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)
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

- **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 Phsics Summit *Otto Mønsted Fonden, 2025*
- Negev Fellowship for Outstanding Graduate Students in Engineering *BGU, 2022*
- The Macquarie Group Scholarship from edX *edX, 2021*

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
- Novel experiments for dynamic characteristics of motorcycle tyres
- 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

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*

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 invarience and invisible corners in polyomio 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)

Organiser of weekly FLUIDS Friday Seminars at DTU Physics *2023 - 2026*
- Seminar invitations have led to collaborations with the section.

Panelist, Roundtable Discussion on Irreproducibilty 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)

- 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