Tarun Sharma

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ACADEMIC QUALIFICATIONS

2020	B.Tech.- M.Tech. Dual, Mechanical Engineering	Indian Institute of Technology, Kanpur	P.G.- 9.7/10
			U.G.- 6.8/10
2015	CLASS XII, ISC	Loyola School, Jamshedpur	94.8%
2013	CLASS X, ICSE	Loyola School, Jamshedpur	90.6%

ACHIEVEMENTS

- Received full- time placement offers from **Jaguar Land Rover, India** & **Bajaj Finance** during Campus Recruitment
- Received **Asha Khanna Award** for securing the **Highest** marks in Mathematics at ISC, 2015 amongst more than 50000 students
- Secured 99.8 percentile in **JEE Advanced'15** among 1.5 million candidates & **Qualified** GATE'19 & **Indian Statistical institute** (ISI) Examinations'15

MASTER'S THESIS

Supervisors: Prof. N.S. Vyas and Dr. Chandraprakash Chindam (in collaboration with Modern Coach Factory, Raebareli)   *May'19- June'20*

TITLE	Primary Suspension redesign of Railway Bogie for Improved Fatigue Life
OBJECTIVE	• To redesign the primary springs used in FIAT type Bogies of LHB Coaches of Indian Railways to stop them from failing
METHODOLOGY	• Performed FE static, dynamic and harmonic response analysis followed by fatigue life calculation of the current bogie • Modify the design and validate the design using similar FEA approach to increase the fatigue life of the bogie

KEY PROJECTS

Deep Neural Networks for Supervised Learning
deeplearning.ai   *Course: Neural Networks and Deep Learning*   *March 2020*
- Implemented a single hidden layer shallow neural network for binary classification of different types of data sets.
- Trained the model for a dataset comprising of dots in the shape of a flower to get an accuracy of 91.25%.
- Implemented a deep neural network for binary classification of Cat vs Non- Cat images with an accuracy of 80%.

Algorithm Study of different Constrained and Unconstrained Optimization techniques
Project Supervisor: Prof. Bhaskar Dasgupta   *Course: Optimization Methods*   *Feb'19 – Apr'19*
- **Analysed** the performance of unconstrained optimization methods like **Steepest Descent**, **DFP**, **BFGS** and **Powell's Conjugate Direction**
- Studied the effect of different parameters like initial point, modality and concluded the **global convergence** on 50 different test functions
- **Linear** and **Quadratic Programming** with **Simplex**, **Active Set** method and **Lemke's** set method for multiple constraints was studied

Design & Development of an Electromagnetic Actuator
Project Supervisor: Prof. Mohit Law   *B.Tech. Project*   *Aug'18 – Apr'19*
- Developed a cheap **Moving Iron Type Linear Electromagnetic Actuator** to be used as **active damping** devices
- Optimized the **spatial** and **functional** parameters to achieve **higher force to volume** ratio and obtained a flat frequency response in 30-140 Hz
- Designed a low friction linear **Flexural Bearing** on **DS Solidworks** and carried out its **fatigue analysis**

Modelling of Railway Vehicle Dynamics: A Multi Body Analytical Approach
Project Supervisor: Prof. NS Vyas   *Student Research Associate*   *July'18 – Dec'18*
- Estimated **critical speed** & determined **contact patch** co-ordinates as a function of lateral perturbation by solving the kinematic equations
- Modelled a rail-wheel pair in **Simpack** and observed the motion on a **straight track** and a **curved track** by varying the wheel positions
- Imparted uncertainties like **Camber**, **Yaw** and **Toe-in** to the wheelset and used **Simpack Post** to visualise its motion behaviour

Motion Planning of a Mobile Robot & a 3 DOF Robot Arm Manipulator
Project Supervisor: Prof. Ashish Dutta   *Course: Robot Motion Planning*   *Aug'19 – Oct'19*
- Used MATLAB to construct the configuration space of a 3DOF & 2DOF robot arm in presence of obstacles
- Used sampling-based planners (**A* Algorithm**) & **Rapidly Exploring Random trees** for the path planning of a mobile robot in presence of obstacles

Other course Projects
- ➢ Helicopter Coupled Trim Analysis for a UH-60A Black Hawk
- ➢ Document Shredder & Automated Box Shifting Mechanism
- ➢ Structure Integrated Sensors and Actuators
- ➢ FEA of Railway Couplers used in LHB Bogies
- ➢ Output feedback stabilisation of inverted pendulum

INDUSTRIAL INTERNSHIPS

ETA Technologies, Bengaluru   *Project Supervisor: Mr. Santhosh Kumar, Director*   *May'18 – July'18*
- Designed and developed an axially frictionless **Hydrostatic Bearing** & components of a **Friction Welding Machine** using Solidworks and AutoCAD
- Used **power recirculation** to design a **Four-Square Test Rig**, for testing 4 components parallelly
- **Optimized** parameters of an **Electrical Upsetting** and **Metal Gathering Machine** to get desired valve profile
- Fixed, redesigned and did **failure analysis** of a broken **Chamfering tool**

R&D, Tata Steel, Jamshedpur   *May'17 – June'18*
Design and Analysis of Tensile Specimen for Quasi Static Tests through FEM   *Project Supervisor: Mr. Pundan Kumar Singh, Principal Researcher*
- Focused on the **plastic** region of deformation for **high strain rates** & modelled a tensile specimen using **Abaqus**
- The tensile test results contributed in designing new specimen for specific tests for **automotive applications**

POSITIONS OF RESPONSIBILITY

- **President,** *Association of Mechanical Engineers, IIT Kanpur*   *Aug'19 – June'20*
- **Senior Executive,** *Start-up Internship Program, Entrepreneurship Cell, IIT Kanpur*   *Nov'16 – Mar'17*
- **Orientation Team Member,** *Institute Counselling Service, IIT Kanpur*   *July'19 – Aug'19*
- **Teaching Assistant,** *Advanced Mechanics of Solids (ME321A), IIT Kanpur*   *July'19 – Nov'19*
- **Teaching Assistant,** *Engineering Graphics (TA101A), IIT Kanpur*   *Jan'20 – June'20*

TECHNICAL SKILLS

- **Languages**: Python, C, C++, Java, Arduino IDE, Octave, Maple, MATLAB, LaTeX
- **Tools/Packages & Frameworks**: Tensorflow, Keras, NumPy, Pandas
- **Softwares**: COMSOL, Ansys, Abaqus, Simpack, CutPro, Unigraphics, Solidworks, AutoCAD, CATIA, ADAMS, VI Rail

RELEVANT COURSEWORK

Convolutional Neural Networks	Hyperparameter Tuning, Regularization & Optimization	Neural Networks and Deep Learning
Basics of Modern Control	Data Structures & Algorithms	Probability & Statistics
Optimization Methods	Robot Motion Planning	Railroad Vehicle Dynamics
Helicopter Dynamics & Aeroelasticity	Modal Analysis	Engineering Acoustics & its Controls