

CURRICULUM VITAE

AYAN MAJUMDER

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ACADEMIC DETAILS

Examination	Year	Institute/School	Board	GPA/%
B.Tech + M.Tech (Dual Degree)*	2015-2020	Department of Mechanical Engineering		9.32/10
Senior Secondary School Exam (XII)	2013-2015	ODM Public School, Bhubaneswar	CBSE	95.4%
Secondary School Exam (X)	2012-2013	DAV Model School, Kharagpur	CBSE	10/10

*Specialization in Thermal Science and Technology

SCHOLASTIC ACHIEVEMENT

- Currently **Department Rank 2** (Dual degree) amongst a total of 100 students.
- Received the **Honda Young Engineer and Scientist Award (Honda YES), 2017-18** which is given to a total of 14 students across all disciplines of engineering in the country for presenting a competitive research proposal to advance the energy sector and foster ecotechnology using thermal engineering.
- Secured **Gold** at the 7th **InterIIT Tech Meet** in the Medical Innovation Challenge for the design and fabrication of a low cost non-invasive saliva based glucometer strip for diabetes detection.
- Secured **Gold** in product design at the **Technology General Championship 2018-2019** for the development of a microfluidic device for Parkinson's disease prediction.
- Qualified **National Standard Examination in Physics(NSEP), 2014** (top 1 percentile of India).
- Qualified **National Standard Examination in Chemistry(NSEC), 2014** (top 1 percentile of India).

TECHNICAL TOOLS AND SOFTWARE SKILLS

- **Languages** (C), **Tools** (L^AT_EX), **Web Technology** (HTML), **Softwares tools/packages** (Solidworks, AutoCad, Ansys Fluent, Comsol, Matlab, Engineering Equation Solver (EES), MS Office).

INTERNSHIPS

- **Thermal Energy Engineering Lab, The University of Tokyo, Japan (May 2019 - July 2019)**
Guide: Prof. Junichiro Shiomi, Department of Mechanical Engineering
Numerical Investigation of Phonon Transport in Nanomaterials using Monte Carlo Method
 - Performed first principle calculations using Quantum Espresso on a cluster for the determination of optimized crystal structures for various materials such as Si, Ge and RuSi.
 - Determined the band structures and thermal conductivities by analyzing displacement files generated.
 - Determined the thermal conductivity of some designed nanowires using a Phonon Monte Carlo simulator.
 - Obtained a design with a predicted lower thermal conductivity compared to other existing designs.
 - Developed an Electron Monte Carlo simulator for heat transfer across a nanowire.
- **Waterloo Institute of Nanotechnology, University Of Waterloo, Canada (May 2018 - July 2018)**
Guide: Prof. Sushanta Mitra, Executive Director Waterloo Institute of Nanotechnology
Waterflooding on a Microfluidic Chip for the prediction of Oil Recovery of Reservoir Rocks
 - Came up with a unique solution for the extraction of oil from dead pores in rock micro-channels, with complete mathematical derivations to show the feasibility of the idea.
 - Developed a MatLab script, which can completely recreate the pore network inside rocks based on porosity, permeability measurements and pore and throat size distribution.
 - The pore network, obtained in an AutoCad file, was then sent to print a photomask to be used in Photolithography for the fabrication of the microfluidic chip.
 - The required design was obtained as micro-channels on a PDMS chip with uniform depth, and silicon-glass bonding was done for flow visualization using a microscope.
 - Analysis of fluid flow through micro-channels and volumetric measurements were done indirectly by image analysis of the channel filled with different color dyed liquids.

- **Mechanical Engineering, Indian Institute of Technology, Kharagpur (May 2017 - July 2017)**

Guide: Prof. Vikranth Racherla, Department of Mechanical Engineering

- **Design and Fabrication of an Electric Rickshaw with Enhanced Safety and Performance**

- Mathematically determined the exact specifications of components of the transmission system which included differential, continuous variable transmission (CVT), motor and axles based on power and torque requirements of the vehicle when being driven on both highways and cities.
- Designed the entire transmission system of the vehicle performing design optimization using Solidworks and stress analysis using Ansys to obtain a final overview of the entire design.
- Contacted dealers for the purchase of respective components and obtained quotations.

PROJECTS

- **Flow Modelling of a Viscous (Porous) Rotor Blower in a Centrifugal Fan for Notebook Devices, Intel Corporation, Oregon Area, USA**

Guide: Prof Anandaroop Bhattacharya, Mechanical Engineering, IIT Kharagpur & Dr. Mark MacDonald, Principal Engineer, Intel Corporation, USA (August 2018 - Present)

- Developed a simplified 3d CAD model on solidworks of the experimental setup at Intel.
- Developed a simulation model on Ansys Fluent with proper tuning of the porous foam giving fan curves coinciding with the experimentally generated curves.
- Performed foam optimization tests to determine the best foam material, porosity and PPI density.
- Performed geometry and motor placement optimization tests on the model to maximize the CFM output.
- Currently involved in the DOE analysis of the centrifugal fan to obtain finalized design characteristics.

- **Development of a Low Cost Non-Invasive Saliva based Glucometer Strip**

The 7th InterIIT Tech Meet 2018

- Developed the design of the micro-channels for transferring saliva from input location to reaction region.
- Designed the electrodes for the detection of the progress and output of the reaction.
- Performed simulations on Comsol using the microfluidics - electrochemistry module for the prediction of I-V characteristics, Fe^{3+} , Fe^{2+} and glucose levels and the distribution over the electrodes.
- Manufactured the electrodes and the microfluidic channels for the strip using appropriate methods.

- **Study of Natural Convection over a Heated Vertical Plate using Schlieren Technique**

Guide: Prof. Manab Kumar Das, Department of Mechanical Engineering (June 2017 - March 2018)

- Set up the apparatus for Z-Schlieren by employing self devised techniques to obtain precise alignments.
- Obtained qualitative images to visualize the thermal boundary layer due to a heated vertical plate.
- Determined the convective heat transfer coefficient experimentally using Schlieren system and compared it with the analytically determined solution to determine accuracy of the experimental solution.
- Obtained different isotherms using filament method and generated the temperature profile based on the intensity variations of captured images by using basic image processing methods on Matlab.
- Presently developing an algorithm to predict the temperature distribution from intensity gradients of captured images and extending it to video inputs for live measurements of temperature variation.

- **Prediction of Angle of Repose for Dry Granular Materials - An Analytical Model**

Guide: Prof. Arun Kumar Majumder, Department of Mining Engineering (May 2016-June 2016)

- Developed a mathematical model for the prediction of the angle of repose for dry granular material.
- Derived the existing empirical models from this model to validate it.
- Collected experimental data for various materials and compared them with the model predicted values.

RELEVANT COURSES

Heat Transfer | Fluid Mechanics | Thermodynamics | Applied Thermofluids | Partial Differential Equations | Mechanics of solids* | Kinematics of machines* | Basic Electronics* | Computational Fluid Dynamics | Advanced Fluid mechanics
Other Courses : Transform Calculus, Matrix Algebra, Vector Algebra, Mechanics, Dynamics, Programming and Data Structure*, Electrical Technology*, Physics*, Chemistry*.

**Courses having a Laboratory Component*

EXTRA-ACADEMIC ACTIVITIES/AWARDS

Cofounder of the research group **BioEngine** for research in Medical Diagnostic Devices | **Mechanical Team Head** of the Inter Hall Product Design team | Member of Hall Music Band as **Lead Guitarist** | **Team-Leader** of National Service Scheme (NSS) UNIT-14 for the session 2016-2017.