

# Rahul Shagrithaya

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[GitHub Profile](#) • [Engineering Portfolio Website](#)

## SKILLS

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

## WORK EXPERIENCE

**Research and development intern**, CuriousTech Lab, Manipal Institute of Technology | Manipal, India August 2019 – December 2019

- Collaborated with 4 doctors and 1 professor to design a 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
- Repalced a 4mm stiff shaft with a 2mm and 420mm long flexible shaft attached to partially insulated cutting blades to safely insert into bladders
- 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 analysing 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 hot kitchen air to cold water which can be used in restrooms
- Demonstrated using Fusion 360 and Ansys Fluent that water can be heated from 5°C to 13°C using 95°C kitchen air in a basic heat exchanger

## ENGINEERING PROJECTS

**Performance analysis of three-lobe bearing (Final year thesis project)** January 2021 – Present

- Analysed 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 increase in eccentricity, and the strongest bearing material among the 3 is steel followed by bronze and then brass

**AeroMIT UAV Structures Subsystem Engineer** April 2018 – November 2019

- Collaborated with an interdisciplinary team of 35 students divided into 5 subsystems and designed experimental Unmanned Aerial Vehicles (UAV)
- Designed UAV structures in Fusion360 based on centre of equilibrium, wing span, ribs spacing, and fabricated prototypes using composites and wood in accordance with the aircraft plan sent by the aerodynamic subsystem
- Conducted strength and flying tests, and investigated crashes to minimize malfunctions in the future prototypes
- Drafted 6 CAD drawings of aircraft parts in AutoCAD that were sent for laser-cutting
- Participated in regional aeromodelling competitions and won 1<sup>st</sup> and 2<sup>nd</sup> Rank at the National Institute of Technology in Calicut, 2018 Competition
- Prototyped 9 designs and conducted 117 flying tests to develop a 1.2m wing span 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
- World Rank 5 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 1D Beam Element FEM Solver**

- Coded a software to calculate physical forces and dispalcements of 2D truss structures subjected to forces and dispalcements 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 interactively create multiple tasks and link them together to mathamatically balance an assembly line
- 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

## LEADERSHIP EXPERIENCE

**Senior Engineer**, AeroMIT UAV Research Project Team – Interviewed, selected, and managed the junior team members

**Category Organiser**, UAV Flying Competition – Coordinated with the participants and inspected UAVs to ensure compliance with the rules

**Management Committee member**, Photography Club – managed and covered several events as a photographer

## EDUCATION

**Manipal Institute of Technology** | Manipal, India

Graduation in May 2021

BTech - **Mechanical Engineering**, Minor - **Business Management**

Cumulative GPA: **8.15/10.0**