Lala Shakti Swarup Ray

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Employment History

2022 – · · · · **Researcher.** Embedded Intelligence Lab, DFKI, Kaiserslautern.

2021 – 2022 **Research Assistant.** Image Processing group, Fraunhofer ITWM, Kaiserslautern.

Education

2019 – 2022 **M.Sc. Computer Science** in TU Kaiserslautern.
Thesis title: *Physics-informed dynamic pressure map generation from videos.*

2014 – 2019 **B.Tech. Computer Science** in IGIT, Sarang, India
Thesis title: *Mobile VR Application to treat PTSD using smart-phone and smart-watch.*

Skills

Languages	English, German and Hindi.
Coding	Python, C/C++, JavaScript/TypeScript.
AI Libraries	Pytorch, JAX, Tensorflow, DeepXDE.
Tools	Unreal Engine, Blender, ThreeJs, Gradio.
Misc.	Teaching, Supervising, Graphic design.

Miscellaneous Experience

Awards and Achievements

2023 **Excellent Paper Award**, IEEE ABC conference 2023 (Primary author).

Best Paper Award, ACM ISWC 2023 (Primary author).

2024 **Best Paper Award**, EAI BODYNETS 2024 (Co-author).

Best WIP Runner Up, IEE Percom 2024 (Primary author).

Distinguished Paper Award, ACM IMWUT 2024 (Co-author).

2025 **Best Paper Award**, IEEE AMPS 2025 (Co-author).

Winner (1st prize HASCA challange), ACM Ubicomp 2025 (Co-author).

Organising Experience

2024 **Program Committee**, MCMI Workshop,(Springer ICPR 2024)

2025 **Program Committee**, ISWC 2025,(ACM Ubicomp 2025)

Research Publications

Journal Articles

1 M. Liu, V. F. Rey, L. S. S. Ray, B. Zhou, and P. Lukowicz, "Contrastive-representation imu-based fitness activity recognition enhanced by bio-impedance sensing," *Pervasive and Mobile Computing*, vol. 110, p. 102 047, 2025.

2 V. Negri, A. Mingotti, R. Tinarelli, *et al.*, "A novel health index for mv cable joint aging prediction based on dynamic graph attention model," *IEEE Transactions on Instrumentation and Measurement*, vol. 74, pp. 1–8, 2025. DOI: 10.1109/TIM.2025.3550602.

3 L. S. S. Ray, L. Krupp, V. F. Rey, B. Zhou, S. Suh, and P. Lukowicz, "Txp: Reciprocal generation of ground pressure dynamics and activity descriptions for improving human activity recognition," *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies*, vol. 9, no. 2, pp. 1–32, 2025.

4 L. S. S. Ray, Q. Xia, V. F. Rey, K. Wu, and P. Lukowicz, "Improving imu based human activty recognition using simulated multimodal representations and a moe classifier," *Frontiers in Computer Science*, vol. 7, p. 1 569 205, 2025.

5 D. Geißler, B. Zhou, H. Bello, *et al.*, "Embedding textile capacitive sensing into smart wearables as a versatile solution for human motion capturing," *Scientific Reports*, vol. 14, no. 1, p. 15 797, 2024.

6 L. Ray, D. Geißler, B. Zhou, P. Lukowicz, and B. Greinke, "Origami single-end capacitive sensing for continuous shape estimation of morphing structures," *Scientific Reports*, vol. 14, no. 1, p. 17 448, 2024.

7 L. S. S. Ray, B. Zhou, S. Suh, and P. Lukowicz, "A comprehensive evaluation of marker-based, markerless methods for loose garment scenarios in varying camera configurations," *Frontiers in Computer Science*, vol. 6, p. 1 379 925, 2024.

8 B. Zhou, D. Geissler, M. Faulhaber, *et al.*, "Mocapose: Motion capturing with textile-integrated capacitive sensors in loose-fitting smart garments," *Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.*, vol. 7, no. 1, 2023. DOI: 10.1145/3580883.

Conference Proceedings

1 S. G. Fritsch, C. Oguz, V. F. Rey, L. Ray, M. Kiefer-Emmanouilidis, and P. Lukowicz, "Mujo: Multimodal joint feature space learning for human activity recognition," in *2025 IEEE International Conference on Pervasive Computing and Communications (PerCom)*, IEEE, 2025, pp. 1–12.

2 L. S. S. Ray, V. F. Rey, B. Zhou, P. Lukowicz, and S. Suh, "Chairpose: Pressure-based chair morphology grounded sitting pose estimation through simulation-assisted training," in *Proceedings of the 38th Annual ACM Symposium on User Interface Software and Technology*, 2025, pp. 1–16.

3 L. S. S. Ray, B. Zhou, S. Suh, and P. Lukowicz, "Initial findings on sensor based open vocabulary activity recognition via text embedding inversion," in *2025 IEEE International Conference on Pervasive Computing and Communications Workshops and other Affiliated Events (PerCom Workshops)*, IEEE, 2025, pp. 685–688.

4 L. S. S. Ray, B. Zhou, S. Suh, and P. Lukowicz, "Ov-hhir: Open vocabulary human interaction recognition using cross-modal integration of large language models," in *ICASSP 2025 - 2025 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2025, pp. 1–5. DOI: 10.1109/ICASSP49660.2025.10890689.

5 V. Fortes Rey, L. S. S. Ray, Q. Xia, K. Wu, and P. Lukowicz, "Enhancing inertial hand based har through joint representation of language, pose and synthetic imus," in *Proceedings of the 2024 ACM International Symposium on Wearable Computers*, ser. ISWC '24, Melbourne VIC, Australia: Association for Computing Machinery, 2024, pp. 25–31, ISBN: 9798400710599. DOI: 10.1145/3675095.3676609.

6 M. Liu, V. F. Rey, Y. Zhang, L. S. Swarup Ray, B. Zhou, and P. Lukowicz, "Imove: Exploring bio-impedance sensing for fitness activity recognition," in *2024 IEEE International Conference on Pervasive Computing and Communications (PerCom)*, 2024, pp. 194–205. DOI: 10.1109/PerCom59722.2024.10494489.

7 L. S. S. Ray, D. Geißler, M. Liu, B. Zhou, S. Suh, and P. Lukowicz, "Als-har: Harnessing wearable ambient light sensors to enhance imu-based human activity recognition," in *International Conference on Pattern Recognition*, Springer, 2024, pp. 133–147.

8 L. S. S. Ray, B. Zhou, L. Krupp, S. Suh, and P. Lukowicz, "A synthetic benchmarking pipeline to compare camera calibration algorithms," in *International Conference on Pattern Recognition*, Springer, 2024, pp. 226–238.

9 L. S. S. Ray, B. Zhou, S. Suh, L. Krupp, V. F. Rey, and P. Lukowicz, "Text me the data: Generating ground pressure sequence from textual descriptions for har," in *2024 IEEE International Conference on Pervasive Computing and Communications Workshops and other Affiliated Events (PerCom Workshops)*, 2024, pp. 461–464. DOI: 10.1109/PerComWorkshops59983.2024.10503379.

10 D. P. Singh, L. S. S. Ray, B. Zhou, S. Suh, and P. Lukowicz, "A novel local-global feature fusion framework for body-weight exercise recognition with pressure mapping sensors," in *ICASSP 2024 - 2024 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2024, pp. 6375–6379. DOI: 10.1109/ICASSP48485.2024.10447226.

11 P. Zolfaghari, V. F. Rey, L. Ray, H. Kim, S. Suh, and P. Lukowicz, "Sensor data augmentation from skeleton pose sequences for improving human activity recognition," in *2024 International Conference on Activity and Behavior Computing (ABC)*, IEEE, 2024, pp. 1–8.

12 H. Bello, S. Suh, D. GeißLer, L. S. S. Ray, B. Zhou, and P. Lukowicz, "Captainglove: Capacitive and inertial fusion-based glove for real-time on edge hand gesture recognition for drone control," in *Adjunct Proceedings of the 2023 ACM International Joint Conference on Pervasive and Ubiquitous Computing & the 2023 ACM International Symposium on Wearable Computing*, ser. UbiComp/ISWC '23 Adjunct, New York, NY, USA: Association for Computing Machinery, 2023, pp. 165–169, ISBN: 9798400702006. DOI: 10.1145/3594739.3610713.

13 Y. Cho, L. S. S. Ray, K. S. P. Thota, S. Suh, and P. Lukowicz, "Clothfit: Cloth-human-attribute guided virtual try-on network using 3d simulated dataset," in *2023 IEEE International Conference on Image Processing (ICIP)*, 2023, pp. 3484–3488. DOI: 10.1109/ICIP49359.2023.10222494.

14 D. Geißler, E. F. Zahn, H. Bello, *et al.*, "Moca'collection: Normalizing dynamic textile geometry with capacitive sensing in design centric wearables," in *Adjunct Proceedings of the 2023 ACM International Joint Conference on Pervasive and Ubiquitous Computing & the 2023 ACM International Symposium on Wearable Computing*, ser. UbiComp/ISWC '23 Adjunct, New York, NY, USA: Association for Computing Machinery, 2023, pp. 276–280, ISBN: 9798400702006. DOI: 10.1145/3594739.3610779.

15 L. S. S. Ray, D. Geißler, B. Zhou, P. Lukowicz, and B. Greinke, "Capafoldable: Self-tracking foldable smart textiles with capacitive sensing," in *Adjunct Proceedings of the 2023 ACM International Joint Conference on Pervasive and Ubiquitous Computing & the 2023 ACM International Symposium on Wearable Computing*, ser. UbiComp/ISWC '23 Adjunct, New York, NY, USA: Association for Computing Machinery, 2023, ISBN: 9798400702006. DOI: 10.1145/3594739.3610791.

16 L. S. S. Ray, B. Zhou, S. Suh, and P. Lukowicz, "Pressim: An end-to-end framework for dynamic ground pressure profile generation from monocular videos using physics-based 3d simulation," in *2023 IEEE International Conference on Pervasive Computing and Communications Workshops and other Affiliated Events (PerCom Workshops)*, 2023, pp. 484–489. DOI: 10.1109/PerComWorkshops56833.2023.10150221.

17 L. S. S. Ray, B. Zhou, S. Suh, and P. Lukowicz, "Selecting the motion ground truth for loose-fitting wearables: Benchmarking optical mocap methods," in *Proceedings of the 2023 ACM International Symposium on Wearable Computers*, ser. ISWC '23, New York, NY, USA: Association for Computing Machinery, 2023, pp. 27–32, ISBN: 9798400701993. DOI: 10.1145/3594738.3611359.

18 A. Anand, L. S. S. Ray, R. K. Sahoo, and S. Sethi, "Analysis of attention level of human body in different forms," in *Emerging Technologies in Data Mining and Information Security: Proceedings of IEMIS 2018, Volume 3*, Springer, 2019, pp. 23–32. DOI: 10.1007/978-981-13-1501-5_3.

Books and Chapters

1 L. S. S. Ray, V. F. Rey, B. Zhou, S. Suh, and P. Lukowicz, "Pressuretransfernet: Human attribute guided dynamic ground pressure profile transfer using 3d simulated pressure maps," in *Activity, Behavior, and Healthcare Computing*, CRC Press, 2023, pp. 3–15.

References

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