

# JOHN SEBASTIAN

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## Research Interests

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*Fluid Mechanics; Soft Matter and Biophysics; Applied and Computational Mathematics*

## Education

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**Technical University of Denmark (DTU)** 2023 - Ongoing  
Doctor of Philosophy (Physics)  
Soft Matter and Biophysics Group ([Jensen Research](#))

**Ben-Gurion University of the Negev, Israel (BGU)** 2021 - 2023  
Master of Science (Mechanical Engineering)  
Fluid Mechanics Laboratory ([Green Lab](#))  
*Thesis: Electrical Circuit Modelling of Nanofluidic Systems*

**College of Engineering, Trivandrum (CET)**  
**University of Kerala, India** 2013 - 2017  
Bachelor of Technology (Mechanical Engineering)  
Micro/Nanofluidics Laboratory ([RS Kumar Lab](#))  
*Thesis: Inverse Design of Short Span Hydrofoils*

## Publications/ In press

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- **J Sebastian**, K H Jensen. “The geometry of Nature’s stingers is universal due to stochastic mechanical wear” (In press, PNAS (2026))
- **J Sebastian**, A L Schødt, K H Jensen. “Experiments on a sphere settling towards a boundary in a viscous liquid under the influence of a magnetic force”, [Journal of Fluid Mechanics](#), 1024, A12 (2025)
- **J Sebastian** and Y Green. “Electrical Circuit Modelling of Nanofluidic Systems”, [Advanced Physics Research](#) 2.10 (2023): 2300044 On journal cover

## Honors and Awards

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- Travel Award to attend APS Global Physics Summit Otto Mønsted Fonden, 2025
- Negev Fellowship for Outstanding Graduate Students in Engineering BGU, 2022
- The Macquarie Group Scholarship from edX edX, 2021

## Teaching Experience

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- Teaching Assistance + Guest lectures (on transport, electrokinetics):  
*Theoretical Microfluidics* Graduate Course DTU: 2023, 2024
- Teaching Assistance: *Statistical Physics* Graduate Course DTU: 2023, 2024

## Professional Research Experience

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**MRF Tyres (Research & Development)** July 2017 - September 2020  
*Research Engineer* Chennai, India

- Computational modelling of tyre composites; development of functional geometric designs and materials
- Image analysis methods to estimate complex deformations at the tyre contact patch

**STAD TechnoInnovations** October 2015 - April 2016  
*Mechanical Design Intern* Ernakulam, India

- Reverse engineered the complex shape and material characteristics of the tibial bone implant to arrive at an internal mesh structure suitable for 3D printing

## Other Academic Research Projects

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### **PD Pillars: Electrokinetic constraints on intercellular signalling in plants**

*Supervisors: Prof Kaare H. Jensen, Prof Howard Stone* manuscript in prep., 2026

### **Soft Poiseuille: Nonlinear viscous flow response in soft compliant channel**

*Supervisor: Prof Kaare H. Jensen* 2025

### **phytoMaze: Anisotropic signal transport in plant tissue encoded by cellular architecture**

*Supervisors: Prof Kaare H. Jensen, Prof Johannes Liesche* 2024

### **Water Tetris: Drag invariance and invisible corners in polyomino plates**

*Supervisor: Prof Kaare H. Jensen* 2023

### **Surface Charge Regulation and its Effects on the Conductance of 2D nanochannels**

*Supervisor: Prof Yoav Green* May 2022 - March 2023

### **Microswimmers in non-Newtonian fluids**

*Supervisor: Prof Roiy Sayag* March 2022 - July 2022

### **Detection of Microplastics in Inland Waters using Impedance Spectroscopy** [webpage](#)

*Supervisor: Prof Manu Prakash* Stanford/ Online, October 2020 - January 2021

### **Design of Short Span Hydrofoils**

*Supervisor: Prof Ranjith S Kumar* Bachelor's Thesis, 2017

### **Rapid and Low- Cost Fabrication of Expendable Microfluidic Devices**

*Supervisor: Prof Ranjith S Kumar* Micro/nanofluidics Research Laboratory, 2016

## Invited Talks

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- “Useful and Pointless Optima in Nature” Biocomplexity Section, Niels Bohr Institute, Feb 2026
- “Form v. Function through toy problems and actual toys” Prakash Lab, Stanford, Nov 2025
- “Traversing a thin film lubricant in finite time” Alim Group, TU Munich, Aug 2024

## Selected Conference Presentations

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- **J Sebastian**, K H Jensen. “Electrokinetic constraints on intercellular signalling in plants” APS DFD (Houston, USA – November 2025)
- **J Sebastian**, K H Jensen. “Geometric flows shaping universal geometries” Complex Motion in Fluids – CMIF (Île d’Oléron, France – July 2025) *Poster*
- **J Sebastian**, K H Jensen. “Random wear shapes all pointed things alike” The Art and Science of Liquid Interfaces (Zurich, Switzerland – March 2025) *Poster*
- **J Sebastian**, K H Jensen. “Random wear shapes all pointed things alike” APS Global Summit (LA, USA – March 2025)
- **J Sebastian**, A L Schødt, K H Jensen. “Traversing a thin film lubricant in finite times” Complexity of Life Conference (Graz, Austria – September 2024) *Poster*
- **J Sebastian**, A L Schødt, K H Jensen. “Traversing a thin film lubricant in finite times” Plant Biomechanics UK (Cambridge, UK – April 2024) *Poster*
- **J Sebastian**, A L Schødt, K H Jensen. “Traversing a thin film lubricant in finite times” APS March Meeting 2024 (Minneapolis, USA – March 2024)
- **J Sebastian** and Y Green. “Can nanofluidic systems be described by a simple electrical circuit?” 6th Physics of Membrane Processes Workshop - PMP 2023 (Online – November 2023)
- **J Sebastian** and Y Green. “Understanding the Conductance of Nanoslits” Israel Society for Theoretical and Applied Mechanics, Annual Conference, (Technion, Israel – Dec 2022)
- **J Sebastian** and Y Green\*. “Electrical Circuit Modelling of Nanofluidic Systems” 75th Annual Meeting of the APS DFD 2022 (Indianapolis, USA – November 2022) (\*Preseted by YG)
- **J Sebastian** and Y Green. “Electrical Circuit Modelling of Nanofluidic Systems” 5th International Symposium on Physics of Membrane Processes - PMP 2022 (Wageningen, Netherlands – October 2022)

- **J Sebastian** and Y Green. “*Electrical Circuit Modelling of Nanofluidic Systems*” 14<sup>th</sup> International Symposium on Electrokinetics - ELKIN 2022 (Tel Aviv, Israel – July 2022) *Poster + Soundbite*
- **J Sebastian** and Y Green. “*Multichannel Nanofluidic Systems: The Equivalent Electrical Circuit*” International Water Summit (Sde Boker, Israel – May 2022)
- **J Sebastian** and Y Green. “*Multichannel Nanofluidic Systems: The Equivalent Electrical Circuit*” 67<sup>th</sup> Annual Meeting of the Israel Physical Society (IPS) (Be’er Sheva, Israel – February 2022)
- **J Sebastian** and Y Green. “*The Equivalent Electrical Circuit of Multichannel Nanofluidic Systems*” Israel Society for Theoretical and Applied Mechanics, Annual Conference, (Tel Aviv, Israel – December 2021)
- **J Sebastian** and Y Green. “*Multichannel Nanofluidic Systems: The Equivalent Electrical Circuit*” Nano Israel 2021 (Jerusalem, Israel – October 2021)

## Leadership and Mentorship Roles (Outreach activities)

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- Organiser of weekly FLUIDS Friday Seminars at DTU Physics** *2023 - 2026*
- Seminar invitations have led to collaborations with the section.
- Panelist, Roundtable Discussion on Irreproducibility in Scientific Research** *14 Mar 2022*
- INTERNATIONAL WORKSHOP: The Problem of Irreproducibility in Scientific Experimentation: Is there a “Replication Crisis”? *BGU, Israel*
- Member, History and Philosophy of Science Club** *Nov 2021 - Mar 2022*
- Presented analyses of historical texts at various meetings *BGU, Israel*
- Member, Emergency Design Collective (EDC)** *Jun 2020 - Jul 2021*
- Part of a global team of problem solvers working together to mitigate new challenges in the wake of the COVID-19 pandemic
- Nominated to top three projects under “Pandemic Era Educational Challenges”
- Student Coordinator, Innovation Center CET** *2016 - 17*
- Coordinated weekly meetings, brainstorming sessions and training programs in the state-run facility
- Organised the first undergraduate thesis project expo, *Innov-EXPO* in May 2017
- Bosch Student Ambassador** *2016 - 17*
- Coordinated research collaboration, projects and student placements
- Project Coordinator, Society of Automotive Engineers (SAE)** *2015 - 16*
- Launched and mentored eight projects and maximized participation in national design competitions

## Selected Achievements (Academic adjacent)

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- Institute Topper - IET PATW 2016 Presentation Competition “*Microfluidics for the Future*” *Institution of Engineering and Technology (IET)- Present Around The World (PATW)*
- Founded CETALKS, an in- campus talk show in 2015
- Attended Indian Science Congress 2010 as Invited Student Delegate

## Extra Curricular Engagement

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- Photography (One of the final 5 Yuujou travel photographers out of 30,000 global photographers in 2019; World Photography Club (WPC) Cover Photo, 2022)
- DIY Microscopy, Origami, Stand up comedy