# SOHA YUSUF | Ph.D. Mechanical Engineering

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## EDUCATION

**Rensselaer Polytechnic Institute (RPI)** *Jan/22 – present*
PhD in Mechanical Engineering, United States
CGPA: 4.00/4.00      *Advisor: Prof. Jason Hicken*

**National University of Sciences and Technology (NUST)** *Sep/16 – Jul/20*
B.E. in Mechanical Engineering, Pakistan
CGPA: 3.91/4.00      *Advisor: Dr. Sana Waheed*

**Western Carolina University** *Jan/19 – May/19*
Exchange Scholarship by U.S. Department of State
CGPA: 4.00/4.00

**Beaconhouse School System** *Sep/14 – Sep/16*
A-levels, Sciences, Pakistan
Grades: 4 A*s

**Chenab College Jhang** *Sep/11 – Sep/14*
O-levels, Sciences, Pakistan
Grades: 8 A*/As

## RESEARCH EXPERIENCE

**Accelerating the solution of partial differential equations using Graph Neural Networks (current project)** *RPI, Sep/22 - present*
*Advisor: Prof. Jason Hicken*
- Literature review of machine learning models used to solve linear system of equations
- Solving poison equation using machine learning (Graph Neural Networks)
- Using machine learning model (MeshGraphNets) as a pre-conditioner for numerical solvers

**Generate 3D Mesh from 2D Image using Graph Neural Networks** *RPI, Jan/22- Aug/22*
*Advisor: Prof. Suvranu De*
- Implemented machine learning model for graph data
- Literature review for solving PDEs using neural networks
- Implemented deep learning models for robust loss functions

**General and Adaptive Loss function** *RPI, March/22*
- Implemented adaptive loss (Barron, n.d.) on machine learning models for image classification (neural network)

**Conditional Generative Adversarial Network (cGAN)** *RPI, May/22*
*Supervisor: Prof. Qiang Ji*
- Trained a cGAN on CelebA dataset for generating images of human face given the attributes of the image

**Design and Manufacturing of a prosthetic knee (Undergraduate Thesis Project)** *NUST, Jul/19 – Jun/20*
*Advisor: Dr. Sana Waheed*
- Designed and simulated the polycentric prosthetic knee using Solidworks and MATLAB. Manufactured the product prototype using 3D printing, wrote a thesis for cost-effective and efficient knee for trans-femoral amputees.

**Glioma Progression** *WCU, Jan/19 – May/19*
*Advisor: Dr. Martin Tanaka*
- Developed mathematical equations to characterize the vascular nature of brain tumors, transfer of nutrients from blood vessels through the tumor bodies, and the subsequent effects of chemotherapy on the basis of literature review.

**Computational Fluid Dynamics (CFD)** *NUST, Jun/18 – Aug/18*
*Advisor: Dr. Muhammad Sajid*
- Internal flow and external flow analysis was done on non-circular geometries using snappyHexMesh in OpenFoam.

## STARTUP

**Little Wings Tuition Center** *2010 – 2019*
- Co-founded 'Little Wings Tuition Center' at the age of 16 to educate under-privileged students by teaching math and science.

# ENGINEERING PROJECTS

**Hydraulic Arm Robot** *NUST, Dec/18*
- Manufactured a three-armed low weight prototype using hydraulic syringes.
- Developed an inverse-kinematic model in MATLAB.

**Repeatable Vehicle** *NUST, Jan/17*
- Manufactured four-wheeled vehicle using gear motors.
- Represented the vehicle in 'National Design Challenge' held by School of Mechanical and Manufacturing Engineering.

**Wind Turbine** *CCJ, Nov/13*
- Worked as a team leader to produce electricity from a wind turbine as a solution for the energy crisis of Pakistan. The project was made to be represented on International Geo – Fest Competition of 2013 held by City Montessori School, India.

# INDUSTRY EXPERIENCE

**National Foods Limited, Pakistan** *Oct/20 – Jan/21*
- During my work as Management Trainee Engineer at National Foods Pakistan, I visited industrial sites, made real-time decisions, analyzed complex manufacturing issues and most importantly, worked in a team – all which made me realize the direct impact of technology on people's lives.

# INTERNSHIPS

**Computational Fluid Dynamics** *NUST, Jun/18 – Aug/18*
- 6 weeks: Used OpenFoam to perform external flow and internal flow analysis.

**The Citizens Foundation Pakistan (Community Service)** *Jun/18 – Aug/18*
- Taught Math and developed interactive speaking skills in underprivileged students of a village ('Chakra').

**World Wide Fund (WWF)** *Jul/11 – Jul/13*
- Attended National Children Mountain Conservation Meet in 2012 and 2013 funded by WWF.
- Taught the students how to conserve the environment and planted many trees in Thandiyani, Pakistan.

# AWARDS AND SCHOLARSHIPS

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|---|---|
| Teaching Assistant at Rensselaer Polytechnic Institute | *Sep/22 - present* |
| Research Assistant at Rensselaer Polytechnic Institute (Prof. De Lab) | *Jan/22 – Aug/22* |
| KAIST scholarship for Masters of Mechanical Engineering (awarded) | *2020* |
| Silver Medalist in a batch of 120 students in Bachelor of Mechanical Engineering | *Jul/20* |
| 2018-2019 Global Undergraduate Exchange Program, Funded by U.S Department of State | *Jan/19 – May/19* |
| NUST Merit Scholarship | *Sep/16 – Jul/20* |
| PepsiCo Change the Game Competition 26 Finalist | *Dec/18* |
| Gold Medalist in Advanced Level (High School) | *Jul/16* |
| Geo-Fest International Competition of 2013 organized by City Montessori School, India | *Nov/13* |
| Junior Leader NCMC, WWF Pakistan | *Jul/11 – Jul/12* |
| Participant: All-Pakistan Declamation Contest, held in Lahore by Punjab Medical College | *2012* |
| Third Prize: Hydro-Electric Generator as a solution to Pakistan energy crisis | *Jan/12* |

# CERTIFICATIONS

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|---|---|
| Deep Learning Specialization (DeepLearning.AI) | *Jan/22* |
| Machine Learning (Stanford University) | *Oct/21* |
| Python Data Structures (University of Michigan) | *Aug/21* |
| Microsoft Office (Certified) | *Jan/18* |

# SKILLS

Python     TensorFlow     SolidWorks     OpenFoam     Pytorch     MATLAB     Public Speaking

*Last Updated: Nov 30, 2022*