# Joel Martis

Indian Institute of Technology Madras
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## EDUCATION

**Indian Institute of Technology Madras** Chennai, India

*Bachelor of Technology in Mechanical Engineering (Honors)* 2017

*Minor: Physics*

Cumulative grade point average (CGPA): **9.57/10**

**St. Aloysius Pre-University College** Mangalore, India

*Higher Secondary Education* 2013

Marks obtained: 94.16/100

**St. Aloysius High School** Mangalore, India

*Secondary Education* 2011

Marks obtained: 96.64/100

## SCHOLASTIC ACHIEVEMENTS

- Recipient of the DAAD WISE fellowship for researching at Karlsruhe Institute of Technology, Germany in 2016 (one among 150 students from all over the country)
- Secured the prestigious Kishore Vigyanik Protsahan Yojana (KVPY) scholarship in 2013
- Among the top 1% of students in the country to qualify for the Indian National Physics Olympiad and Indian National Astronomy Olympiad in 2013
- Honored as "Best Outgoing Student" by St. Aloysius High School for outstanding overall performance in 2010

## PUBLICATIONS

- Joel Martis and Ratna Kumar Annabattula, *An analytical and DEM study on the effective thermal conductivity of a packed granular bed*, Second International Conference on Particle, Granule, and Bulk Solids: Innovations and Applications, December 1 - 3, 2016, Jaipur, India
- Joel Martis and Ratna Kumar Annabattula, *Effective thermal conductivity of a multi-component polydisperse granular bed*, Physical Review B, December 2016 (under review)

## RESEARCH PROJECTS

**Heat Transfer in a Packed Granular Bed** Aug 2015 – Nov 2016

*Guide: Prof Ratna Kumar Annabattula*

- Analytically and numerically studied heat transfer in a packed granular bed of spherical particles
- Developed code with the help of LIGGGHTS Discrete Element Method (DEM) package and simulated heat transfer in a packed granular bed of monodisperse spheres
- Derived an analytical expression for the effective thermal conductivity in terms of mean parameters
- Extended the analysis to a general multi-component packed bed
- Presented the work at the 2nd International Conference on Powders, Granule, and Bulk Solids
- Submitted paper to Physical Review B

**Dendritic Growth of Poly Ethylene Oxide (PEO) on a 2D mesoscale lattice** Dec 2015 – present

*Guide: Prof Manu Jaiswal*

- Programmed a probabilistic mathematical model using MATLAB to simulate polymer growth
- Applied the theory of phase transitions to physically explain the phenomenon
- Numerically simulated phase transition and dendritic growth using phase field modelling

**Heat Transfer in Rotating Heat Sinks (Bachelor Thesis)** Sep 2016 – present

*Guide: Prof Chakravarthy Balaji*

- Simulated a cylindrical rotating heat sink filled with phase change material in an external domain of air
- Simplified the problem computationally by finding the heat transfer coefficient on the outer surface of the heat sink as a function of rotation rate
- Analyzed the time required to reach a set point temperature as a function of rotation rate
- In the process of adding heat transfer enhancing structures (such as fins) to the system, and finding the optimal geometry and arrangement using neural networks to achieve the best possible cooling

**Phase Field Modelling and Applications** May 2016 – Jul 2016

*Guide: Prof Britta Nestler*

- Studied formulation of phase field modelling at Karlsruhe Institute of Technology in Germany under the DAAD WISE fellowship program
- Analyzed a triple junction, under static (equilibrium angle) and dynamic conditions (interfacial velocity) under various phase field formulations using the PACE3D package
- Verified Young's law at the triple junction for a new simplex formulation

## COURSEWORK

*Relevant courses are listed here*

- Heat Transfer
- Foundations of Fluid Mechanics
- Flow and Thermal Instabilities
- Computational Fluid Dynamics
- Micro and Nanoscale Energy Transport
- Rheology of Complex Materials

- Introduction to Turbulence
- Classical Physics
- Quantum Physics
- Differential Equations
- Applied Mechanics of Materials
- Classical Field Theory
- Multivariable Calculus
- Probability and Stochastic Processes

## PROFESSIONAL EXPERIENCE

**Wipro Limited** Bangalore, India

*Intern* Nov 2015 – Jan 2015

- Designed connectors of various geometries (square, pentagonal, hexagonal) for enhancing the modularity of luminaires and enabling complex lighting solutions for office spaces

**Mahindra & Mahindra Limited** Mumbai, India

*Project Trainee* June 2015 – July 2015

- Designed an oil level switch mechanism to prevent incomplete filling of oil in a gearbox, thus improving the efficiency of the gearbox production line by more than 10 %
- Designed a lifting mechanism to automatically lift transfer cases, which were previously being manually lifted, thus reducing fatigue to the operator and increasing the speed of the operation

**Water Bird LLC** Dubai, UAE

*Intern* May 2015 – June 2015

- Studied the design and operation of water treatment plants involving reverse osmosis, media filtration, wastewater treatment, desalination, disinfection, and other water treatment processes

## EXTRACURRICULARS

*Basketball*

- Represented the college basketball team during 'Sportsfest 2014'
- Represented the high school basketball team and won several tournaments
- Captain of the hostel basketball team between August 2015 and May 2016

*Music*

- Proficient at lead guitar, bass guitar, piano and drums.
- Composed the theme song *Spirit of Saarang* for the college cultural festival *Saarang* in 2015

## SKILLS

**Programming Languages:** C/C++, Python, HTML, Java and JavaScript

**Software/Packages:** ANSYS, OPENFOAM, MATLAB, Wolfram Mathematica, AutoCAD, PTC Creo Parametric, SolidWorks, LIGGGHTS