Safi Ahmed Memon

Ph.D. in Mechanical Engineering

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EDUCATION

2018.03. – 2024.02. **Kyungpook National University, Daegu, South Korea**

- **Ph.D.** in Mechanical Engineering. Thesis focused on systematically testing geometrical attributes of cooling channels. Key findings suggested incorporating wall concavity and smooth flow bifurcation to improve the channel heat dissipation ability.
- Coursework included the Finite Element Methods course which involved writing code to analyze composite time integration schemes and discussing their dispersion properties. Conditions for second-order accuracy were derived and 3-DOF spring-mass systems were analysed using the numerical schemes. Codes available on my GitHub.

2015.08. – 2017.06. **GIK Institute, Topi, Pakistan**

- **M.S.** in Mechanical Engineering. Thesis focused on phase change of salt hydrate slurry in heat sink cooling channels. Developed Nusselt number correlations that predicted thermal performance with 5.6% accuracy.
- Coursework involved in-depth modeling of heat equation in cylindrical and spherical coordinates, writing code to improve solar panel efficiency, and programming microcontrollers to rectify underwater vehicle wheel slippage.

2010.08. – 2014.06. **GIK Institute, Topi, Pakistan**

- **B.S.** in Mechanical Engineering. Coursework included analytical and numerical solutions of ordinary and partial differential equations.

SCIENTIFIC PROGRAMMING EXPERIENCE

Spherical Heat Equation Solver for Phase Change Material with Dynamic Visualization

- Developed numerical solution code for heat equation in spherical coordinates to track phase change material interface over 24 hours.
- The code visualizes series solution of heat equation over a sphere, depicting temperature profiles of a spherical PCM and its surroundings, with adjustable time control via slider.

Intelligent Microcontroller Design to Solve Magnetic Bearing Slippage Issue

- Addressed a critical challenge in underwater vehicle operation: the potential slippage of the thruster from the vehicle servo motor due to external interference, such as marine creatures.
- Integrated sensors with the microcontroller to detect slippage in the magnetic coupling.
- Programmed the servo motor using Wolfram language to gradually decrease its RPM to match that of the uncoupled wheel, reengage with the wheel, and then gradually return to its initial RPM.

Software Application for Fluid-Structure Interaction Analysis of Wastewater Screening Mechanism

- Created a Java-based user interface that allows end-user to enter the desired configuration of a wastewater screening mechanism and run the k–ω turbulence model simulations in COMSOL Multiphysics.

Software Application for Capacity Assessment of Solar-powered Air Conditioner

- Created user-interface using Wolfram language to input system parameters, such as available solar collector area
- The program generated system metrics such as operating temperatures and the percentage of energy demand met by solar power for a specified month.
- The program generated plots such as solar collector area vs energy contribution to evaluate system efficiency.

COMPUTATIONAL SKILLS

- **Software**: Wolfram Mathematica & SystemModeler, COMSOL Multiphysics, Ansys Fluent
- **Programming languages:** Wolfram language, Java, Python

RELEVANT CERTIFICATIONS

- Certified in "Python for Engineers and Scientists" course, LinkedIn, February 2024
- Certified in "Python Essential Training" course, LinkedIn, February 2024
- PTC Certified Training in CAD/CAM using Creo Parametric, August 2011

TEACHING AND SUPERVISION EXPERIENCE

2018.03. – 2024.02. **Supervised CFD projects**
as a *Graduate Research Assistant* at Bio & Experimental Fluid Engineering Lab

- Mentored undergraduate students in CFD projects utilizing ANSYS Fluent simulation.
- Projects included analyses of turbulent flow in centrifugal pumps and bullet aerodynamics.

2017.08. – 2018.02. **Developed thermal storage product**
as a *Research Assistant* at GIK Institute

- Led an undergrad student team with development of a Solar-Powered Adsorption Refrigerator for vaccine storage
- Development process included research, design calculations, and documentation.

2015.08. – 2017.07. **Conducted scientific programming workshops**
as a *Graduate Research Assistant* at GIK Institute

- Conducted trainings on solving mechanical vibration problems using numerical solver in Wolfram Mathematica; sample of my workshop: http://tinyurl.com/safi-mathematica
- Conducted trainings on CFD modeling of phase change materials in ANSYS Fluent; sample of my workshop: http://tinyurl.com/safi-fluent
- Course grader for *Ordinary Differential Equations*, *Heat Transfer Modeling*, *Fluid Mechanics*, *Statics*, and *Mechanical Vibrations* courses

AWARDS & RECOGNITION

- ***Best "Brain Korea" Researcher Award*, 2021:** Awarded for research paper on CFD simulation of heat exchangers
- ***IEEE-RAS Scholarship Recipient*** to attend the **IEEE Rescue Robotics Summer School** in Turkey (2012.09.)
- Team member for NightFury – a robot that won ***Best Engineering Design Award*** among **170+ teams in Pakistan** at the **National Engineering Robotics Contest, 2012**. Project details and video: http://bit.ly/NightFuryRobot
- Scored in ***top 1.15%*** in Pakistan in **20th International Kangaroo Mathematics Olympiad** (2010.06.)
- Scored ***770/800*** in SAT Subject (Mathematics Level II), 2010.
- Scored ***95.56 percentile*** in **Mathematics GAT Subject Test**; topics included **calculus**, **differential equations**, **linear algebra**, **mechanics**, **complex analysis**, and **probability** (2015.02)

ADDITIONAL INFO

Reviewer for CFD related articles in *International Journal of Heat and Mass Transfer* and *Journal of Thermal Sciences*