Jeffrey R. Blum - Curriculum Vitae
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Online version: http://cim.mcgill.ca/~jeffbl/about/

SYNOPSIS
Ph.D. Candidate (ABD) in McGill's Electrical and Computer Engineering Department. Over 25 years of experience in mobile software design and development as a program and project manager, software designer and developer, and entrepreneur. Dual citizenship: Canada and USA.

EDUCATION
Princeton University, B.S.E. Computer Science, *magna cum laude*, 1994
McGill University, French for Professional Communication certificate program, 2011
In progress (ABD): McGill University, Ph.D., Electrical and Computer Engineering, Sep. 2013-

EXPERIENCE

McGill Dept of Electrical & Computer Engineering, Montréal, Canada: Ph.D. Candidate (Sep. 2013-)

- Thesis topic: Using body worn wireless sensors for mobile remote implicit communication via haptics. (Supervisor: Prof. Jeremy Cooperstock)
- Research exchange: 2018 May-Aug, miLAB, IDC Herzliya, Israel.
- Research exchange: 2016 Jan-Jul, Media Computing Group, RWTH Aachen, Germany.

McGill University, Shared Reality Lab, Montréal, Canada: Research Assistant/Technical Project Manager (Mar. 2021-present)

- Led distributed team of over 15 people building the IMAGE project, an open source web browser extension and Docker-based server system that lets people who are blind or low vision experience dynamically generated audio-haptic renderings of web graphics. Scoped and prioritized features for both browser extension and back-end server, set and monitored schedules, participated in technical architecture and UX design, created workflows, authored and triaged work issues using agile methods and a Github project board. Interviewed and onboarded new project members for technical and other roles. Ran internal project meetings and interacted with external partners. Drafted report content for funder. Created shell scripts and other tools to help with testing docker containers. Launched IMAGE at the CSUN Assistive Technology Conference in March, 2022.

McGill University, Shared Reality Lab, Montréal, Canada: Research Assistant (Nov. 2008-Sep. 2013)

- Lead developer and project manager for Autour (available on Apple AppStore), implementing an iPhone application that renders points of interest surrounding a blind individual via spatialized audio. Project funded by both Google Research and the Québec Secrétariat du Conseil du trésor. Awards: CIRA 2012 Impact Award for best Application; Best paper award at Mobiquitous 2011 in Copenhagen, Denmark. **Technology:** *primarily C++ for cross-platform (e.g., Android) compatibility; some Objective-C for iPhone-specific functionality; XCode; Subversion; Python + matplotlib for log file analysis.*
- Project manager for McGill's deliverables to the Health Services Virtual Organization (HSVO) project. Key designer of system architecture for 17 Ethernet camera array providing individual viewpoint selection to remote viewers of cadaveric dissections. Deployed at the McGill Medical Simulation Centre. **Technology:** *Video streaming architecture Adobe Flash/VP6/H.264; Basler Ethernet cameras.*
- Modified and debugged underwater camera remote control software to use Moxa IP to serial hardware for the Oceans 2.0 project; optimized performance of system, culminating in successful control of remote hardware. **Technology:** *Java.*
- Technical contributions and project management for many other lab activities, ranging from World Opera, involving opera singers and a conductor performing live, but with audio and video latency simulated as if they were located in different cities around the globe, to a portable gaming device for treating amblyopic children (patent licensed to Amblyotech, then sold to Novartis). Team member for Mozilla Ignite winning Real Time Emergency Response (rtER) application ($55,000 total prize money won across multiple contest rounds). Edited and authored successfully funded grant proposals submitted to NSERC, Google, and other funding agencies.

FullMeasure.org (personal project, currently offline) (2006-2008)

- Conceived, designed and implemented web application to provide a neutral clearinghouse for quantitative investment ratings based on non-financial measures such as environmental impact, social responsibility, and

religious beliefs. **Technology:** *Ruby on Rails; Netbeans IDE; MySQL; Perl (for data gathering and parsing from the web); Capistrano; Ubuntu Linux.*

Glass Lantern, LLC, Washington, DC (2002-2007)

- Founded Single Member Limited Liability Company focused on creating mobile software for professional photographers; **Technology:** *C; C++; Win32; Visual Studio; Windows CE; Windows Mobile.*
- Pocket PC products: PocketLoupe, a positively reviewed image viewer for RAW (camera proprietary) images; Pixfer, a mobile image management tool; CalTrack, a calorie tracking application.
- Pixfer XP, a multithreaded Windows XP version of the Pocket PC Pixfer program.
- Windows Mobile smartphone port of CalTrack calorie tracker, plus a pack of small smartphone utilities.

MindSurf Networks, McLean, VA: Experience Designer / Director of Product Design (2001)

- Managed Product Design team including Art Director, Experience Designer, and two Graphic Designers.
- Oversaw design aspects of the Mindsurf Achievement Essentials product suite, which allowed students and teachers to collaborate via handheld computers in a wireless networked environment. Responsible for design specifications and user workflow documentation. (Background on Mindsurf in Washington Post and New York Times.)

Microsoft Mobile Electronics Group, Redmond, WA: Program Manager / Lead Program Manager (1994-2000)

- Oversaw all aspects of Pocket Outlook software (Calendar, Contacts, Tasks, Note Taker) for three full product cycles: Handheld PC (released 8/1996), Palm-size PC (released 3/1998), and Pocket PC (released 3/2000, e.g., Compaq iPaq).
- Directed first version of desktop personal information management (PIM) synchronization software.
- Drove components from initial design through final release, including determining user requirements and feature set, designing features, developing prototypes and storyboards, writing specifications, soliciting and incorporating usability and design feedback, setting schedule, and leading bug triage.
- Managed temporary staff and the Program Manager responsible for email functionality.
- Worked directly with product planners and technical staff at companies such as Hewlett-Packard, Casio, Compaq, and LG Electronics to define product requirements and resolve feature/technical issues.
- Oversaw/specified additional components at various points: Hardware requirements for OEMs, Shell & navigation, Pocket Word, Email, Calculator, physical keyboard design, and user notification system.

NeXT Computer, Inc., Redwood City, CA (various 1991-1994)

- NeXT Campus Consultant responsible for technical/sales support for Princeton University.
- Summer internship at NeXT headquarters: technical assistant in Higher Education Marketing.
- Designed and implemented NeXTSTEP software to handle large electronic mailings for NeXT marketing team.**Technology:** *Objective-C; NeXTSTEP.*

Princeton University, Princeton, NJ (various 1990-1994)

- Wrote lab manual for a new introductory Computer Science course COS111 with two other undergraduate students. (Summer '91)
- Undergraduate Teaching Assistant for COS111. (Two semesters)
- Provided end-user technical support at the campus computing center and completed consultant training program. (Fall 1990-1991)

OTHER ACHIEVEMENTS, ACTIVITIES

- Co-authored position paper accepted to ACM CHI '97 Issues in Wearable Computing workshop.
- Student Member of Centre for Interdisciplinary Research in Music Media and Technology (CIRMMT).
- Run a Tor middle relay. Former volunteer website contributor for the open source Tor Project (2007).
- Reviewer: EuroHaptics, World Haptics, CHI, MobileHCI, ISS, Haptic Symposium
- Student Volunteer: CHI 2018, Ubicomp 2018, World Haptics 2019.
- *HealthCare Bear* Developed wireless sensor components and helped demonstrate bluetooth teddy bear that allowed children to self-report pain levels, with team members Dalia El-Shimy and Mike Sterle-Contala. Hacking Health Montreal hackathon, February, 2014.
- Guest lectured on Mobile Computing 2014, 2015, 2016 (top voted guest lecture by students), 2017, 2019, 2020, 2021 in McGill's HCI class (ECSE 424/542).
- Participant in US National Academies Keck Future Initiative (NAKFI) 2015 conference on Art and Science, Engineering, and Medicine Frontier Collaborations: Ideation, Translation & Realization.

AWARDS & FUNDING

- Mitacs Globalink Research Award CAD$6000 for research exchange in miLAB, IDC Herzliya, Israel.

- McGill Graduate Mobility Award CAD$4118 for research exchange in miLAB, IDC Herzliya, Israel.
- Conference student stipends : Privacy Enhancing Technologies Symposium (PETS) 2016 (USD$795) & 2017 (USD$795), UIST 2016
- Keck Futures Initiative USD$100,000 Seed Grant, May 2016 -- May 2018. One of four "Key Personnel" for "Empathy Mirror" seed grant, including participation in authoring grant application, and managing McGill's portion of funds and deliverables.
- Selected as Graphics, Animation and New Media (GRAND) Scholar (G*PGS). July, 2014
- Best Research Note Reviewer award: Graphics, Animation and New Media (GRAND) 2014 conference.
- Natural Sciences and Engineering Research Council of Canada (NSERC) Postgraduate Scholarship-Doctoral (PGS-D) 2014-2017
- McGill Engineering Doctoral Award (MEDA) 2013-2016
- Lorne Trottier Engineering Graduate Fellowship 2013
- McGill Graduate Excellence Fellowship 2013
- Best Use of Sound award at conference: *The Walking Straight Mobile Application: Helping the Visually Impaired Avoid Veering.* S. Panëels, D. Varenne, J.R. Blum, J. R. Cooperstock, International Conference on Auditory Displays, Lodz, Poland, July 2013.
- Best paper award: *What's around me? Spatialized audio augmented reality for blind users with a smartphone.* Blum, J.R., Bouchard, M., and Cooperstock, J.R., Mobiquitous 2011, Copenhagen, Denmark, December. Main track accept rate 28%.

PATENTS
Inventor on 13 issued US Patents:

1. 5805164 Data display and entry using a limited-area display panel
2. 6593949 Smart column for contact information on palm-sized computing devices & method & apparatus for displaying the same
3. 6633924 Object synchronization between objects stores on different computers
4. 6664991 Method and apparatus for providing context menus on a pen-based device
5. 6727917 UI for palm-sized computing devices & method & apparatus for displaying the same
6. 6727830 Time based hardware button for application launch
7. 6760696 Fast start voice recording and playback on a digital device
8. 6819315 Soft input panel system and method
9. 6901559 Method and apparatus for providing recent categories on a hand-held device
10. 7411582 Soft input panel system and method
11. 7533352 Method and apparatus for providing context menus on a hand-held device
12. 7669208 Object synchronization between object stores on different computers
13. 8066372 Binocular vision assessment and/or therapy

PEER REVIEWED CONFERENCE & JOURNAL PUBLICATIONS

1. *IMAGE: A Deployment Framework for Creating Multimodal Experiences of Web Graphics.* Juliette Regimbal, Jeffrey R. Blum, Jeremy R. Cooperstock. In 19th Web for All Conference (W4A'22), April 25–26, 2022, Lyon, France. ACM, New York, NY, USA, 5 pages. [TO APPEAR]
2. *Contact Force Estimation from Raw Photoplethysmogram Signal.* Pascal E. Fortin, Jeffrey R. Blum, Antoine Weill-Duflos, Jeremy R. Cooperstock. 2020 IEEE SENSORS, 2020, pp. 1-4.
3. *Habituation to Pseudo-Ambient Vibrotactile Patterns for Remote Awareness.* Jeffrey R. Blum, Jessica R. Cauchard, Jeremy R. Cooperstock. 2020 IEEE Haptics Symposium (HAPTICS), 2020, pp. 657-663. Washington, DC.
4. *Ten Little Fingers, Ten Little Toes: Can Toes Match Fingers for Haptic Discrimination?* Preeti Vyas, Feras Al Taha, Jeffrey R. Blum, Antoine Weill-Duflos, Jeremy Cooperstock. IEEE Transactions on Haptics, vol. 13, no. 1, pp. 130-136, 1 Jan-Mar 2020.
5. *HapToes: Vibrotactile Numeric Information Delivery via Tactile Toe Display.* Preeti Vyas, Feras Al Taha, Jeffrey R. Blum, Jeremy Cooperstock. 2020 IEEE Haptics Symposium (HAPTICS), 2020, pp. 61-67. Washington, DC.
6. *Getting Your Hands Dirty Outside the Lab: A Practical Primer for Conducting Wearable Vibrotactile Haptics Research.* Jeffrey R. Blum, P. Fortin, F. Al-Taha, P. Alirezaee, M. Demers, A. Weill-Duflos, Jeremy Cooperstock. IEEE Transactions on Haptics, Special Issue on Wearable and Hand-held Haptics.
7. *Single-Actuator Vibrotactile Numeric Information Delivery in the Face of Distraction.* Jeffrey R. Blum, and Jeremy Cooperstock. Proc. 2019 World Haptics Conference. Tokyo, Japan, June 2019.
8. *Grabbing at an Angle: Menu Selection for Fabric Interfaces.* Nur Al huda Hamdan, Jeffrey R. Blum, Florian Heller, Ravi Kanth Kosuru, and Jan Borchers. Proc. 2016 ACM International Symposium on Wearable Computers (ISWC '16). Heidelberg, Germany, September.
9. *Improving Haptic Feedback on Wearable Devices through Accelerometer Measurements.* Jeffrey R. Blum, Ilja Frissen, Jeremy R. Cooperstock. Proc. 28th Annual ACM Symposium on User Interface Software & Technology (UIST 2015), Charleston, NC, Nov 2015, p.31-36.
10. *Real-Time Emergency Response: Improved Management of Real-Time Information During Crisis Situations.* Jeffrey R. Blum, Alexander Eichhorn, Severin Smith, Michael Sterle-Contala, Jeremy R. Cooperstock. Journal

on Multimodal User Interfaces (JMUI), Volume 8, Issue 2 (2014), p.161-173.

11. *The Walking Straight Mobile Application: Helping the Visually Impaired Avoid Veering.* S. Panëels, D. Varenne, J.R. Blum, J. R. Cooperstock, Proc Intl Conf on Auditory Displays, Lodz, Poland, July 2013. p.25-32 (**Best Use of Sound award at conference**)

12. *Listen to It Yourself! Evaluating Usability of "What's Around Me?" for the Blind.* Panëels, S., Olmos, A., Blum, J., and Cooperstock, J. R. 2013, CHI '13 Proc. SIGCHI Conf. on Human Factors in Computing Systems, Paris, France, April. p.2107-2116

13. *Spatialized Audio Environmental Awareness for Blind Users with a Smartphone.* Blum, Jeffrey R. and Bouchard, Mathieu and Cooperstock, Jeremy R. 2012, Mobile Networks and Applications, 18:295-309, Springer US, December.

14. *Smartphone sensor reliability for augmented reality applications.* Blum, J.R., Greencorn, D., and Cooperstock, J.R. 2012, Proc. 9th Intl. Conf. on Mobile and Ubiquitous Systems: Computing, Networking and Services (Mobiquitous 2012), Beijing, China, December. 120:127-138 Accept rate 31%.

15. *What's around me? Spatialized audio augmented reality for blind users with a smartphone.* Blum, J.R., Bouchard, M., and Cooperstock, J.R. Proc 8th Intl ICST Conf, MobiQuitous 2011, Copenhagen, Denmark, December. 49-62 Main track accept rate 28%. (**best paper award**)

16. *End-user viewpoint control of live video from a medical camera array.* Blum, J; Sun, H; Olmos, A; and Cooperstock, J R 2011. Proc Intl Conf Distributed Smart Cameras (ICDSC), Ghent, Belgium, August. 1-6

17. *A game platform for treatment of amblyopia.* To, L.; Thompson, B.; Blum, J.; Maehara, G.; Hess, R.; and Cooperstock, J. R., 2011. IEEE Transactions on Neural Systems and Rehabilitation Engineering. 19(3):280-9

18. *Exploring the role of latency and orchestra placement on the networked performance of a distributed opera.* Olmos, A, Brulé, M., Bouillot, N., Benovoy, M., Blum, J., Sun, H., Lund, N.W., and Cooperstock, J.R., 2009. 12th Annual International Workshop on Presence, Los Angeles, Nov. 11-13. 9 pages

19. *Did Minority Report Get it Wrong? Superiority of the Mouse over 3D Input Devices for a 3D Placement Task.*, Bérard, F., Ip, J., Benovoy, M., El-Shimy, D., Blum, J.R. and Cooperstock, J.R., IFIP TC13 Conf. Human-Computer Interaction (INTERACT), Uppsala, Sweden, August 24-28, 2009. 107-122

TALKS, POSTERS, PRESENTATIONS, DEMONSTRATIONS

1. *IMAGE: Accessible Internet Graphics via Audio and Touch* Presenter with four other team members at IMAGE launch. 37th Annual CSUN Assistive Technology Conference. March 14-18, 2022. Anaheim, California.

2. *Towards Consistent Haptic Coupling with HaptiStrap: Doing Better than "Tight yet Comfortable"* Pascal E. Fortin, Jeffrey R. Blum, Jeremy R. Cooperstock. Poster, Adjunct Publication of the 32nd Annual ACM Symposium on User Interface Software and Technology (UIST) 2019, New Orleans, LA, October 20-23.

3. *Exploring the Limits of Vibrotactile Numeric Information Delivery.* Jeffrey R. Blum, Jeremy R. Cooperstock. Poster, ACM International Joint Conference on Pervasive and Ubiquitous Computing (Ubicomp) 2018, Singapore, October 8-12.

4. *Pseudo-Ambience: Filling the Gap Between Notifications and Continuous Information Displays.* Jeffrey R. Blum, Jeremy R. Cooperstock, Jessica Cauchard. UbiTtention Workshop, ACM International Joint Conference on Pervasive and Ubiquitous Computing (Ubicomp) 2018, Singapore, October 8-12.

5. *Mobile Communication and Information Delivery: Breaking Away from the Smartphone Screen.* Jeffrey R. Blum. Invited Seminar Talk, Interdisciplinary Center (IDC) Herzliya, Israel, June 14, 2018.

6. *Usability of Foot-Based Interaction Techniques for Mobile Solutions.* Taeyong Kim, Jeffrey R. Blum, Parisa Alirezaee, Andre Arnold, Pascal Fortin, and Jeremy R. Cooperstock. In Mobile Solutions and Their Usefulness in Everyday Life. Springer International Publishing AG, 2019. (Book chapter)

7. *Punching Empathy into Yourself and Others: Subversive Transformation of Hostility.* Jeffrey R. Blum, Pascal E. Fortin, Feras Al Taha, Yubei Xiong, James Sham. Demonstration, CHI '18 SIGCHI Conf. Human Factors in Computing Systems, Montreal, Quebec, April 21-26 2018.

8. *Raising the Heat : Electrical Muscle Stimulation for Simulated Heat Withdrawal Response.* Pascal Fortin, Jeffrey R. Blum, Jeremy R. Cooperstock. Work in Progress Poster, ACM Symposium on User Interface Software and Technology (UIST) 2017, Quebec City, Canada, October 22-25, 2017.

9. *Expressing human state via parameterized haptic feedback for mobile remote implicit communication.* Jeffrey R. Blum, Jeremy R. Cooperstock. CIRMMT Student Symposium, presented poster from Augmented Human 2016, plus demonstration of SenseProxy.

10. *Shared Reality Lab booth demo team at TEDx Montreal* SenseProxy demonstrations throughout the event. November 12, 2016.

11. *Raising the Heat : Electrical Muscle Stimulation for Simulated Heat Withdrawal Reflex.* Student Innovation Contest. Team: Pascal Fortin, Jeffrey R. Blum, Danny Horodniczy. 29th Annual ACM Symposium on User Interface Software & Technology (UIST 2016), Tokyo, Japan, October 2016. (contest proposal accept rate 38%)

12. *Creating a New Sense by Feeling Remote Information.* Demonstration. IEEE Workshop on Multimedia Signal Processing (MMSP 2016), Montreal, Canada, 2016

13. *Expressing Human State via Parameterized Haptic Feedback for Mobile Remote Implicit Communication.* Jeffrey R. Blum, Jeremy R. Cooperstock. Proc. ACM Augmented Human '16, Geneva, Switzerland, February. (work in progress poster)

14. *Body-worn sensors for remote implicit communication.* Doctoral Consortium presentation. Mobile HCI 2014,

Toronto, September.

15. *Summarizing motion data for remote implicit haptic communication.* Research Note presentation. Graphics, Animation and New Media (GRAND) annual conference, Ottawa, May, 2014.

16. US Ignite Application Summit., Real Time Emergency Response (rtER) main stage demo, June, 2013

17. *Rendering the world to blind people via spatialized audio.* Research Note presentation. Graphics, Animation and New Media (GRAND) annual conference, Toronto, May, 2013.

18. *Assisting the blind and treating amblyopia: Two more things you can do with your smartphone.* Invited talk. Co-presented by J. R. Cooperstock and J. R. Blum. Le 15e Symposium scientifique sur l'incapacité visuelle et la réadaptation. U. Montreal, February, 2013.

19. *Mobile is not just fun and games: improving people's lives with smartphones.* Presentation, Mobiz, Montréal Digital Festival, Montréal, Canada, November 15, 2012

20. *Two ways Smartphones can change the lives of blind and visually impaired people.* Invited talk, Premier Atelier sur les Technologies Assistés, Centre de recherche informatique de Montréal (CRIM), 2012, Montréal, Canada, June

21. *Sound, Noise, Silence: What's around me? Spatialized audio augmented reality for blind users with a smartphone.* Invited talk, ConnexCité, Montréal, Quebec, March 2012.

22. *Hearing Neon Signs: Spatialized Audio Augmented Reality for Blind Users.* Invited talk, Interacting with Sound Workshop, Mobile HCI 2011, Stockholm, Sweden, September.