Rahul Shagrithaya

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GitHub Profile • Engineering Portfolio Website

EDUCATION

Manipal Institute of Technology - Manipal, India   Graduated July 2021
B. Tech. **Mechanical Engineering**, Minor Specialization - **Business Management**
Cumulative GPA: **8.30/10.0**

SKILLS

Design and FEA: Siemens NX, Fusion 360, CATIA, AutoCAD, Ansys Workbench (Structural and Fluent), Keyshot
Manufacturing: Radial drilling, Dremel, composite lay-up, vacuum bagging, grinding, lathe, soldering
Programming: Python, C++
Languages: English

WORK EXPERIENCE

Research and development intern, CuriouzTech Lab, Manipal Institute of Technology - Manipal, India   August 2019 – December 2019
- Collaborated with 4 doctors and a professor to design tumour-removal Endoscopic scissors to improve diagnosis of small visible tumours in bladders
- Collected and appraised details of 2 available endoscopic scissors to implement an improved and safer design
- Designed CAD Models in Siemens NX and developed images, videos, and illustrations in KeyShot that were used for documentation and presentation
- Replaced a 4mm stiff shaft with a 2mm and 420mm long flexible shaft attached to partially insulated cutting blades to insert into bladders safely
- Incorporated a saline injector and a retractable surgical needle that passes directly through the shaft to inject fluids into tumours before cutting
- Patent Granted in the Indian Patent Office, "A scissors-needle system for intra-cavitary hydro-dissection and excision of tissues" - Patent No. 354334

Research and development intern, MLBE Laboratory, Cracow University of Technology - Kraków, Poland   June 2019
- Assisted a researcher in the Malopolska Laboratory of Energy Efficient Building in analyzing a 2-phase fluid heat exchanger to contribute to the research on reduction of non-renewable energy consumption
- Designed a 600mm diameter cylindrical heat exchanger to transfer heat from 95°C kitchen air to 5°C water, which can be used in restrooms
- Demonstrated using Fusion 360 and Ansys Fluent that water temperature can be increased by 8°C using 95°C air in a primary heat exchanger

ENGINEERING PROJECTS

Performance analysis of three-lobe bearing (Graduate Project)   January 2021 – May 2021
- Analyzed high-speed three-lobe bearings using Fluid Structure Interaction (FSI) on Ansys Workbench considering 4 eccentricity ratios, 2 lubricants, and 3 different bearing and shaft materials to compare the structural strength of all combinations
- Implemented a system coupled between static structural and two-phase fluent modules to calculate the deformation and stresses caused due to the motion as well as the change in the geometry of the lubricant over the bearing and the shaft
- Simulated 24 combinations of bearings with various eccentricities and materials to collect static fluid pressure, bearing deformation, and stress data
- Examined the database and concluded that physical forces on the bearing increases with an increase in eccentricity, and the most robust bearing material among the 3 is steel followed by bronze, and then brass

SAE Aero Design Team   April 2018 – November 2019
- Built and operated Unmanned Aerial Vehicles (UAV) with a team of 35 interdisciplinary students to research various UAV designs
- Prototyped 9 designs and conducted 117 flying tests to develop a 1.2m wingspan fixed-wing aircraft for SAE Aero Design that can be assembled in less than 90 seconds and carry 1.5Kg of payload to disaster-struck zones
- Designed 10 experimental UAV structures based on the centre of equilibrium, wingspan, rib spacing, and fabricated composite and wood parts according to the aircraft plan sent by the aerodynamic subsystem
- Conducted strength and flying tests and investigated crashes to minimize malfunctions in the future prototypes
- Drafted CAD drawings of aircraft parts in AutoCAD that were sent for laser-cutting
- Interviewed, selected, and supervised first-year undergraduate students to finalize 20 competent members for the team
- Participated in 3 regional aeromodelling competitions and won 1st and 2nd Rank at the National Institute of Technology in Calicut, 2018 Competition
- Finished 5th in the SAE Aero Design East 2019 Collegiate Design Series hosted by Lockheed Martin in the micro-class category in Texas, USA

SELECTED PROGRAMMING PROJECTS

Planar Truss Element and 1-D Beam Element FEM Solver
- Coded a software to calculate physical forces and displacements of 2D truss structures subjected to forces and displacements using FEM
- Solved simultaneous equations using Python and NumPy by assembling the global element stiffness, nodal displacements and force matrices
- Developed a user-friendly Graphical User Interface (GUI) using Dear PyGui to receive the problem data and display the solution in a plot and table

Interactive Assembly Line Balancer
- Programmed a GUI using Python to allow users to create multiple tasks and link them together to balance an assembly line mathematically
- Formulated an algorithm to group tasks into workstations to achieve the most efficient assembly line with the least number of workstations
- Implemented the longest and shortest work element rule into the algorithm to balance the workloads and minimize bottlenecks in an assembly line