Preeti Vyas

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Research Interests

Affective Haptics, Affective Human-Robot Interaction, Social Robotics, Emotion Regulation, Human-Computer Interaction

Education

University of British Columbia (UBC) — *Vancouver, Canada*
Ph.D. in Computer Science • *President's Academic Excellence Initiative Ph.D. Award* — *Sep 2020–present*
Supervisor: ***Prof. Karon MacLean*** — *94%*

McGill University — *Montreal, Canada*
M.Sc. in Electrical and Computer Engineering (ECE) — *Sep 2017–Jun 2020*
Supervisor: ***Prof. Jeremy Cooperstock*** • *Graduate Excellence Fellowship McGill* — *GPA 3.85/4.0*
Thesis: Foot-based Haptic Interfaces for Numeric Information Delivery and Dance Learning

Maulana Azad National Institute of Technology (NIT-Bhopal) — *Bhopal, India*
B.Tech. in Electronics and Communication Engineering (ECE) — *Jul 2013–Jun 2017*
Supervisor: ***Prof. Jyoti Singhai*** • *Top 3 in ECE class of 2017* — *GPA 9.24/10.0*

Research Experience

University of British Columbia — *Vancouver, Canada*
GRADUATE RESEARCH ASSISTANT • SPIN LAB — *Sep 2020–present*
Supervisor: ***Prof. Karon MacLean***

Happraisal: Investigating an Affective Haptic Robot as a Comforting Co-regulating Agent in Cognitive Reappraisal
Lead • Evaluating the effect of haptic interaction with a comforting agent on user's emotion regulation process • Conducting a study situated at the intersection of psychology and affective haptics • Applying emotion regulation theories and psychology models in practice • Building research platform for an in-lab study.

Tactile Comfort Objects: Understanding People's Touch Interactions with Comfort Objects for Emotion Regulation
Lead • Conducting survey and interviews with participants from diverse cultural backgrounds • Leading data collection of ~100 survey respondents • Conducting quantitative and qualitative analysis • Translating research findings into design guidelines and technical recommendations for touch-based emotion regulation technologies.

Analyzing a Decade of Affective Haptics Research
Lead • Conducted a scoping review of the past 10 years of research on affective haptics • Developed a multi-dimensional framework to code papers • Conducted in-depth quantitative and qualitative analysis on coded data • Synthesized the data and reported on main roadblocks and open research avenues in the field • Led a team of 3 • **Publication**: C3.

Synchrobots: Understanding Effect of User's Haptic Interaction with a Social Robot on Collaboration
Collaborated on research formulation and study design • Conducted user study • Leading data analysis of nominal, text, video, audio, and physiological data • Collaborated with a team of 5 • **Publication**: D1.

Developing Flexible Conformable Multi-Touch Sensors for Affective Haptics Applications
Cross-disciplinary collaboration • Formulating sensor characterization and testing plan for Affective Touch applications • Informing the design of sensors with specifications drawn from past works.

McGill University — *Montreal, Canada*
GRADUATE RESEARCH ASSISTANT • SHARED REALITY LAB — *Sep 2017–Jun 2020*
Supervisor: ***Prof. Jeremy Cooperstock***

HapToes: Vibrotactile Numeric Information Delivery via Tactile Toe Display
Lead • Explored haptic modality to convey information on toes • Developed hardware and software platform needed for rendering tactile stimuli • Experimented with different tactile patterns to design a feasible rendering • Designed and conducted two usability studies (16, 25 participants each) to test proposed hypothesis • **Publication**: J1, C1, C2, MT

Haptic-Assisted Motor Learning for Novice Dancers
Lead • Developed a prototype of haptic-based smart shoes to assist new dancers in learning spatial foot movements • Proposed haptic cues for conveying changes in weight transfer and direction of movement • Worked with force sensors (FSR), inertial motion sensors (IMU) and haptic actuators • Collaborated with an expert Latin dancer • **Publication**: MT

Max Planck Institute for Intelligent Systems (MPI-IS) *Stuttgart, Germany*

MITACS GLOBALINK GRADUATE RESEARCH INTERN • HAPTIC INTELLIGENCE DEPARTMENT *Jan–Apr 2019*

Supervisor: ***Prof. Katherine Kuchenbecker*** • Collaborators: Adam Spiers, Mayumi Mohan

Facilitating Human Interaction with Robot Exercise Coach using Smart Objects
Lead • Designed engaging human-robot interaction scenarios involving smart objects • Prototyped smart objects with iterative design process • Developed communication platform • Worked with RFID sensor, inertial motion sensor (IMU), load cell, Robot Operating System (ROS) • **Grant:** Mitacs Graduate Research Award, McGill Graduate Mobility Award

Ayatana Technologies *Montreal, Canada*

UX RESEARCHER • COLLABORATION PROJECT *Jan–Dec 2018*

Supervisor: ***Prof. Jeremy Cooperstock*** • Collaborators: Terence Kao, Jerome Combet Blanc

Wine and Meal Pairing Experiment to Evaluate a Wine Recommendation Engine
Lead • Designed user study to test the performance of a wine recommendation engine against an expert Sommelier • Collaborated with the company to plan and conduct user study • Conducted user study on four groups, 33 participants

Maulana Azad National Institute of Technology *Bhopal, India*

RESEARCH ASSISTANT • ECE DEPARTMENT *Jan 2016–Apr 2017*

Supervisor: ***Prof. Jyoti Singhai***

Automatic Ripe Fruit Detection and Sorting Technique
Lead • Prototyped a 4-DOF robotic arm with gripper • Implemented image processing algorithms on camera feed for detection of ripe and raw fruits from a mixed batch • Performed real-time automated segregation of fruits via robotic arm • Improved motor acceleration profile to perform smooth transitioning between different poses of the end-effector

Barcode Scanner: An Inexpensive Product for Small-Scale Retailers
Lead • Interviewed a local retailer to understand problems related to product cataloging • Followed an iterative design approach • Prototyped a barcode scanner equipped with a Raspberry Pi processor and camera • Implemented computer vision algorithms for segmentation and scanning • Scanner worked in different orientations and ambient light conditions

York University *Toronto, Canada*

MITACS GLOBALINK RESEARCH INTERN (GRI) • LASSONDE MECHANICAL ENGINEERING *May–Jul 2016*

Supervisor: ***Prof. Dan Zhang***

Development of Novel Design for a Hybrid Robot
Lead • Performed kinematic/dynamic analysis of 3-RRR planar robot • Implemented close-loop vectors, workspace mapping, end-effector position validation, Jacobian matrix, and stiffness mapping for the same • Developed a novel design of a hybrid robot with improved workspace and stability compared to a similar serial and parallel mechanism

Publications

Demo **P**roject **C**onference **J**ournal **W**ork-in-progress **M**aster **T**hesis

2023 *J2* James H. Kryklywy, **Preeti Vyas**, Karon E. Maclean, Rebecca M. Todd, "Characterizing affiliative touch in humans and its role in advancing haptic design" *Annals of the New York Academy of Sciences (2023)*

C3 **Preeti Vyas,** Unma Desai, Karin Yamakawa, Karon MacLean, "A Descriptive Analysis of a Formative Decade of Research in Affective Haptic System Design" *ACM CHI 2023*

D1 Yuna Watanabe, Laura Cang, Rubia Guerra, Devyani McLaren, **Preeti Vyas,** Karon MacLean, "Enhancing Virtual Teamwork with Synchrobots: A Robot-Mediated Approach to Improving Connectedness" *Interactivity Demo at ACM CHI 2023*

2021 *P1* Kattie Sepehri, **Preeti Vyas**, Jane Jun, Jessica Wilkin, Anika Sayara, Stephanie Glegg, "Digitizing KidsAction Coaching: A Web App to Support Home-Based Physical Activity for Children with Neurodevelopmental

Disabilities", *Digital Health Week Poster Competition 2021*

W1 **Preeti Vyas,** Linnea Kirby, Marco Moran-Ledesma, "HaptiColour: Haptic-assisted Digital Colouring Platform for Managing Anxiety and Increasing Mindfulness" *World Haptics Conference, 2021*

2020 *MT* **Preeti Vyas,** "Foot-Based Haptic Interfaces for Numeric Information Delivery and Dance Learning" *Master's Thesis, McGill University (Canada), 2020.*

J1, C1 **Preeti Vyas**, Feras Al Taha, Jeffrey Blum, Antoine Weill--Duflos, Jeremy Cooperstock, "Ten Little Fingers, Ten Little Toes: Can Toes Match Fingers for Haptic Discrimination?" *IEEE Transactions on Haptics, vol. 13, no. 1, pp. 130-136, Jan 2020 and IEEE Haptics Symposium (HAPTICS), 2020*

C2 **Preeti Vyas**, Feras Al Taha, Jeffrey Blum, Jeremy Cooperstock, "HapToes: Vibrotactile Numeric Information Delivery via Tactile Toe Display" *IEEE Haptics Symposium (HAPTICS), 2020*

Work Experience

Graduate Research Assistant, University of British Columbia — *Vancouver, Canada*
Sensory Perception and Integration Research Group (SPIN) — *Sep 2020–present*

Graduate Teaching Assistant, University of British Columbia — *Vancouver, Canada*
Topics in Human-Computer Interaction: DFP PROJECT (CPSC 554K) — *Jan–Apr 2023, Jan–Apr 2022*
Physical User Interface Design and Evaluation (CPSC 543) — *Jan–Apr 2022*
Introduction to Human-Computer Interaction Methods (CPSC 344) — *Sep–Dec 2020*

Graduate Research Assistant — *Montreal, Canada*
Shared Reality Lab, McGill University — *Sep 2017–Jun 2020*

Graduate Teaching Assistant, McGill University — *Montreal, Canada*
Human-Computer Interaction (ECSE 424/542) — *Sep–Dec 2019*

iOS Instructor — *Montreal, Canada*
Summer Coding Camp, Axiom Academy — *Jul 2018*

Executive Operations Officer — *Indore, India*
Hindustan Petroleum Corporation Limited (HPCL) — *Jun–Aug 2017*

Technical and Research Skills

Programming Languages	Python, Java, C, C++, R, LaTeX
UX Research and Design	Thematic Analysis, Mixed-method User Study, Figma, Prototyping
Data Analysis Tools	Python (pandas, matplotlib, sci-kit-learn, seaborn, pingouin), NVivo, SPSS
Software/Libraries	MATLAB, SolidWorks, Tableau, Android Studio, Arduino IDE, XCode, Simulink, ROS

Graduate Courses

University of British Columbia, Vancouver, Canada

CPSC 547 Information Visualization
CPSC 554K DFP Research Project Course
CPSC 538B Distributed Systems Abstraction
CPSC 543 Physical User Interface Design and Evaluation (Haptics)
CPSC 554X Topics in HCI: Machine Learning and Signal Processing

McGill University, Montreal, Canada

COMP 652 Machine Learning
POTH 639 (Human) Motor Control
COMP 767 Reinforcement Learning
ECSE 626 Statistical Computer Vision
ECSE 542 Human-Computer Interaction

Committees

Chair	Student Volunteer Chair ICMI (2021)
Committee Member	DFP Justice, Equity, Diversity, and Inclusion Committee, UBC (2021—2022) Outreach, Diversity, and Equity Representation CS, UBC (2021) Graduate Recruiting Committee, CS, UBC (2021)
Reviewer	Grant: Digital Health Research Accelerator Grant (2022) Conferences: ACM CHI (2023, 2024), CHIWORK Symposium (2022), IEEE WHC (2021) Journal: Springer Virtual Reality (2021), TOCHI (2022, 2023)
Volunteer	SURE Student Research Program Judge (2019), Student Volunteer CHI (2023, 2018)

Mentoring Experience

Under-Graduates	**William Chen** Developing an Experimental Dashboard for Happraisal Study, *Honors Thesis*	*May—Aug 2023*
	Angel Bao An Investigation of Emotional Regulation from Comfort Objects, *Directed Studies*	*May—Aug 2023*
	Khan Zikeng Developing Closed-loop Control, Modulating Actuator Using Bio Signals	*May—Aug 2023*
	Suzette Sun Characterizing and Testing Flexible Conformable Soft Sensors	*Sep—Dec 2022*
	Karin Yamakawa Creating Framework and Coding Papers for Scoping Review	*Oct 2021—Sep 2022*
	Bridget Meyboom Fabricating, Testing, and Characterizing Flexible Sensors	*May—Sep 2021*
	Yangtao Deng Implementing Beat Detection and Gait Tracking for Dance Shoes	*Apr—Sep 2020*
	Zhanna Klimanova Implementing Client-server Architecture for Dance Shoes	*Jan—Feb 2020*
	Jennie Chen, Bruce Bu Fabricating Hardware for Dance Shoes	*May—Aug 2019*
	Feras Al Taha Fabricating Hardware/Software Platform for HapToes	*Jan 2018—Jun 2020*
High-Schoolers	**Yeganeh Taghavi, Darren Wang** STEM Fellowship Research Exploration Opportunity (REO)	*Apr 2023*
	Emily Hsu MyPeer: Designing a Peer Support App for Students, Talaria Summer Institute	*Jul 2022*

Awards and Funding

Oct 2021 **UBC's nominee to the Vanier Canada Scholarship** (ranked 155 out of 172 in the final round), Canada

Jun 2021 **Computer Science Graduate Teaching Assistant Award,** UBC, Vancouver, Canada

May 2021 **DFP CREATE Design Showcase Best 554K Student Project Award,** UBC, Vancouver, Canada

Sep 2020 **President's Academic Excellence Initiative Ph.D. Award** UBC, Vancouver, Canada

Sep 2020 **Faculty of Science Ph.D. Tuition Award** UBC, Vancouver, Canada

Sep 2020 **International Tuition Award** for the Ph.D. program, UBC, Vancouver, Canada

Sep 2020 **CODE (Committee for Outreach, Diversity and Equity) Funding** for Grace Hopper Celebration 2020

Jan 2019 **Mitacs Graduate Research Award** for research exchange at Max Planck Institute for Intelligent Systems

Jan 2019 **McGill Graduate Mobility Award** for research exchange at Max Planck Institute for Intelligent Systems

Sep 2017 **McGill Graduate Excellence Fellowship Award** for Graduate Research Program

Sep 2017 **Mitacs Globalink Graduate Fellowship Award** for Graduate Research Program

May 2016 **Mitacs Globalink Research Internship Award** for a research internship at York University

Jun 2012 **INSPIRE Scholarship by Department of Science and Technology, Govt. of India** for Higher Education

Jun 2012 **Central Sector Scholarship Scheme Award by M.H.R.D. India** for Higher Education

Research Talks

Apr 2023 **A Descriptive Analysis of a Formative Decade of Research in Affective Haptic System Design,** CHI, Germany

Mar 2023 **Happriasal: Understanding the Causal Effect of a User's Haptic Interaction with a Social Robot on their Cognitive Reappraisal Success,** CRA-Ideals, Honolulu, Hawaii, USA

Oct 2022 **Happriasal: Social Robots and Cognitive Reappraisal,** Motivated Cognition Lab, Vancouver, Canada

Oct 2021 **Research Proficiency Examination,** Department of Computer Science, UBC, Vancouver, Canada

Aug 2021 **Haptics and Affective Health,** CanHaptics Seminar, Virtual

Aug 2021 **Haptic-assisted Digital Colouring Platform for Managing Anxiety and Increasing Mindfulness,** Work-in-progress Paper, World Haptics Conference 2021, Virtual

May 2021 **Digitizing KidsAction Coaching,** DFP Symposium, UBC, Vancouver, Canada

Jul 2020 **Foot-based Haptic Interfaces for Numeric Information Delivery and Dance Learning,** Montreal Haptics, Canada

May 2020 **Vibrotactile Numeric Information Delivery via Tactile Toe Display,** IEEE Haptics Symposium, Virtual

May 2020 **Can Toes Match Fingers for Haptic Discrimination?** IEEE Haptics Symposium, Virtual

Jan 2020 **Designing Foot-based Haptic Interfaces for Communication and Dance Learning,** IMPRS Symposium, Germany

Apr 2019 **Facilitating Human Interaction with Robot Exercise Coach using Smart Objects,** MPI-IS, Stuttgart, Germany

Feb 2018 **Motor Learning by Multimodal Feedback,** Shared Reality Lab, McGill University, Montreal, Canada

Mar 2017 **Barcode Scanner: Inexpensive Product for Small-Scale Retailers,** IEEE Project Competition, NIT-Bhopal, India

Outreach Talks

Oct 2022 **Connecting the Dots and Looking at the Bigger Picture,** STEM Engagement Night, UBC, Vancouver, Canada

Jun 2022 **Haptics: The Sense of Touch,** Science 101 Lectures, UBC, Vancouver, Canada

Mar 2022 **Haptics: The Sense of Touch,** Science 101 Lectures, UBC, Vancouver, Canada

May 2021 **Prompt Journalling Session for Alleviating Covid-19 Effects on Mental Health of Students,** Graduate Student Wellbeing Event, Department of Computer Science, UBC, Vancouver, Canada

Aug 2019 **Opportunities of Graduate Studies and Research in Canada,** Mitacs Globalink Annual Reception, Montreal, Canada

Jul 2019 **Sense of Touch**, SHAD Canada, McGill University, Montreal, Canada

Nov 2018 **Pre-Departure Orientation: Regional Session South Asia**, McGill Abroad, McGill University, Montreal, Canada

Aug 2017 **Higher Studies Abroad: Why? How? When?** Seminar on Foreign Education, NIT-Bhopal, India

Volunteering Work

May 2023 **Organizer,** HapticHIVE, a UBC-V UBC-O Hackathon, Kelowna, Canada

Jul 2023 **Little Folks Committee Member,** Vancouver Folk Festival, Vancouver, Canada

Aug 2022 **Moderator,** DFP Graduate Student Summer School, UBC, Vancouver, Canada

Jul 2022 **Little Folks Committee Member,** Vancouver Folk Festival, Vancouver, Canada

Aug 2019 **Judge,** SURE Student Research Program, McGill University, Montreal, Canada

Aug 2019 **Parade's Asian Heritage Representative**, Festival Fierté MTL, Montreal, Canada

Jul 2019 **General Volunteer,** Osheaga, Festival Musique et arts, Montreal, Canada

Jun 2019 **Media Content Manager,** Festival folk de Montreal sur le canal, Montreal, Canada

Mar 2019 **Volunteer**, Girls' Day Lab Visit, Haptic Intelligence Department, MPI-IS, Stuttgart, Germany

Aug 2018 **Volunteer,** Campus Life and Engagement Team, McGill University, Montreal, Canada

Jul 2018 **Cultural Team,** Festival of India, Montreal, Canada

Jun 2018 **ECE Dept. Panelist**, Faculty of Engineering Graduate Education Retreat, McGill University, Montreal, Canada

Jun 2018 **Junior League Judge,** RoboCup Federation, Montreal, Canada

Apr 2018 **Student Volunteer,** ACM CHI Conference on Human Factors in Computer Systems, Montreal, Canada

Oct 2017 **Shared Reality Lab Volunteer,** McGill Open House, Montreal, Canada

Jul 2016 **Procession and Crowd Control Team,** Festival of India, Toronto, Canada

References

Karon MacLean ✉ maclean@cs.ubc.ca
Professor, Department of Computer Science, University of British Columbia, Vancouver, Canada

Jeremy Cooperstock ✉ jer@cim.mcgill.ca
Professor, Electrical and Computer Engineering, McGill University, Montreal, Canada