

JOHN SEBASTIAN

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Research Interests

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

Education

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)

2013 - 2017

University of Kerala, India

Bachelor of Technology (Mechanical Engineering)

Micro/Nanofluidics Laboratory ([RS Kumar Lab](#))

Thesis: Inverse Design of Short Span Hydrofoils

Publications/ In press

- **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

- 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

- 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

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

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

March 2022 - July 2022

Supervisor: Prof Roiy Sayag

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

Bachelor's Thesis, 2017

Supervisor: Prof Ranjith S Kumar

Rapid and Low- Cost Fabrication of Expendable Microfluidic Devices

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

Invited Talks

- “*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

- **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*” 14th 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*” 67th 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 | <i>2023 - 2026</i> |
| · Seminar invitations have led to collaborations with the section. | |
| Panelist, Roundtable Discussion on Irreproducibility in Scientific Research | <i>14 Mar 2022</i> |
| · INTERNATIONAL WORKSHOP: The Problem of Irreproducibility in Scientific Experimentation: Is there a “Replication Crisis”? | <i>BGU, Israel</i> |
| Member, History and Philosophy of Science Club | <i>Nov 2021 - Mar 2022</i> |
| · Presented analyses of historical texts at various meetings | <i>BGU, Israel</i> |
| Member, Emergency Design Collective (EDC) | <i>Jun 2020 - Jul 2021</i> |
| · 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 | <i>2016 - 17</i> |
| · Coordinated weekly meetings, brainstorming sessions and training programs in the state-run facility | |
| · Organised the first undergraduate thesis project expo, <i>Innov-EXPO</i> in May 2017 | |
| Bosch Student Ambassador | <i>2016 - 17</i> |
| · Coordinated research collaboration, projects and student placements | |
| Project Coordinator, Society of Automotive Engineers (SAE) | <i>2015 - 16</i> |
| · Launched and mentored eight projects and maximized participation in national design competitions | |

Selected Achievements (Academic adjacent)

- 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

- 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