

RENUKA DIXIT

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EDUCATION

North Carolina State University, Raleigh, NC, **Master of Science** in Mechanical Engineering (GPA 3.75/4.0) **Aug 2018**
University of Pune, India, **Bachelor of Engineering** in Mechanical Engineering (GPA 3.5/4.0) **May 2014**

TECHNICAL SKILLS

Applications and Software: MATLAB, MS Visual Studio, MS SQL Server, SOLIDWORKS, ANSYS, CATIA, SIMULINK, AutoCAD, TECPLOT 360, FEMM, MS Office
Languages: C++, C#, Python, MS-SQL, Visual Basic, Java, C, JavaScript, MATLAB
Areas of Knowledge: Object-Oriented Programming, Finite Element Analysis, Numerical Methods, Linear Algebra, Differential equation, Interpolation, Electromagnetism, Heat Transfer, Design Optimization, Mechanical Design.

WORK EXPERIENCE

North Carolina State University, Raleigh, NC (**Graduate Assistant**) **Aug 2017-Present**

- Conducting Research on calculating stress trajectories in a component using Finite Element Analysis (FEA) with the objective of achieving an optimized uniformly stressed lattice structure that can replace the original component.
- Calculated principal stresses and obtained stress trajectories in the beam using MATLAB and TECPLOT 360.
- Achieved 30% reduction in material by volume, and a uniformly stressed lattice structure that can replace the original beam.
- Implementing the same methodology for material reduction in structures with more complex and unexplored geometries.
- Graded Assignments and Exams and conducted Labs for the FEA course for graduate and undergraduate students.

GKN Driveline, Sanford, NC (**Manufacturing Engineering Intern**) **June 2017 - Aug 2017**

- Generated 3-D models of parts like ball splined inner race, roll cage, outer race from 2-D AutoCAD drawings using SOLIDWORKS.
- Performed Structural Finite Element Analysis on these models to ensure a safe design using ANSYS.
- Reduced manufacturing of faulty parts by 10% by conducting root-cause analysis for defects in pre-roll diameter of outer race.
- Created and documented correct tool setup procedures for all the manufacturing processes to prevent tolerance violations.

Infosys BPO, Pune, India (**Systems Engineer**) **Jun 2014 - Jan 2016**

- Developed and implemented an invoice processing web application on ASP.NET (C#) platform as a part of 4-member team.
- Improved the application efficiency by 20% by developing and implementing change requests bug fixes.
- Reduced the generation of unwanted data in the database by 80% by fixing a major issue in the application.
- Optimized report generation from large data using MS SQL and reduced its execution time from 2 minutes to 5 seconds.
- Achieved the SPOT Award 2015 for being the best performer in the team in the year.

Precise Vacuum Systems, Nashik, India (**Design Engineer Intern**) **Jun 2013 - May 2014**

- Designed a hydraulic crimping machine to apply the accurate required pressures to crimp the necks of liquid nitrogen containers.
- Carried out design calculations and modelled all parts of the crimping machine separately in CATIA V5.
- Carried out FEA on the modelled parts in ANSYS to ensure failure safe design and created an assembly model in CATIA V5.
- Tested the machine after manufacture for application of correct pressures for corresponding size of liquid nitrogen containers.
- Improved accuracy in applied pressure by 25% by removing the error in human judgement.
- Reduced rejected parts by 50% by completely eliminating the erroneous manual process and increasing accuracy.

ACADEMIC PROJECTS

Numerical Methods in C++

- Developed a code in C++ to solve ordinary differential equations using Euler, Modified Euler and Runge - Kutta (2 and 4) Methods.
- Used Runge-Kutta 4th order method in C++ to generate stream traces from a quiver plot data.
- Studied effect of sub-interval size on not-a-knot cubic spline interpolation code developed in C++ by testing it on Runge function.
- Solved Numerical Integration and differentiation in C++ using methods like Gaussian quadrature and Divided difference.
- Studied the effect of step-size on accuracy and made modifications to obtain results within 0.1% of the analytical solutions.

Finite Element Analysis for Dynamics and non-linear problems

- Developed code in C++ and MATLAB for solving linear elastic dynamics problems using Finite Element Method.
- Implemented the code to perform dynamic modal analysis of a frame structure and verified the results with ANSYS.
- Perform transient analysis to get stress history plots using this code and verified the results with ANSYS
- Developed and implemented the code in C++ and MATLAB to solve problems involving non-elastic behaviour.
- Achieved relative error less than 0.1% in both Finite element codes with respect to ANSYS results.

Design Optimization of semi-active haptic feedback drive

- Optimized the drive to produce controllable, high amplitude damping forces with minimum size and input power constraints and dimensions of the drive as the design variables.
- Ensured that saturation of iron core was accounted for in force calculations in every iteration by performing Electromagnetic FEA.
- Achieved the optimum feasible design in 100 generations of Genetic Algorithm using MATLAB that produced a force 3 times larger than the original design without violating any design constraints.