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 (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*

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

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*

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*

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"* 14$^{\text{th}}$ 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$^{\text{th}}$ 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)

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

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