

# Vinayak Garg

Indian Institute of Technology Madras

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## EDUCATION

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

Bachelor of Technology in Mechanical Engineering (*Honors*) 2018

Master of Technology in Thermal Engineering

Minor in Nano Science and Engineering

**Delhi Public School, RK Puram** New Delhi, India

Senior Secondary Education (10+2, Science with Economics) 2013

**Kendriya Vidyalaya, Hebbal** Bangalore, India

Secondary Education (10th) 2011

## SCHOLASTIC ACHIEVEMENTS

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- Secured a rank in the top 0.1% in IIT-JEE, a Physics, Chemistry and Mathematics - based entrance examination for admission to the IITs in 2013
- Recipient of National Talent Search Examination/National Merit scholarship
- Ranked 19th in the Junior Mathematics Olympiad and 51st in the Junior Science Olympiad in 2011

## PROJECTS

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**Droplets on Soft Matter** (December 2017-present)

(Guided by Dr. Ashis Kumar Sen)

- Investigating and modelling conditions for droplet coalescence on soft matter; has application in droplet manipulation on lab-on-a-chip devices and modelling movement in cytoplasm in cells.
- Devised a metrological technique to measure the thickness of liquid thin film substrates.

## **Problem of retrieval of seed points from a Voronoi Diagram in Computer Graphics**

(May 2017-present)

(Supervised by Dr. M Ramanathan, IITM)

- Proposed two algorithms to generate the points constellation from a given Voronoi diagram: an iterative bisection method-based algorithm and a closed-form geometrical solution
- Implemented and tested the bisection method-based algorithm for 1,000,000 Voronoi points.
- Has application in various fields utilising plane partitioning based on distance to some points, for example, crystal growth in chemistry, understanding organisation of biological tissues or even networking.
- In the process of writing a paper for publication.

## **Research internship at Department of Applied Physics, Aalto University, Finland**

(June 2016-August 2016)

(Supervised by Dr. Robin Ras ([robin.ras@aalto.fi](mailto:robin.ras@aalto.fi)))

- The motion of water droplets on superhydrophobic substrates with superhydrophilic patterns was studied by capturing videos using high-speed cameras.
- The pinning and subsequent breakage of droplets were studied and analysed.
- The potential and applications of soft materials in 3-D printing were investigated through a review of the recent advances in the field and the findings were presented in a survey paper.

## **Research internship at Centre for Nano Science and Engineering, Indian Institute of Science**

(May 2015-July 2015)

(Guided by Dr. Prosenjit Sen ([prosenjits@cense.iisc.ernet.in](mailto:prosenjits@cense.iisc.ernet.in)))

- ❖ Project “Rainergy” (Generation of electricity from rainwater)
  - Proposed and conceptualised a novel energy harvester that harvests energy from raindrops.
  - Garnered interest from angel investors and VCs at a startup event organised by Accel Partners, Bangalore.
- ❖ Studied contact angle hysteresis on a superhydrophobic surface using high-speed imaging
  - Proposed a solution to qualitatively determine the forces acting on a water droplet on a Si-based superhydrophobic surface.
  - Has applications in the consumer goods industry to significantly reduce their wastage.

## **Light Painting**

(August 2014 - November 2014)

- This is an image processing based project which revolutionises the traditional chalk-blackboard style of writing.
- Devised a setup that converts a directed light stimulus into the corresponding trajectory on a screen using a light source, webcam and projector. Creates an experience of painting with light on a screen.
- The project was featured in the IIT Madras “Centre for Innovation” Open House and also covered by the media.

## **PROFESSIONAL EXPERIENCE**

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### **Industrial Internship at Titan Innovation Hub, Titan Company Ltd. (TATA Group)**

(December 2015-January 2016)

- Worked with the R&D team for Titan’s eyewear division, Titan EyePlus.
- Using image processing and metrological techniques, designed a setup along with a Graphical User Interface for the end user to compare spectacle parameters like frame sizes, progressive corridor and refractive indices virtually.
- This project is being scaled for implementation in all retail stores of Titan Eye Plus as part of their policy to improve customer care through technology.

## **COURSEWORK**

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Relevant courses are listed here.

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|--|---|
| • Foundations of Fluid Mechanics           | • Heat Transfer                             |
| • Numerical Methods in Thermal Engineering | • Computational and Differential Geometry   |
| • Microfluidics and Microsystems           | • Design and Optimisation of Energy Systems |
| • Applied Thermodynamics                   | • Linear Algebra and Numerical Analysis     |
| • Computational Neuroscience               | • Multivariable Calculus                    |
| • Differential Equations                   | • Science and Technology of Nano Materials  |
| • Mathematical Theory of Games             | • Air Breathing Engines                     |
| • Incompressible Fluid Flow                | • Materials and Design                      |
| • Turbomachines                            |   |
| • Dynamic Modelling of Engineering Systems |   |

I am enthusiastic about learning languages and have studied the following during my Undergraduate studies at IIT Madras:

- Mandarin(Intermediate proficiency)
- French (Intermediate proficiency)
- German (Intermediate proficiency)
- Japanese (Elementary proficiency)

## **EXTRA-CURRICULAR ACTIVITIES**

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### **Mountaineering**

- Completed 26-day Basic Mountaineering Course organised by Atal Bihari Vajpayee Institute for Mountaineering and Allied Sports, Manali with distinction.
- The diploma-level course entailed rock climbing, snowcraft, icecraft, trekking and survival skills.

### **Sports**

- Played basketball and represented IIT Madras at Inter-varsity tournaments.

### **Mental Math**

- Crowned 'Champion' at two consecutive national level abacus-based arithmetic competitions.

## **TECHNICAL SKILLS**

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I have incorporated the following into my projects:

Languages: C,C++, Python, MATLAB

Libraries: CGAL, OpenCV

Softwares: AutoCAD, PTC Creo