Shrutidhara Sarma

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Last Updated: December 31, 2023

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Nationality: Indian **Date of Birth:** 08-02-1989

Research Bio

The goal of my research is to design and fabricate highly reliable and mechanically robust physical sensors based on novel nanocomposites with applications in wearable sensors, vehicle and structural health monitoring.

Research Interests

Synthesis and characterization of nanomaterials (CNT/Gr) and laminated nanocomposites (LNC), electrospun polymer nanocomposite fibers, flexible sensors, printed stretchable sensors, structure-property relations in nanocomposites.

Education

2012-17 **Ph.D. in Mechanical Engineering**, *Indian Institute of Technology Guwahati*, India.
- Jointly with Aristotle University of Thessaloniki (AUTh), Greece as an **Erasmus Mundus Fellow**. Coursework CGPA: 9.75/10
- Dissertation: Thin film heat transfer gauges for short duration transient measurements. Advisors: Dr. N. Sahoo and Dr. Aynur Ünal

2008-12 **B.Tech. in Mechanical Engineering**, *Tezpur University*, India.
- **Institute Gold Medalist**. Ranked 1 in Department of Mechanical Engineering (CPI: 9.32/10)
- Major Project: Simulation of a Hybrid Solid Oxide Fuel Cell–Gas Turbine System

Experience

2019- **Assistant Professor**, Dept. of Mechanical Engineering, Indian Institute of Technology Jodhpur.
- Establishing **F**lexible s**E**nso**R**s from **N**anocomposites (FERN) Lab

2018-19 **Assistant Professor**, Dept. of Mechanical Engineering, National Institute of Technology Delhi.

2017-18 **Postdoctoral Fellow**, Kunsan National University, South Korea.
- Project: Design of Novel Airfoils for Slow Speed Wind Turbines. Advisor: Dr. J.H. Lee

2015-16 **Erasmus Mundus Fellow**, Aristotle University of Thessaloniki (AUTh), Greece.
- Project: Developing Multi-layered Nanocomposite based Thin Film Sensors. Advisor: Dr. P. Patsalas

2010 **Summer Research Fellow**, Indian Academy of Sciences, India.
- Project: Wind Power Developments in India with Reference to World Scenario. Advisor: Prof. D P Kothari and Dr. R. Natarajan

Awards and Mentions

- **ISEES Young Scientist Award 2024** by International Society for Energy, Environment and Sustainability.
- **Institution of Engineers (India)'s Smt. Sheela Baya National Award** on recognition of outstanding contribution and technological advancement in the field of Mechanical Engineering, 2023
- **SERB International Research Experience (SIRE) fellowship** for 2023-24 to collaborate with LNBD, Technion, Israel
- **SERB POWER Research Grant** for 2023-26
- **WISER (Women in Science and Engineering Research) Fellowship** for 2023-26
- **PECFAR (Paired Early Career Fellowship in Applied Research Fellowship** for 2023 (I declined)
- **Erasmus Mundus Fellowship** for 2015-2016 by European Commission.
- **Jenesys 2.0 Fellowship** by JICE to represent India in Japan in 2014
- **Gold medal** in B.Tech in Mechanical Engineering by Tezpur University in 2012
- Class X **All Assam State Board Topper** (17th Position) 2005

Grants and Fellowships

Funding Agency	Project Title	PI/ Co-PI	Amount	Award Year
SERB POWER Grant	Flexible sensoR Array for health Monitoring of Morphing structurEs (FRAMME)	PI	Rs 60 Lakhs	2023-26
SERB International Research Experience (SIRE)	Mechanically resilient and ultra-sensitive flexible strain sensors for soft machines	Fellow	Fully funded (Rs 10 Lakh)	2023-24
WISER Indo-German Science and Technology Centre (IGSTC)	Towards development of ultrasensitive strain measurement system using laminated nanocomposites (TESSLA)	PI	Rs 39 Lakhs	2023-26 (ongoing)
PECFAR Indo-German Travel Grant (IGSTC)	Developing high performance linear temperature sensor from nanocomposites	PI	Rs 5 Lakhs	2023 (recommended for award, I declined)
Startup Research Grant (SRG), Science and Engineering Research Board (SERB), India	Highly conductive nanocomposite fibers for flexible temperature sensors (FlexTem)	PI	Rs 28 Lakhs	2020-22 (completed)
SEED Grant, IIT Jodhpur	Development of High performance flexible pressure sensors from nanocomposites using hierarchical microstructures	PI	Rs 25 Lakhs	2021-24 (ongoing)
Marie Sklodowska-Curie Actions (MSCA) Summer School, Cardiff University	Real Time Temperature Monitoring using Flexible Temperature Sensors (Flexmon)	Fellow	Fully-funded	May 2018
Erasmus Mundus Action-II Interweave Grant (European Commission)	Developing Multi-layered Nanocomposite based Thin Film Sensor	Fellow	Fully-funded (€ 18,000)	2015-16

Grants (Submitted/Under Review)

1. "Multifunctional sensing skins for curved aircraft surfaces (MultiSENSE)" - **SERB** Core Research Grant (2023)- Shortlisted for next round

Publications [In Review/In process]

1. Srivastava, R., **Sarma, S.** 2023 " Unraveling Stress Transfer Mechanisms in Bilayer Graphene-PDMS Nanocomposites using Raman Spectroscopy" **.** Under review at Advanced Engineering Materials.
2. Golwala, K., **Sarma, S.**, Agarwal A, Garg Y, 2023 "A woven wristband sensor for continuous temperature

monitoring". Under review at Advanced Engineering Materials.

3. Thapa, P., **Sarma, S.**, Bachhar, N., 2023 "Monodispersive Silver nanoparticle generation using Laser Ablation Synthesis in Solution and their use in strain sensors". Under review at Particle & Particle System Characterization.

Journal Publications

1. Yadav, Y.,Thapa, P., **Sarma, S.**, 2023 " CNT/PVDF Strain Sensor Development through Integrated Experimental and Computational Analysis" . Accepted at Instrumentation Science & Technology.
2. **Sarma, S.**, Rao, V. Ramgopal., 2023 "Emerging Synthesis and Characterization Techniques for Hybrid Polymer Nanocomposites". Nanotechnology, 35: 012002. DOI 10.1088/1361-6528/acfef8 IF= 3.658
3. Phadkule, S. S., **Sarma, S.**, (2023) "Progress in Nanocomposite based Flexible Temperature Sensors: A Review". Measurement:Sensors, 27:100692; https://doi.org/10.1016/j.measen.2023.100692
4. Phadkule, S. S., **Sarma, S.**, (2023) High-performance flexible temperature sensor from hybrid nanocomposite for continuous human body temperature monitoring. Polymer Composites, 44 (2): 1381-91; https://doi.org/10.1002/pc.27178 IF= 3.2
5. Phadkule, S. S., Singh, S. V., **Sarma, S.** (2023) Influence of experimental conditions on conductivity of electrospun nanocomposite fibers. Materials Today: Proceedings, 76 (2): 310-315; https://doi.org/10.1016/j.matpr.2022.11.244 IF=1.5
6. **S**ingh, S. V., **Sarma, S.**, (2022) Taylor cone height as a tool to understand properties of electrospun PVDF nanofiber. Journal of Electrostatics, 120:103770. https://doi.org/10.1016/j.elstat.2022.103770 IF=2
7. **Sarma, S.**, Verma, A. K., Phadkule, S. S., and Saharia, M., (2022) "Towards an Interpretable Machine Learning model for electrospun polyvinylidene fluoride (PVDF) fiber properties". Computational Materials Science, 213: 111661 https://doi.org/10.1016/j.commatsci.2022.111661. IF= 3.6
8. **Sarma S**, Singh S, Garg A (2021) Laminated Ag and Ag/CNT nanocomposite films as sensing element for efficient thin film temperature sensors, Measurement, 172: 108876. https://doi.org/10.1016/j.measurement.2020.108876. IF=5.1
9. **Sarma S**, Patsalas P (2020) Graphene nanostructures on electrodeposited Cu by chemical vapor deposition. International Journal of Mechanical and Production Engineering (IJMPE) 8 (4): 26-29
10. **Sarma S**, Fekas I, Filintoglou K,⋯.Sahoo N, Patsalas P (2019) Layer by layer deposition of alternate CNT and Ni films for efficient multilayer thin film temperature gauges. Journal of Physics D: Applied Physics 52, 095104. https://doi.org/10.1088/1361-6463/aaf692. IF= 3.2
11. **Sarma S**, Gao L, Niu X, Garg A, Sandoval J (2019) Thermal performance of thin fim heat gauges of gold, silver and nanocomposite. Appl. Therm Engg. 147: 545-550. doi: https://doi.org/10.1016/j.applthermaleng.2018.10.079. IF= 6.5
12. **Sarma S**, Sahoo N, Unal A (2018) Prediction of experimental surface heat flux of thin film gauges using ANFIS. Journal of the Institution of Engineers: Series C. doi: https://doi.org/10.1007/s40032-018-0458-2
13. **Sarma S**, Lee JH (2018) Developing efficient thin film temperature sensors utilizing layered carbon nanotube films. Sensors 18(10), 3182; https://doi.org/10.3390/s18103182. IF=3.6
14. Ahadi A, **Sarma S**, Moon JS, Kang S, Lee JH (2018) A robust optimization for designing a charging station based on solar and wind energy for electric vehicles of a smart home in small villages, Energies 11(7), 1728; https://doi.org/10.3390/en11071728. IF= 3
15. Garg A, **Sarma S**, Panda BN, Zhang J, Gao L (2016) Study of effect of nanofluid concentration on response characteristics of machining process for cleaner production. Journal of Cleaner Production 135: 476-489. http://dx.doi.org/10.1016/j.jclepro.2016.06.122. IF= 9.3
16. **Sarma S**, Unal A, Sahoo N (2015) Thin film gauges using carbon nanotubes as composite layers. ASME Journal of Engineering Materials and Technology 138: 041014-1-8. doi: 10.1115/1.4033909.
17. **Sarma S**, Sahoo N, Unal A (2015) Calibration of a silver Thin Film Gauge for short duration convective step heat load. SADHANA (Indian Academy of Sciences Journal) 41 (7): 787-794. doi: 10.1007/s12046-016-0513-8.
18. Gogoi TK, **Sarma S**, Borthakur S (2013) Simulation of a hybrid solid oxide fuel cell-gas turbine, International Journal of Emerging Technology and Advanced Engineering 3(3): 250-258.
19. **Sarma S**, Natarajan R, Kothari DP (2010) A critical analysis of Government of India policy towards wind

power developments with reference to world scenario, Journal on Future Engineering and Technology 6(1): 1-5.

International/National Conferences

1. Verma, G., Sarmah, T. T., **Sarma, S.**, Koch, E., Dietzel, A. (2023) Designing a Printed Strain Sensor Array with minimal Cross-Sensitivity and Orientation Independence. APSCON 2024, IEEE Applied Sensing Conference, Goa, India.
2. Golwala, K., **Sarma, S.**, Agarwal A, Garg Y (2022) A woven wristband for spatiotemporal body temperature sensing for healthcare applications. APSCON 2023, IEEE Applied Sensing Conference, Bengaluru, India, 23-25 January.
3. Singh S V, **Sarma S** (2022) Influence of experimental conditions on conductivity of electrospun nanocomposite fibers. International Conference on Nanotechnology for Sustainable Living and Environment (ICON-NSLE), BITS Pilani, India, 14-16th April.
4. Thapa P, **Sarma S** (2022) Analysis of Laser Ablation Synthesis in Solutions (LASiS) of silver nanoparticles (AgNPs) in DI Water and their dependence in laser repetition rate. Empowering ST with Women- A Step towards a New Era, IIT Jodhpur, India, 19th- 20th April.
5. **Sarma S**, Patsalas P (2020) Graphene nanostructures on electrodeposited Cu by chemical vapor deposition. International Conference on Recent Innovations in Engineering and Technology (ICRIET), Kuala Lumpur, Malaysia, 18th – 19th January.
6. **Sarma S** (2019) Dependence of resistivity on thickness of vacuum deposited copper thin films. 1st National Conference on Advances in Mechanical Engineering, NIT Delhi, India, 16th March.
7. Thakur S, Kumar H, **Sarma S** (2019) Flow simulation of atmospheric re-entry vehicle at varying mach number and angle of attack. International Conference on Emerging Trends in Electro-Mechanical Technologies and Management, New Delhi, India, 26th-27th July.
8. **Sarma S**, Lee JH (2018) The influence of new airfoil-shaped blades on a 5 mw wind turbine performance. Korea New Renewable Energy Society 2018 Spring Conference, Seoul, South Korea, 19-20 April.
9. **Sarma S**, Lee JH (2017) Aerodynamic force analysis on novel airfoils shaped wind turbine blades under steady wind. KWEA: Korea Wind Energy Society 2017 Fall Conference, Jeju Island, South Korea, 30 October-1 November.
10. **Sarma S**, Lee JH (2017) Understanding dynamic torque behavior of novel airfoils designed for smaller wind turbine blades. The 6th Korea-Japan Joint Workshop on Fans and Compressors, Seongnam-si, Gyeonggi-do, South Korea, 6th November.
11. **Sarma S**, Lee JH (2017) Dynamic force analysis using bem theory on airfoils shaped wind turbine blades. The 7th Asia Pacific Forum on Renewable Energy AFORE, Busan, South Korea, 15 -18 November.
12. **Sarma S**, Sahoo N (2014) Computational study of a thin film heat transfer gauge for transient measurements. FMFP-5th International and 41st National Conference on Fluid Mechanics and Fluid Power, IIT Kanpur-INDIA, 12-14 December
13. **Sarma S**, Agarwal S, Sahoo N (2014) Numerical and experimental study for measurement of exhaust gas temperature and heat flux using thermal sensors in an internal combustion engine. ICTACEM-6th International Conference on Theoretical, Applied, Computational and Experimental Mechanics, IIT Kharagpur-INDIA, 29-31 December.
14. **Sarma S**, Sahoo N (2013) Thin film temperature sensors for transient measurement. Proceedings of the 22nd National and 11th International ISHMT-ASME Heat and Mass Transfer Conference, IIT Kharagpur-INDIA, 28-31 December.

Membership of Professional Bodies

Materials Research Society - Regular Member, Member ID: 11138025

Invited Talks and Outreach Activities

Oct 2023 Invited Speaker for International Workshop on Membrane Technologies for Desalination, Energy and Water Sustainability (MemDEW) organized by IIT Roorkee, India under G20 summit

Oct 2023	Invited Keynote Speaker for 2nd International Conference on Aspects of Materials and Mechanical Engineering (ICMME- 2023) organized by GLA University Mathura, India and Universidade Federal do Rio Grande do Sul, Brazil under G20 Summit
Sep 2022	Invited expert lecture on energy-saving devices, and smart structures under ISTE student Chapter, organized by Amity University, Delhi, India
Jun 2022	Invited speaker for INAE's flagship event 16th National Frontiers of Engineering Symposium (NatFoE) organized by Jadavpur University, Kolkata, India
Jan 2022	Invited speaker for FDP on Shape Memory Alloy Modelling, its Applications to Wearable Devices and Smart Structures organized by The LNM Institute of Information Technology Jaipur, India
Nov 2021	Invited speaker for Graduate Induction Program organized by Tezpur University, Assam, India
Mar 2021	Session Chair for 1st International Conference for Women in Multifaceted Research (ICWMR)
Feb 2021	Invited speaker for Teacher' s Training Program on Recent Advances and Applications of Machine Learning and IoT in Mechanical Engg. organized by Sagar Institute of Sc. & Tech., Bhopal, India
Dec 2020	Invited speaker for AICTE sponsored FDP on Recent Developments of Nano-Composites and Smart Materials in Aerospace Industry organized by MLR Institute of Technology, Hyderabad, India
2019-20	Member of Preliminary Committee for Evaluation of Fellowships/Programmes under Indo-Shastri Canadian Institute
Nov 2017	Session Chair for The 7th Asia Pacific Forum on Renewable Energy AFORE, Busan, South Korea

Teaching Experience

1. Nanosensors MEL7420 (IITJ: 2020,2021,2022) - (New Course Developed)
2. Experimental Techniques in Thermofluids MEL7070 (IITJ: 2019, 2020, 2021)
3. Heat Transfer(Radiation) MEL3010, (IITJ: 2021, 2022)
4. Engineering Visualization MEP1010 (IITJ: 2020, 2021)
5. Engineering Realization MEP1012 (IITJ: 2021, 2022)
6. Design Credits MEN2020/ MEN1012 (IITJ: 2021, 2022)
7. Social Connect OSN 1010 (IITJ: 2019-2020)
8. Engineering Graphics ME102, NITD
9. Computer Aided Product Design MEL622, NITD
10. Computational Fluid Dynamics MEL583, NITD
11. Computer Aided Engineering Lab MEP561, NITD

Thesis Supervision

Ongoing - 3 PhD, 1 Masters, 6 Bachelors
Graduated - 3 Bachelors, 4 Masters

Ph.D. Scholar	**Title**	**Year**
Saket	Design and fabrication of flexible temperature sensors from highly conductive nanocomposite fibers	2020-
Parul	Development of High Performance Soft Strain/Pressure Sensors with Hierarchical Microstructures	2021-
Gitansh	Towards development of ultrasensitive strain measurement system using laminated nanocomposites	2023-

M.Tech. Scholar	Title	Year
Tushar	Fabrication and calibration of screen printed strain sensors	2023-24
Taniya	Optimizing hierarchical microstructure pattern by laser marking	2022-23
Ritu	Characterization studies for in-house synthesized nanocomposites	2022-23
Shivam K	Impact of Taylor cone height on nanofiber formation through electrospinning	2021-22
Abhay	Analysis of droplet formation of nanocomposite ink in DOD inkjet	2020-21
Shivam	Flow simulation of atmospheric re-entry vehicle at varying Mach number and AOA	2018-19

B.Tech. Scholar	Title	Year
Chaitanya	Prediction of bead formation in electrospun PVDF fibers	2023-
Rohan & Khushal	IEI design and fabrication	2023-
Kunj	Textile based sensors	2022-
Akarshit	ML based modeling of electrospun fibers with ML	2021-
Raveen & Suresh	Dynamic calibration of temperature sensors	2019-20

Summer Intern	Title	Year
Yogeshwar	Simulation of nanocomposite fiber based strain sensor	2022

Administrative Experience

2022-P Member, Centre of Excellence for Arts and Digital Immersion (ADI), IIT Jodhpur, India

2019-P Faculty Advisor (UG 2019 batch) Dept. of Mechanical Engineering, IIT Jodhpur, India

2020-P Member, Interdisciplinary Research Platform (IDRP), IoT & Applications section, IIT Jodhpur, India

2020-P Member, Department Webpage Committee Dept. of Mechanical Engineering, IIT Jodhpur, India

2020-22 Member, Committee for Celebration of Commemorative Days (CCCD), IIT Jodhpur, India

2019-20 Faculty Advisor (Cultural and Literary Society) Student Gymkhana, IIT Jodhpur, India

2019-20 Member, Career Counselling Committee (CCC) , IIT Jodhpur, India

2019-20 Nodal Officer, JEE Female Helpdesk JEE Admissions Committee, IIT Jodhpur, India

2019-20 Member, Ek Bharat Shreshtha Bharat (EBSB) IIT Jodhpur, India

2018-19 Faculty Co-Advisor Cultural Board, NIT Delhi, India

Extracurricular Activities and Awards

1. Awarded gold medal in All India Tabla Competition in 2003 and awarded with Kalabid title in 2003
2. Certified “B” grade artist from All India Radio Guwahati in Folksong/ Instrumental category.
3. Certified degree holder in Vocal (Classical), Tabla (Percussion), Fine Arts (Painting) and Hindi language.
4. Awarded bronze medal in 15th State Teakwon-Do Championship in 1998
5. Participated and won several medals in Zonal and National Youth Festivals during undergraduates
6. Supervised and organized several cultural and literary fest in IIT Jodhpur and NIT Delhi, India.
7. Passed Basic and Advanced French language course in 2011-2012

Personal Interests

Tabla, Singing, Vocal, Guitar, Tzouras (Greek instrument), Educational outreach.