Monitoring with the aid of Convolutional Neural Network (CNN)**
    - Building regression models based on CNN to predict the locations of impact of steel balls on an aluminium plate. The input data was simulated and experimental piezoelectric sensor data.
    - Simulation input data was augmented and experimental data was cleaned and pre-processed before feeding into the CNN.
    - Three convolutional layers were used in the CNN to extract the relevant features from the input data.
2. **Solver development for vibration analysis of a simple car**
    - Developed a simple car model as a 2 degree of freedom system to analyse its vertical dynamics in the form of bounce and pitch motions using MATLAB and Simulink
    - Provided excitations to the model in the form of frequency independent harmonic forces and base excitations in the form of road bumps modelled as waves with constant wavelengths and amplitudes.
    - Applied Fast Fourier transforms to analyse the natural frequencies and mode shapes of the system
    - Optimized location of force application and amount of damping in the system for minimal excitations

Technical Skills

Programming	**Softwares**	**Miscellaneous**
1. **Scripting Languages** • MATLAB • Python 2. **Programming Languages** • C • Java 3. **Markup Languages** • HTML • LaTeX	1. **Multi-Body Dynamics** • MSC ADAMS • Hyperworks Motionview 2. **Finite Element Analysis** • ANSYS Workbench 3. **Computer Aided Design** • SolidWorks • Autodesk Fusion 360	• Simulink • Arduino Uno • QMIL, QPROP • XFOIL • Geometric Dimensioning and Tolerances (GD&T)