Tamil Selvan Gunasekaran

Researcher · Data Scientist · Human Computer Interaction

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

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Education

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

Researcher (Contract) *May 2023 - Present*

Determ, New Zealand

- Conducted in-depth research on spatial computing, focusing on 3D point cloud Instance Semantic Segmentation for interactive spatially aware systems.
- Developed and applied 3D point cloud Instance Semantic Segmentation deep learning model for interactive application in realtime reducing time latency by 10.08 seconds.

Researcher (Contract) *October 2020 - December 2023*

Ovrcome, New Zealand

- Conducted in-depth research on Affective Computing, Developed novel solutions to counter Phobias in Virtual reality.
- Developed a scalable and efficient machine-learning model to predicts users anxiety from wearable bio-signals
- Developed a Anxiety-adaptive Virtual reality environment for rehabilitation services

Research Assistant (Contract) *October 2020 - Present*

Empathic Computing Lab, University of Auckland

- Contributing to research projects focused on enhancing remote collaborations in Extended Reality using Human-AI teams, including virtual and augmented reality platforms to improve team dynamics, collaboration and communication.
- Developed and integrated a real-time Facilitator Digital Agent using open-source LLM and Unity into video conferencing meetings. The agent was designed to enhance decision-making by dynamically adjusting its behaviour based on participants' cognitive and affective states.

Research Collaborator (Voluntary) *July 2022 - Present*

Embodied Media Lab, Keio University Graduate School of Media Design

- Researched gaze and audio-aware adaptive avatars for improving communication in video conference meetings.

Visiting Researcher *December2019 - September2020*

Augmented Human Lab, University of Auckland

- Assisted PhD students with their user studies and research
- Developed software and machine learning systems for the research projects

Embedded Software Intern *June 2019 to August 2019*

Petrofac Engineering Services Pvt. Limited

- Provided design and production team support as required.
- Assisted production team with various project stages in coordination with suppliers.
- Tested all products for accurate and efficient functionality.

Vice Chairman *June 2018 - December 2019*

IEEE Robotics and Automation Society, VIT Chennai

- Head of Research and Development in IEEE -Robotics and Automation Society student chapter of VIT- Chennai.
- Validate the feasibility of potential project ideas. Initiate, manage and successfully complete the identified projects.Assisted junior students to meet current industrial skills.
- Successfully conducted 18+ Workshops and 12 Hack-o-thons and Guided a team to develop Swarm Robots for Military purposes and presented in a competition conducted by DRDO, India.

Awards, Fellowships, & Grants

Doctoral Research Fellowship *Septemeber 2024*

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.

Dr.A.P.J. Abdul Kalam IGNITE Award *February 2014*

National Innovation Foundation, India

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

Publications

Published

1. **Tamil Selvan Gunasekaran**, Ryo Hajika, Chloe Dolma Si Ying Haigh, Yun Suen Pai, Eiji Hayashi, and Mark Billinghurst 2023. RadarHand: a Wrist-Worn Radar for Proprioceptive Gestures - TOCHI-2023
2. Mark Armstrong, Kinga Skiers, Danyang Peng, **Tamil Selvan Gunasekaran**, Anish Kundu, Tanner Person, Yixin Wang, Kouta Minamizawa, and Yun Suen Pai. 2023. Heightened Empathy: A Multi-user Interactive Experience in a Bioresponsive Virtual Reality. In ACM SIGGRAPH 2023 Immersive Pavilion (SIGGRAPH '23). Association for Computing Machinery, New York, NY, USA, Article 9, 1–2. https://doi.org/10.1145/3588027.3595599
3. Kunal Gupta **Tamil Selvan Gunasekaran**, Prasanth Sasikumar,and Mark Billinghurst. 2021. VRdoGraphy: An Empathic VR Photography Experience. In IEEE VR Posters (IEEE VR '23 Posters), March 14–17, 2023, China. https://doi.org/10.1145/3476124.3488650
4. **Tamil Selvan Gunasekaran**, Ryo Hajika, Yun Suen Pai, Eiji Hayashi, and Mark Billinghurst. 2022. RaITIn: Radar-Based Identification for Tangible Interactions. In Extended Abstracts of the 2022 CHI Conference on Human Factors in Computing Systems (CHI EA '22). Association for Computing Machinery, New York, NY, USA, Article 445, 1–7. https://doi.org/10.1145/3491101.3519808
5. **Tamil Selvan Gunasekaran**, Ryo Hajika, Chloe Dolma Si Ying Haigh, Yun Suen Pai, Danielle Lottridge, and Mark Billinghurst. 2021. Adapting Fitts' Law and N-Back to Assess Hand Proprioception. In Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems (CHI EA '21). Association for Computing Machinery, New York, NY, USA, Article 245, 1–7. DOI: https://doi.org/10.1145/3411763.3451699
6. Chan, S. W. T.,**Tamil Selvan Gunasekaran**, Pai, Y. S., Zhang, H., Nanayakkara, S. 2021. KinVoices: Using Voices of Friends and Relatives in Voice Interfaces. In Proceedings of ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW '21). ACM, New York, NY, USA, 24 pages. DOI: https://doi.org/10.1145/3479590
7. Ryo Hajika, **Tamil Selvan Gunasekaran**, Alaeddin Nassani, Yun Suen Pai,and Mark Billinghurst. 2021. VRTwitch: Enabling Micro-motions in VR with Radar Sensing. In SIGGRAPH Asia 2021 Posters (SA '21 Posters), December 14–17, 2021, Tokyo, Japan. ACM, New York, NY, USA, 3 pages. https://doi.org/10.1145/3476124.3488650
8. Mark Armstrong, Yang Chi-la, **Tamil Selvan Gunasekaran**, Yun Suen Pai, and Kouta Miniamizawa 2023. Sealmates: Improving Communication in Videoconferencing using a Collective Behavior-Driven Avatar In Proceedings of ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW '24). ACM, New York, NY, USA, 24 pages

In Review

1. **Tamil Selvan Gunasekaran**, Kunal Gupta, Huidong Bai, Yun Suen Pai, Elisabeth Audrey and Mark Billinghurst 2024. Mushin-AI: Augmenting Group Cognition using Cognitive and Affective Aware Embodied Agents in Remote Meetings **Under Review Transaction on computer-human interaction**
2. **Tamil Selvan Gunasekaran**, Kunal Gupta, Huidong Bai, Yun Suen Pai, Elisabeth Audrey and Mark Billinghurst 2024. Coaffinity: Integrating Multimodal Data for Enhanced Cognitive Load and Emotional Assessment in Remote Collaborative Settings **Under Review Transaction on Affective Computing**
3. Nastaran , **Tamil Selvan Gunasekaran**, and Mark Billinghurst 2024. Empathic Conversation agents for remote therapy **Under Review Transaction on Affective Computing**
4. **Tamil Selvan Gunasekaran**, Alaeddin Nassani, Huidong Bai, and Mark Billinghurst 2024. State-of-the-Art vs. Segment Anything: A Comparative Study of Deep Learning Models for 3D Point Cloud Segmentation Across Diverse Techniques **Under Review**

Teaching Experience

Graduate Teaching Assistant *July 2024- November 2024*

Computer Science, UoA

- Course: Advanced Human-computer Interactions.
- Mentored 25 students on projects

Visiting Lecturer *June 2023 - September 2023*

Perception Computing, Keio University

- Lectured on Machine Learning concepts for designers

Teaching Assistant *February 2023 - June 2023*

Mathematical Modelling, Engineering Science,UoA

- Evaluated assignments for a class of 165 students

Graduate Teaching Assistant *February 2021 - June 2021*

Design and Autonomous Technology, Creative Arts and Industries,UoA

- Co-developed curriculum, Guided projects and evaluated assignments for a class of 52 students. Lectured on Deep Learning and its Applications

Teaching Assistant *2018 - 2019*

Electromagnetic Wave Theory, Vellore Institute of Technology

- Prepared Coursework, Guided projects and evaluated assignments for a class of 60 students

Skills and Tools

Programming: Python, Java, JavaScript, R, C/C++, C#, HTML, Bash, SQL

Prototyping and Research Analysis : Arduino, Raspberry Pi, Unity, MATLAB, SPSS, Touch Designer

Data Science Framework: Machine Learning (Scikit-learn), Deep Learning(Keras, TensorFlow, PyTorch)

Server and Cloud tools : Django, Microsoft Azure, Amazon Web Services and Google Compute Engine

Data Visualisation and Tools : Seaborn, Matplotlib, Tableau, Apache Spark and Power Bi

Design: Fusion360, Figma, Adobe Creative Suite(Photoshop, Illustrator, Premiere Pro, After Effects)

Fabrication: 3D Printing, Laser Cutting