Curriculum Vitae David Sinden

Personal Data

Title	Dr.
First name	David
Name	Sinden
Current Position	Senior Research Scientist
Current institution(s)/site(s), country	Fraunhofer Institute for Digital Medicine MEVIS, Bremen, Germany
Identifiers/ORCID	0000-0002-8514-8279

Qualifications and Career

Stages	**Periods and Details**
Degree programme	**MSc** – *Modern Applications of Mathematics*, 2003-2004, University of Bath, United Kingdom **MSc** – *Math. with. Applied Math. and Theo. Phys.*, 2000-2003, Imperial College London, United Kingdom
Doctorate	31.07.2008, Prof. Gert van der Heijden, Centre for Nonlinear Dynamics, University College London, United Kingdom
Stages of academic/professional career	2019-Present, Senior Research Scientist, Fraunhofer Institute for Digital Medicine MEVIS, (Prof Tobias Preusser) Bremen • Thermal ablation modelling • Pharmacokinetic modelling of liver function • Transcranial ultrasound simulation 2014-2019: Senior Research Scientist, Ultrasound and Underwater Acoustics Group (Prof Bajram Zeqiri) National Physical Laboratory, Teddington, United Kingdom • Worked on development of proto-type phase-insensitive breast imaging • Assessed design of ultrasound systems and generated acoustic fields for clinical imaging and therapy system for regulatory approval using measurement-based simulations of linear and nonlinear fields.

	2011-2014: Post-Doctoral Research Associate, Therapeutic Ultrasound Group (Prof. Gail ter Haar), Institute of Cancer Research/Royal Marsden Cancer NHS Foundation Trust, Sutton, United Kingdom. • Design and implementation of treatment planning software for pre-clinical large phased-array ultrasound transducer for transcostal thermal ablations 2008-2011: Post-Doctoral Research Associate, Department of Mechanical Engineering (Prof. Eleanor Stride), University College London, United Kingdom • Modelling cavitation activity in tissue during high-intensity focus ultrasound therapy. • Delivered mathematics lectures to engineering students

Supplementary Career Information

Activities in the Research System

- Teaching:
  - Calculus and Linear Algebra for Graduate Students, Constructor University, Bremen 2025
  - Numerical Methods, Constructor University, Bremen 2024, 2025
  - Numerical Analysis, Jacobs University, Bremen 2022 (now known as Constructor University)
- Standardisation: IEC Technical Committee 87 (Ultrasonics), Working Group 6 (High Pressure) Author New Work Item 62900: “Measurement-based Simulation in Water and Complex Media”. Also, member of parallel national committee BSI EPL/87 (Ultrasonics).

Supervision of Researchers in Early Career Phases

Prior to moving to Fraunhofer MEVIS, at the National Physical Laboratory I was the industrial supervisor to three PhD students (2018-2019):

- Katherine Baxter: PhD: “Linear and nonlinear wave equation models with power law attenuation”, 2018-2019, Primary Supervisor: Prof. Lehel Banjai, Dept. Mathematics, Heriot-Watt University, United Kingdom, awarded 2022. Software developer at Wood Mackenzie, Edinburgh. Acknowledged in: K. Baker, L. Banjai “Numerical analysis of a wave equation for lossy media obeying a frequency power law”, IMA J. Numer. Anal., 42(3) pp 2083–2117 (2022), doi: 10.1093/imanum/drab028
- Santeri Kaupinmaki: PhD: “Inverse Problems for Ultrasound Computed Tomography of the Breast” 2018-2019. Primary Supervisor: Prof. S. Arridge, Dept. Medical Physics, University College London, United Kingdom,
- Morgan Roberts: PhD: “Ultrasound Computed Tomography of the Breast”. Primary Supervisor: Prof. Ben Cox, Dept. Medical Physics, University College London, United Kingdom

Fraunhofer Institute for Digital Medicine MEVIS:

- Sandeep Gyawali: MSc: “Extending Composite Finite Element Method for PDE Problems with Geometric Uncertainties” (2022). Primary Supervisor: Prof. Tobias Preusser, (Jacobs University Bremen). Now a scientific software developer at TechsoMed GmBH, Bremen

Scientific Results

Category A

1. C. A. Neizert, H. N. C. Do, M. Zibell, C. Rieder, D. Sinden, S. M. Niehues, J. L. Vahldiek, K. S. Lehmann, F. G. M. Poch “Three-dimensional assessment of vascular cooling effects on hepatic microwave ablation in a standardized ex vivo model” *Sci. Rep.* 12 p. 17061 (2022). doi: 10.1038/s41598-022-21437-4
   - A unified experiment and modelling analysis describing the importance of influence of vascular on thermal ablation.
2. P. C. Guillemin, D. Sinden, Y. M’Rad, M. Schwenke, J. Le Guevelou, J. Uiterwijk, O. Lorton, M. Scheffler, P.-A. Poletti, J. Jenne, T. Zilli, R. Salomir “A novel concept of transperineal focused ultrasound transducer for prostate cancer local deep hyperthermia treatments” *Cancers* 15(1) p. 163 (2023). doi: 3390/cancers15010163
   - Designed and performed patient specific simulations of acoustic and thermal fields from novel thermal ablation device. Results were validated against experimental data.
3. D. Hyun, A. Wiacek, S. Goudarzi, S. Rothlübbers, A. Asif, K. Eickel, Y. C. Eldar, J. Huang, M. Mischi, H. Rivaz, D. Sinden, R. J. G. van Sloun, H, Strohm, M. A. L. Bell “Deep learning for ultrasound image formation: CUBDL evaluation framework and open datasets” *IEEE Trans. Ultrason. Ferroelectr. Freq. Control* 68(12) 3466-3483 (2021). doi: 10.1109/TUFFC.2021.3094849
   - Paper presents open-source, standardisation, open source, reproducible and reliable data in order to enable researchers to benchmark machine learning algorithms against test cases.
4. K. Heimes, M. Evers, T. Gerrits, S. Gyawali, D. Sinden, T. Preusser, L. Linsen “Studying the effect of tissue properties on radiofrequency ablation by visual simulation ensemble analysis” *VCBM 2022: Eurographics Workshop on Visual Computing for Biology and Medicine.* doi: 10.2312/vcbm.20221187
   - Creation of clinically relevant case studies for visualisation of uncertainties associated with variability of tissue properties.
5. K.J. Pahk, P. Gélat, D. Sinden, D. K. Dhar, N. Saffari “Numerical and experimental study of mechanisms involved in boiling histotripsy” *Ultrasound Med. Biol.* 43(12) 2848-2861 (2017). doi: 10.1016/j.ultrasmedbio.2017.08.938
   - Performed simulations of nonlinear acoustic simulations which lead to boiling histotripsy. Validated against experiments to show utility of simulations as a treatment planning tool.
6. D. Sinden, G. ter Haar “Dosimetry implications for correct ultrasound dose deposition: uncertainties in descriptors, planning and treatment delivery” *Transl. Cancer Res.* 3(5) 459-471 (2014). doi: 10.3978/j.issn.2218-676X.2014.10.02
   - Outlined sources of uncertainty and potential mitigations for successful clinical delivery of thermal

therapy by therapeutic ultrasound.

Category B

Developer of open-source acoustic simulator k-wave-python

Academic Distinctions

- Member of winning team for IEEE IUS 2020 Challenge on Beamforming using Deep Learning (CUBDL) for paper “Improving image quality of single plane wave ultrasound via deep learning based channel compounding”
- Presentation from paper “Studying the effect of tissue properties on radiofrequency ablation by visual simulation ensemble analysis” received honourable mention at Eurographics Workshop on Visual Computing for Biology and Medicine 2022.

Other Information

Data protection and consent to the processing of optional data

If you provide voluntary information (marked as optional) in this CV, your consent is required. Please confirm your consent by checking the box below.

[X] I expressly consent to the processing of the voluntary (optional) information, including “special categories of personal data”[1] in connection with the DFG’s review and decision-making process regarding my proposal. This also includes forwarding my data to the external reviewers, committee members and, where applicable, foreign partner organisations who are involved in the decision-making process. To the extent that these recipients are located in a third country (outside the European Economic Area), I additionally consent to them being granted access to my data for the above-mentioned purposes, even though a level of data protection comparable to EU law may not be guaranteed. For this reason, compliance with the data protection principles of EU law is not guaranteed in such cases. In this respect, there may be a violation of my fundamental rights and freedoms and resulting damages. This may make it more difficult for me to assert my rights under the General Data Protection Regulation (e.g. information, rectification, erasure, compensation) and, if necessary, to enforce these rights with the help of authorities or in court.

I may **revoke** my consent in whole or in part at any time – with effect for the future, freely and without giving reasons – vis-á-vis the DFG (postmaster@dfg.de). The lawfulness of the processing carried out up to that point remains unaffected. Insofar as I transmit “special categories of personal data” relating to third parties, I confirm that the necessary legitimation under data protection law exists (e.g. based on consent). I have taken note of the DFG’s Data Protection Notice relating to research funding, which I can access at www.dfg.de/privacy_policy and I will forward it to such persons whose data the DFG processes as a result of being mentioned in this CV.

[1] Special categories of personal data are those “revealing racial or ethnic origin, political opinions, religious or philosophical beliefs, or trade union membership, and (...) genetic data, biometric data for the purpose of uniquely identifying a natural person, data concerning health or data concerning a natural person’s sex life or sexual orientation” (Article 9(1) GDPR).