Gyanendra Sharma

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Senior Human Machine Interface Researcher with over 7+ years of experience. Skilled in mixed-methods research with a emphasis on quantitative methodologies, including **eye tracking, experimental design, and statistical analysis.**

Education

2014 – 2019 **Ph.D., Rensselaer Polytechnic Institute** Department of Computer Science.
Thesis title: *Spatially Aware Interactions in Large Scale Immersive Environments.*
Research Area: **Human Computer Interaction**

2009 – 2013 **Bachelors of Arts, Connecticut College**
Majors: Mathematics and Computer Science

Skills

Research Methods & Data Analysis

- **Experimental Design** (Within- and Between-Subjects) ● Quantitative Methods (**Regression Analysis, ANOVA, t-tests, Multi-level Modeling**) ● Psychophysical Experiments (Threshold Detection, MLDS, Sensory Perception Studies) ● Survey Design & Analysis (**Qualtrics, Likert Scaling, Factor Analysis**) ● **In-Depth Interviews & Qualitative Data Analysis** (Thematic Coding, Affinity Mapping, personas) ● Programming Languages (**Python**, R, MATLAB)

User Research & Prototyping

- **Mixed-Methods Research** (Balancing Qualitative & Quantitative Insights) ● Human-Vehicle Interaction Studies ● **Usability Testing** (Remote & In-Person) ● **Eye-Tracking & Behavioral Data Collection** (Smart Eye Pro, Gaze Metrics) ● Prototyping Hardware & Software Systems for Research (Raspberry Pi, Wizard-of-Oz Prototyping) ● Recruitment (UserInterviews, Respondent)

Relevant Experience

2023 – ⋯ **Senior HMI Researcher,** Audi of America, ADAS.

- **Conducted mixed-methods research** on usability, acceptance, and situational awareness of hands-free driving systems, leveraging user interviews and inferential statistics to generate actionable insights.
- **Presented key research findings to stakeholders** (Audi AG, Porsche AG) through work-shops, directly influencing ADAS product decisions.
- **Led eye-tracking instrumentation and analysis** using Smart Eye Pro to assess driver attention and behavior in real-world studies.
- Led efforts to consolidate **HMI requirements for automated vehicle platforms** through user research, regulatory exploration and data analysis for NA region.

2021 – 2023 **HMI Researcher,** Toyota Research Institute/Woven Planet, NA.

- **Investigated driver interaction and perception** of continuous steering guidance systems by designing and executing a within-subject AB testing study, leveraging a tabletop simulator to assess usability.
- **Conducted a psychophysical experiment** to determine detection thresholds of audio-haptic asynchrony in force-feedback steering wheels, informing ADAS interaction design.
- **Applied psychophysics-based modeling** (MLDS) to evaluate vibration warning perception in force-feedback steering, revealing a linear relationship to optimize haptic feedback for drivers.

2019 – 2020   🔖 **Postdoctoral Researcher**, Network Science Institute, Northeastern University.

- Analyzed leadership dynamics in small group interactions by applying **statistical methods** (regressions, multi-level modeling) to verbal and non-verbal behavior data.
- Synthesized research trends through a meta-study on verbal and non-verbal communication, **identifying key gaps and future directions in small group interaction research.**

2014 – 2019   🔖 **Ph.D Student**, Rensselaer Polytechnic Institute.

- **Developed a multi-person tracking system** using camera arrays to capture location and orientation data, enabling research on interactive spatial computing concepts.
- **Evaluated usability and workload** of multimodal interaction (voice, gestures, mobile devices) through human-subject experiments in large immersive environments.
- **Prototyped and iterated user-to-smart-room interactions** by conducting pilot studies with diverse input methods (mobile, Leap Motion, voice, gestures) to refine interactive experiences.
- **Sample Project Link:** https://bit.ly/2ZLNhY9

Research Publications

1. F. Bu, S. Li, G. Sharma, W. Ju, *et al.*, "Extending driving simulation from lab to the road," *Accepted at CHI*, 2024.

2. R. Lange, R. J. Radke, G. Sharma, *et al.*, "Multimodality in group communication research," *arXiv preprint arXiv:2401.15194 (2024)*, 2024.

3. G. Sharma, H. Yasuda, and M. Kuehner, "Continuous visual feedback of risk for haptic lateral assistance," *arXiv:2301.10933*, 2023.

4. G. Sharma, H. Yasuda, and M. Kuehner, "Detection threshold of audio haptic asynchrony in a driving context," *arXiv:2307.05451*, 2023.

5. G. Sharma and R. J. Radke, "Multi-person spatial interaction in a large immersive display using smartphones as touchpads," in *Proceedings of the 2020 IntelliSys, Volume 3*, Springer, 2021, pp. 285–302.

6. D. Jivani, G. Sharma, and R. J. Radke, "Occupant location and gesture estimation in large-scale immersive spaces," in *Living Labs Workshop, CHI*, 2018.

7. G. Sharma, D. Jivani, and R. Radke, "Manipulating screen elements in an immersive environment with a wrist-mounted device and free body movement," in *Living Labs Workshop, CHI*, 2018.

8. G. Sharma, J. Braasch, and R. J. Radke, "Interactions in a human-scale immersive environment: The craive-lab," in *Cross-Surface 2016, ACM International Conference on Interactive Surfaces and Spaces*, 2017.

9. Ö. Izmirli and G. Sharma, "Bridging printed music and audio through alignment using a mid-level score representation." in *ISMIR*, 2012, pp. 61–66.

Patents

2022   🔖 H Yasuda, M Kuehner and G Sharma, J Mathews, J Braasch, R J Radke, D Jivani, *Systems and Methods for Enhancing Operator Vigilance*, U.S. Pat. App. No. 18/095,286.

       🔖 G Sharma, J Mathews, J Braasch, R J Radke, D Jivani, *Multi-Sensor Systems and Methods for Providing Immersive Virtual Environments*, PCT/US2022/051474.

2017   🔖 G Sharma, M Nawhal, A Prakash, P Kumar, M Jain, A Singhee and A Shah, *Hybrid Virtual and Physical Jewelry Shopping Experience*, US 2018/0357702 A1.