

# Tamil Selvan Gunasekaran

RESEARCHER · DATA SCIENTIST · HUMAN COMPUTER INTERACTION

*Empathic Computing Lab, Auckland Bioengineering Institute, 70 Symonds Street, Grafton, Auckland, 1010*

✉ themastergts007@gmail.com | 🏷 www.tamilselvan.info | 📺 GTamilSelvan07 | 📱 tamilselvan-gunasekaran

## Education

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### **The University of Auckland**

*Auckland, New Zealand*

#### **PHD IN BIOENGINEERING**

*September 2023 - August 2026*

- Thesis: AI-Augmented Collaborative Cognition in Virtual Meetings
- University of Auckland Doctoral scholarship recipient

### **The University of Auckland**

*Auckland, New Zealand*

#### **M.ENG. IN BIOENGINEERING**

*December 2020 - March 2022*

- Thesis: Designing Body Centric Interactions with Radar Sensing.
- Grade: A, First Class with Honours.
- Google-ATAP - University of Auckland Masters scholarship recipient

### **Vellore Institute of Technology**

*Chennai, India*

#### **B.TECH. IN ELECTRONICS AND COMMUNICATION ENGINEERING**

*July 2016 - July 2020*

- Thesis: Attention Enriched Deep Learning Model for Cancer Segmentation in Ultrasound Images
- Grade: 9.06/10

## Experience

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### **Researcher (Contract)**

*Jan 2025 – Present*

#### **AUCKLAND BIOENGINEERING INSTITUTE, UNIVERSITY OF AUCKLAND**

- Designed a patient-specific 3D segmentation and annotation pipeline for breast reconstruction, targeting intraoperative AR guidance and surgical planning.
- Developed custom 3D reconstruction and instance segmentation models for point clouds and meshes; building labeling tools to streamline end-to-end data curation.
- Establishing reproducible MLOps (versioned datasets, scripted training/eval, artefact logging) to support clinical translation and future regulatory pathways.

### **Researcher (Contract)**

*Oct 2020 – Dec 2023*

#### **OVRCOME, NEW ZEALAND**

- Developed affective-computing approaches for phobia therapy in VR, predicting user anxiety from wearable biosignals (PPG, EDA) to drive adaptive exposure.
- Implemented a scalable ML pipeline (feature extraction, labeling, model training, evaluation) and integrated closed-loop adaptation within VR scenarios.
- Collaborated on data ethics and privacy safeguards for sensitive physiological data and clinical workflows.

### **Research Assistant (Contract)**

*Oct 2020 – Present*

#### **EMPATHIC COMPUTING LAB, UNIVERSITY OF AUCKLAND**

- Contributed to HCI/CSCW projects improving remote collaboration in XR using Human–AI teams (VR/AR) to support decision-making and team dynamics.
- Engineered a real-time facilitator agent (open-source LLM + Unity) that adapts prompts to participants' cognitive/affective signals; integrated multimodal sensing and meeting UX.
- Designed pilot studies, logging/analysis pipelines, and reproducible experiment artifacts (code, stimuli, preregistration templates).

### **Research Collaborator (Voluntary)**

*Jul 2022 – Present*

#### **EMBODIED MEDIA LAB, KEIO UNIVERSITY GRADUATE SCHOOL OF MEDIA DESIGN**

- Explored gaze- and audio-aware adaptive avatars to improve turn-taking and clarity in video-conference communication; implemented real-time prototypes and instrumentation.

**Visiting Researcher***Dec 2019 – Sep 2020***AUGMENTED HUMAN LAB, UNIVERSITY OF AUCKLAND**

- Supported user studies and prototyping for HCI projects; contributed ML components and software tooling for data collection and analysis.
- Delivered internal utilities for rapid experiment setup and result visualization.

**Embedded Software Intern***Jun 2019 – Aug 2019***PETROFAC ENGINEERING SERVICES PVT. LTD.**

- Assisted firmware and test engineering across project phases; coordinated with suppliers on component selection and compliance.
- Authored test plans and executed verification to ensure functional reliability before hand-off.

**Vice Chairman***Jun 2018 – Dec 2019***IEEE ROBOTICS AND AUTOMATION SOCIETY, VIT CHENNAI**

- Led R&D for the student chapter; scoped and delivered projects, mentored junior teams, and aligned work with industry-relevant skills.
- Organized 18+ workshops and 12 hackathons; guided a team building swarm-robotics prototypes presented at a DRDO competition.

**Awards, Fellowships, & Grants**

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**Doctoral Entrepreneurship and Leadership Programme Scholarship***Septemeber 2025***UNIVERSITY OF AUCKLAND**

- Awarded Full Scholarship for Entrepreneurship Programme at UOA.

**Doctoral Research Fellowship***Septemeber 2025***UNIVERSITY OF AUCKLAND**

- Awarded Full Scholarship for Doctoral Program at UOA.

**Winner, XR Workshop***February, 2023***UNIVERSITY OF CANTERBURY**

- Won 1st prize for developing collaborative AI - yoga in Virtual Reality system among 70 students from 3 countries.

**Graduate Research Fellowship***December 2020***GOOGLE ATAP - UNIVERSITY OF AUCKLAND**

- Awarded Full Scholarship for Masters Program at UOA.

**Best Paper Presentation Award***August 2019***IRCE, NUS, SINGAPORE.**

- Awarded Best Paper Presentation award for presenting the Research paper in Electronic Component Sorting Robot in E-Waste Management.

**Winner, Workshop***July 2019***SIEMENS HEALTHINEERS PVT. LIMITED**

- Innovation Management and Leadership Certification Program (IMLEAP)– Presented solutions pertaining to Diagnosis Treatment of Stroke patients using Artificial Intelligence.

**Winner, Make-a-thon***December 2018***ROBOTICS CLUB, VIT CHENNAI**

- Won 1st prize for developing Mars Rover - sensor fusion system amongst the top 120 students selected in India.

**Best project of the year***October 2018***VIT CHENNAI**

- Awarded Best project for the year award for 2018 by VIT Chennai for creating Autonomous Farm surveillance and Crop Health monitoring Robot.

**Winner***February 2018***START-UP HUNT COMPETITION- VIT CHENNAI.**

- Won 1st prize for presenting a business and prototype Model on Assistive technology for Blind people and Geriatrics. Awarded 50,000 Rupees for developing the product by the Ministry of MSME – Government of India.

- Awarded Young Scientist of the year for Invention of Automated Crutch to Wheelchair conversion system..

## Publications

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### PUBLISHED

1. **Tamil Selvan Gunasekaran** and Kunal Gupta and Huidong Bai and Yun Suen Pai and Mark Billinghurst. 2025. *CLARA: Augmenting Group Cognition using Cognitive- and Affective-Aware Embodied Agents in Remote Meetings*. ACM Transactions on Computer-Human Interaction (TOCHI)
2. Nastaran Saffaryazdi and **Tamil Selvan Gunasekaran** and Mark Billinghurst. 2025. *Empathetic Conversational Agents: Utilising Neural and Physiological Signals for Enhanced Empathetic Interactions*. International Journal of Human-Computer Interaction. 1-25
3. Yulan Ju and Xiaru Meng and Harunobu Taguchi and **Tamil Selvan Gunasekaran** and Yun Suen Pai and Mark Billinghurst. 2025. *Haptic Empathy: Investigating Individual Differences in Affective Haptic Communications*. Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems. 1-25
4. **Tamil Selvan Gunasekaran** and Kunal Gupta and Huidong Bai and Yun Suen Pai and Elisabeth Audrey and Mark Billinghurst. 2025. *CoAffinity: a Multimodal Dataset for Cognitive Load and Affect Assessment in Remote Collaboration*. IEEE Transactions on Affective Computing
5. Yulan Ju and **Tamil Selvan Gunasekaran** and Giorgi Barbareschi and Mark Billinghurst and Haruki Takahashi. 2024. *Re-touch: A VR Experience for Enhancing Autobiographical Memory Recall through Haptic and Affective Feedback*. SIGGRAPH Asia 2024 XR. 1-2
6. Prasanth Sasikumar and Ryo Hajika and Kunal Gupta and **Tamil Selvan Gunasekaran** and Mark Billinghurst. 2024. *A User Study on Sharing Physiological Cues in VR Assembly Tasks*. 2024 IEEE Conference on Virtual Reality and 3D User Interfaces (VR). 765-773
7. Mark Armstrong and Yang Chi-la and **Tamil Selvan Gunasekaran** and Yun Suen Pai and Kouta Minamizawa. 2024. *SealMates: Improving Communication in Video Conferencing using a Collective Behavior-Driven Avatar*. Proceedings of the ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW '24)
8. Mark Armstrong and Kinga Skiers and Danyang Peng and **Tamil Selvan Gunasekaran** and Anish Kundu and Tanner Person and Yixin Wang and Kouta Minamizawa and Yun Suen Pai. 2023. *Heightened Empathy: A Multi-user Interactive Experience in a Bioresponsive Virtual Reality*. ACM SIGGRAPH 2023 Immersive Pavilion (SIGGRAPH '23). Article 9, 1-2. <https://doi.org/10.1145/3588027.3595599>
9. **Tamil Selvan Gunasekaran** and Ryo Hajika and Chloe Dolma Si Ying Haigh and Yun Suen Pai and Eiji Hayashi and Mark Billinghurst. 2023. *RadarHand: A Wrist-Worn Radar for On-Skin Touch-Based Proprioceptive Gestures*. ACM Transactions on Human-Computer Interaction (TOCHI)
10. Kunal Gupta and **Tamil Selvan Gunasekaran** and Prasanth Sasikumar and Mark Billinghurst. 2023. *VRdoGraphy: An Empathic VR Photography Experience*. IEEE VR 2023 Posters (IEEE VR '23 Posters), March 14-17, 2023, China. <https://doi.org/10.1145/3476124.3488650>
11. **Tamil Selvan Gunasekaran** and Ryo Hajika and Yun Suen Pai and Eiji Hayashi and Mark Billinghurst. 2022. *RaITIn: Radar-Based Identification for Tangible Interactions*. Extended Abstracts of the 2022 CHI Conference on Human Factors in Computing Systems (CHI EA '22). Article 445, 1-7. <https://doi.org/10.1145/3491101.3519808>
12. **Tamil Selvan Gunasekaran** and Ryo Hajika and Chloe Dolma Si Ying Haigh and Yun Suen Pai and Danielle Lottridge and Mark Billinghurst. 2021. *Adapting Fitts' Law and N-Back to Assess Hand Proprioception*. Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems (CHI EA '21). Article 245, 1-7. <https://doi.org/10.1145/3411763.3451699>
13. Sam W. T. Chan and **Tamil Selvan Gunasekaran** and Yun Suen Pai and Hao Zhang and Suranga Nanayakkara. 2021. *KinVoices: Using Voices of Friends and Family in Voice Interfaces*. Proceedings of the ACM on Human-Computer Interaction (PACM HCI) 5, CSCW2. 1-25. <https://doi.org/10.1145/3479590>
14. Ryo Hajika and **Tamil Selvan Gunasekaran** and Alaeddin Nassani and Yun Suen Pai and Mark Billinghurst. 2021. *VRTwitch: Enabling Micro-motions in VR with Radar Sensing*. SIGGRAPH Asia 2021 Posters (SA '21 Posters). 1-2. <https://doi.org/10.1145/3476124.3488650>

15. **Tamil Selvan Gunasekaran** and Ryo Hajika and Chloe Dolma Si Ying Haigh and Yun Suen Pai and Eiji Hayashi and Mark Billinghurst. 2022. *Designing Body-Centric Interactions with Radar Sensing*. ResearchSpace@Auckland
16. Kunal Gupta and **Tamil Selvan Gunasekaran** and Mark Billinghurst. 2024. *SensoryScape: Context-Aware Empathic VR Photography*. SIGGRAPH Asia 2023 XR Demo
17. **Tamil Selvan Gunasekaran** and Yulan Ju and Mark Billinghurst. 2024. *The Empathic Metaverse: An Assistive Bioresponsive Platform for Emotional Experience Sharing*. SIGGRAPH Asia 2023 XR Demo
18. **Tamil Selvan Gunasekaran**. 2023. *Healing Horizons: Adaptive VR for Traumatic Brain Injury Rehabilitation*. SIGGRAPH Asia 2023 XR Demo
19. **Tamil Selvan Gunasekaran**. 2024. *The Fusion Nexus: Exploring the Confluence of Virtual and Real... in Immersive XR Environments*. SIGGRAPH Asia 2024 XR Demo
20. **Tamil Selvan Gunasekaran**. 2024. *Virtual Journalist: Measuring and Inducing Cultural Empathy by Visualising Empathic Perspectives in VR*. SIGGRAPH Asia 2024 XR Demo

## IN REVIEW

1. **Tamil Selvan Gunasekaran**, Yun Suen Pai, Huidong Bai, Kunal Gupta, and Mark Billinghurst. *Cognitive Bridge: An AI-Augmented Collaboration Tool for Designers and Developers*. **Under review** — CHI.
2. **Tamil Selvan Gunasekaran**, Yun Suen Pai, Huidong Bai, Kunal Gupta, and Mark Billinghurst. *CoSync: A Multi-modal Dataset for Synchrony in Remote Collaboration*. **Under review** — ACM Transactions on Computer-Human Interaction (TOCHI).

## Teaching Experience

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### Graduate Teaching Assistant — Advanced Human-Computer Interaction

Jun 2025 – Nov 2025

SCHOOL OF COMPUTER SCIENCE, UNIVERSITY OF AUCKLAND (UoA)

- Mentored 6 project teams on study design, IRB/ethics preparation, and mixed-methods analysis; provided scaffolded code templates (Jupyter/Python + RMarkdown) for reproducible stats and figures.
- Co-designed project milestones and detailed grading rubrics (design iteration, study rigour, reporting), streamlining moderation across TAs.
- Authored short “methods primers” (LMER basics, counterbalancing, power checks) and example result write-ups aligned to CHI/TOCHI style.
- Set up GitHub Classroom and CI checks for submission formatting and artefact completeness; supported accessibility (captioning, alt text, colour-contrast checks).

### Graduate Teaching Assistant — Human-Computer Interaction

Feb 2025 – May 2025

SCHOOL OF COMPUTER SCIENCE, UNIVERSITY OF AUCKLAND (UoA)

- Led weekly labs (40+ students across sections) on prototyping, usability testing, and qualitative analysis; created step-by-step lab notebooks and grading rubrics to ensure consistent assessment.
- Developed demo kits (heuristic evaluation checklist, think-aloud scripts) and a mini-design sprint that increased project readiness before milestone reviews.
- Ran structured office hours with booking slots and “triage” templates, reducing response time and improving student support.
- Introduced peer-review guidelines and example critiques to improve feedback quality and academic integrity.

### Visiting Lecturer

Jun 2023 – Sep 2023

PERCEPTION COMPUTING, KEIO UNIVERSITY

- Delivered a lecture series on *Machine Learning for Designers*; created visual-first slides and hands-on notebooks bridging ML concepts to prototyping workflows.
- Supervised mini-projects from ideation to evaluation, emphasising data ethics, reproducibility, and human-centred validation.

### Teaching Assistant — Mathematical Modelling

Feb 2023 – Jun 2023

ENGINEERING SCIENCE, UNIVERSITY OF AUCKLAND

- Evaluated assignments for a cohort of 165 students; wrote solution outlines and common-error notes to standardise feedback across markers.
- Hosted problem-solving clinics focusing on model assumptions, dimensional analysis, and result interpretation.

## Graduate Teaching Assistant

Feb 2021 – Jun 2021

### DESIGN AND AUTONOMOUS TECHNOLOGIES, CREATIVE ARTS AND INDUSTRIES, UoA

- Co-developed module content; lectured on *Deep Learning and Applications* with live demos (classification, transfer learning, and simple interactive UX prototypes).
- Guided studio projects and built marking rubrics emphasising design process, validation, and technical correctness.

## Teaching Assistant – Electromagnetic Wave Theory

2018 – 2019

### VELLORE INSTITUTE OF TECHNOLOGY

- Prepared coursework and tutorials; guided projects and evaluated assignments for a class of 60 students.
- Organised revision sessions covering boundary conditions, waveguides, and antenna basics with worked examples.

## Presentations

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\*presenting author; <sup>+</sup> mentored undergraduate

### INVITED TALKS

2025. *Diving Deep into the Use of AI Tools in XR Applications*. Invited lecture: XR Winter School, University of Adelaide.

2025. *AI Tools for HCI and Research*. Guest lecture: School of Computer Science, University of Auckland.

2025. *AI for XR*. Invited talk: RMIT University.

2025. *Quantitative Analysis for HCI*. Guest lecture: School of Computer Science, University of Auckland.

2024. *Multimodal Interaction*. Guest lecture: School of Computer Science, University of Auckland.

2024. *AI for XR*. Invited talk: RMIT University.

2024. *Body-Centric Interactions Using Radars*. Workshop talk: RadarWavesHCI Workshop, University of Primorska.

2023. *AI-Augmented Collaboration*. Invited talk: Embodied Media Lab, Keio University.

2022. *AI for Designers*. Guest lecture: School of Engineering and Design, University of Auckland.

2022. *AI for Designers*. Guest lecture: Keio Media Design (KMD), Keio University.

2021. *Body-Centric Interactions Using Radars*. Invited talk: Google ATAP.

2021. *Body-Centric Interactions Using Radars*. Invited talk: Embodied Media Lab, Keio University.

## Skills

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**Generative AI & Advanced Machine Learning:** PyTorch, TensorFlow, Scikit-learn; LLMs (GPT, BERT), Diffusion Models, Transformers, GANs; Hugging Face, Prompt and Context Engineering, Fine-Tuning, Reinforcement Learning (RL), Explainable AI (XAI)

**XR Development & HCI Prototyping:** Unity (C#), Unreal Engine (Blueprints); Meta Quest SDK, OpenXR, MRTK, ARKit, AR-Core; Figma, Adobe XD; 3D Interaction Design, Usability Testing, Heuristic Evaluation, Thematic Analysis

**Neurotech & Physiological Signal Processing:** EEG, fNIRS, ECG, EDA/GSR, Eye-tracking; MNE-Python, BioSPPy, SciPy, MATLAB; LabStreamingLayer (LSL), OpenViBE; BCI Design, Time-Series Analysis, Feature Extraction, Event-Related Potential (ERP) Analysis

**Data Science & Visualisation :** Pandas, NumPy, SciPy, MATLAB, SPSS, R; Tableau, Power BI, Seaborn, Matplotlib, Plotly; SQL, NoSQL (MongoDB); Statistical Analysis, A/B Testing

**Programming, Cloud & DevOps:** Python, C#, C/C++, Java, JavaScript, Bash; AWS, Google Cloud, Microsoft Azure; Git, Docker, CI/CD, Django, Apache Spark

**Design & Fabrication:** Fusion360, Blender, Adobe Creative Suite (Photoshop, Illustrator, Premiere Pro, After Effects); 3D Printing (FDM/SLA), Laser Cutting, PCB Design