Julia Ebert

PhD Candidate • Robotics Researcher

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Education

Cambridge, MA
2016 – 2019

Harvard University
- PhD Candidate in Computer Science
- Master of Science in Computer Science

Advisor: Prof. Radhika Nagpal

London, UK
2016

Imperial College London
- Master of Research in Bioengineering, with Distinction

Marshall Scholar
Advisors: Prof. Etienne Burdet, Dr. Ildar Farkhatdinov
Thesis: *Assisting Balance Recovery with a Lower Limb Exoskeleton*

Boston, MA
2015

Northeastern University
- Bachelor of Science in Behavioral Neuroscience, Minor in Computer Science

GPA: 3.98 / 4.0, summa cum laude
Honors Thesis: *Asymmetric Learning in an Asymmetric Bimanual Task*

Peer-Reviewed Publications

Julia Ebert, Melvin Gauci, Frederik Mallmann-Trenn and Radhika Nagpal. 2019. Bayes Bots: Collective Bayesian Decision-Making in Decentralized Robot Swarms. Accepted to *ICRA 2020*.

Ildar Farkhatdinov, **Julia Ebert**, Gijs van Oort, Mark Vlutters, Edwin van Asseldonk and Etienne Burdet. 2019. Assisting Human Balance in Standing with a Robotic Exoskeleton. *IEEE Robotics and Automation Letters*, 4, 2, 414–421.

Julia Ebert, Melvin Gauci and Radhika Nagpal. 2018. Multi-feature collective decision making in robot swarms. In *Proceedings of the 17th International Conference on Autonomous Agents and MultiAgent Systems*, 1711–1719. Stockholm, Sweden.

Salah Bazzi, **Julia Ebert**, Neville Hogan and Dagmar Sternad. 2018. Stability and Predictability in Dynamically Complex Physical Interactions. In *2018 IEEE International Conference on Robotics and Automation (ICRA)*, 5540–5545.

Salah Bazzi, **Julia Ebert**, Neville Hogan and Dagmar Sternad. 2018. Stability and predictability in human control of complex objects. *Chaos*, 28, 10.

Se-Woong Park, **Julia Ebert** and Dagmar Sternad. Asymmetric Learning in an Asymmetric Bimanual Task. In preparation.

Grants and Scholarships

2016 – 2020	Department of Energy Computational Science Graduate Fellowship (DOE CSGF)
2015 – 2016	Marshall Scholarship
2014	Northeastern Provost Undergraduate Advanced Research Award
2013 – 2015	Barry Goldwater Scholarship
2013	Northeastern Provost Undergraduate Research Award
2013	DAAD Undergraduate Scholarship
2013	Northeastern Presidential Global Scholarship
2010 – 2015	Northeastern National Merit Scholarship

Awards

2018	Certificate of Distinction in Teaching, Harvard University Bok Center
2016	Finalist, Hertz Fellowship
2016	Honorable Mention, National Science Foundation Graduate Research Fellowship Program (NSF GRFP)
2015	Northeastern Honors in Behavioral Neuroscience (for thesis)
2015	Northeastern University Honors Program Distinction (for coursework)
2015	Northeastern Alex Skavenski Award for Behavioral Neuroscience
2015	Northeastern Sears B. Condit Award for academic achievement
2010 – 2015	Northeastern Dean's List (6 semesters)
2015	Finalist; Rhodes, Fulbright, and Mitchell Scholarships

Research

Cambridge, MA — **Harvard University Self-Organizing Systems Research Group**
Prof. Radhika Nagpal

2016 – › Multi-feature perception and decision making in robot collectives
Developing Bayesian and bio-inspired algorithms for collective decision-making in Kilobot robots, in both simulation and physical robots, including developing a parallelized, high-throughput Kilobot simulator.

2017 – › LARVAbot: Locomotion of autonomous robots via aggregation
Designing and manufacturing a collective of 3D-printed robots to perform aggregate locomotion, inspired by the movement of sawfly larvae.

Livermore, CA — **Lawrence Livermore National Laboratory**
Dr. Michael Schneider

2018 – › Collaborative Autonomy for Space Situational Awareness
Developing a simulator for testing collective observation by low earth orbit satellite constellations.

London, UK — **Imperial College Human Robotics Group**
Prof. Etienne Burdet and Dr. Ildar Farkhatdinov

2015 – 2016 › Co-control of balance recovery in a lower limb exoskeleton
Developed algorithms for human-robot co-control of the LOPES exoskeleton in both standing a walking balance recovery, and tested with human participants.

Boston, MA — **Northeastern University Action Lab**
Prof. Dagmar Sternad

2014 – 2015 › Prediction and stability in control of objects with complex dynamics
Programmed HapticMaster robot (C++) for human-subject experiments and conducted pilot experiments.

2012 – 2015 › Learning and long-term retention of an asymmetric bimanual task
Designed and programmed experiments to assess ability of humans to learn a motor task with rhythmic and discrete components. Conducted multi-month data collection (including with EEG) and analysed results (Matlab) for Honors thesis.

2011 – 2012 › Effects of central fatigue on cognitive and motor performance
Analyzed data (Matlab) to assess the effect of a prolonged motor experiment on cognitive fatigue in human subjects.

Nahant, MA — **Northeastern University Marine Science Center**
Prof. Joseph Ayers

May – Aug. 2015 › Neuro-inspired rheotaxis and antenna design in a robotic lobster
Contributed to development of flex-sensing antennae for lobster-inspired robot. Developed neuron-based biomimetic control (LabView) for using antennae to adjust robot control in response to water currents.

Watertown, MA — **Interactive Motion Technologies**

July – Sept. 2014 › Integrated stroke assessment software in rehabilitation robotics
Developed a backend and interface (Python + Django) for integrating stroke assesment tools for clinicians into the rehabilitation robot.

Tübingen, DE — **Max Planck Institute for Intelligent Systems**
Prof. Stefan Schaal

July – Dec. 2013 › Learning and exploration in a novel dimensionality-reduction task
Designed a learning task in which subjects learned to map high-dimensional hand joint movements to move a 2D cursor, and conducted pilot experiments.

Conference Abstracts and Posters

Julia Ebert, Melvin Gauci and Radhika Nagpal. 2019. Bayes Bots: Bayesian Decision-Making for Robot Swarms. Poster at *DOE CSGF Program Review* (14–18 July 2019). Washington, DC.

Julia Ebert, Joshua Meyers, William Dawson and Michael Schneider. 2018. Collaborative Autonomy for Space Situational Awareness. Poster at *Lawrence Livermore National Laboratory Summer Student Poster Symposium* (8 August 2018). Livermore, CA.

Julia Ebert, Melvin Gauci and Radhika Nagpal. 2018. Multi-Feature Collective Decision Making in Robot Swarms. Poster at *DOE CSGF Program Review* (15–19 July 2018). Washington, DC.

Julia Ebert, Clark Teeple, Emma Steinhardt and Sharad Ramanathan. 2017. Infotaxis in a Multi-agent Sensor Network. Poster at *DOE CSGF Program Review* (24–27 July 2017). Washington, DC.

Ildar Farkhatdinov, **Julia Ebert**, Gijs van Oort, Edwin van Asseldonk and Etienne Burdet. 2017. Human Balance Augmentation with Lower Limb Exoskeleton Robot. Poster at *RehabWeek 2017 workshop: Towards a next generation of wearable robotic devices for human-oriented assistance and therapy* (17 July 2017). London, UK.

Julia Ebert, Ildar Farkhatdinov, Gijs van Oort, Edwin van Asseldonk and Etienne Burdet. 2016. Preliminary Study on Assisting Balance Recovery with Lower Limb Exoskeleton. Poster at *EuroHaptics 2016* (4–7 July 2016). London, UK.

Dagmar Sternad, Albert Mukovskiy, **Julia Ebert** and Tjeerd Dijkstra. 2016. Dynamic Stability in the Control of Complex Objects. Poster at *Biomechanics and Neural Control of Movement 2016* (12–17 June 2016). Mt. Sterling, OH.

Julia Ebert, Se-Woong Park and Dagmar Sternad. 2015. Asymmetric Learning in an Asymmetric Bimanual Task. Poster at *Society for the Neural Control of Movement 25th Annual Meeting* (20–24 April 2015). Charleston, SC.

Julia Ebert, Albert Mukovskiy, T Dijkstra and Dagmar Sternad. 2015. Why You Don't Spill Your Coffee. Poster at *Northeastern University Research, Innovation, and Scholarship Expo (RISE)* (9 April 2015). Boston, MA.

Julia Ebert, S Kim, Dagmar Sternad and Stefan Schaal. 2014. Learning and exploration in a novel dimensionality-reduction task. Poster at *Society for the Neural Control of Movement 24th Annual Meeting* (20–25 April 2014). Amsterdam, NL.

Julia Ebert, Se-Woong Park and Dagmar Sternad. 2014. Asymmetric Learning in an Asymmetric Bimanual Task. Poster at *Northeastern University Research, Innovation, and Scholarship Expo (RISE)* (10 April 2014). Boston, MA.

Julia Ebert, Se-Woong Park and Dagmar Sternad. 2013. Asymmetric Learning in an Asymmetric Bimanual Task. Poster at *Northeast Undergraduate Research and Development Symposium* (2–3 March 2013). Biddeford, ME.

Julia Ebert, Se-Woong Park, L Griffen, T O'Neil Pirozzi and Dagmar Sternad. 2012. Central Fatigue in Cognitive and Motor Performance. Poster at *Northeastern University Research, Innovation, and Scholarship Expo (RISE)* (29 March 2012). Boston, MA.

Teaching and Mentoring

Cambridge, MA	**Harvard University**
Summer 2019	› **REU mentor** for Kilobot research and outreach project
Fall 2018, Fall 2019	› **Teaching staff,** How To Make (Almost) Anything, Harvard section
Fall 2018, Fall 2019	› **Guest lecture**, CS 289: Biologically-inspired Multi-agent Systems
Spring 2018	› **Teaching fellow,** CS 189: Autonomous Robot Systems

Boston, MA	**Northeastern University**
2014 – 2015	› **Teaching assistant,** CS 2500: Fundamentals of Computer Science (2 semesters)
2012 – 2014	› **Tutor,** CS 2500: Fundamentals of Computer Science (3 semesters)
2011 – 2013	› **Undergraduate mentor,** Proactive Recruitment in Science and Mathematics (PRISM)

Outreach and Service

2017, 2018, 2020	Volunteer, Boston Public Schools Science Fair
2018, 2019	Robot Design Judge, FIRST LEGO League
2018	Speaker, Science in the News fall lecture series: "Brains and Bodies: How to Make Smart Robots"

2018	Guest, *Brains On!* science podcast live show
2016	Volunteer, EuroHaptics 2016
2010 – 2015	Volunteer, Northeastern Civic Engagement Program
2014 – 2015	Student Ambassador, Northeastern College of Science
2014	Tutor team leader, TechBoston Academy
2014	Teacher, NEU Splash Program. Class: "This is your Brain"
2011 – 2013	Volunteer, Brigham and Women's Hospital
2010 – 2011	Mentor, Massachusetts General Hospital Youth Program

Skills

Programming	Python (including NumPy, Pandas, Django) · MATLAB · C/C++ (including OpenMP, AVR, Arduino) · HTML/CSS · LaTeX · JavaScript (including Vue.js) · Java
Fabrication	Laser cutting · 3D printing · Vinyl cutting · CNC milling · Electronics design (Eagle) and production · Soldering · Sewing · Molding and casting
Other	Computer-aided design (OnShape) · Database design · Linux · 3D motion capture · Kinematic and EEG data collection in human subjects

Relevant Coursework

Computer Science	Biologically-inspired Multi-agent Systems · Distributed Systems · Machine Learning · Network Algorithms · Computational Neurodynamics · Artificial Intelligence · Robotics
Science and Engineering	Laboratory Electronics · How to Make (Almost) Anything · Biomimetics · Comparative Neurobiology · Human Neuroanatomy · Biochemistry · Genetics and Molecular Biology · Organic Chemistry
Mathematics	Stochastic Methods for Data Analysis, Inference, and Optimization · Biological Signal Processing · Statistics and Data Analysis · Multivariable Calculus · Linear Algebra · Differential Equations

Activities and Interests

Sport	Harvard University curling team · Imperial College and Goodenough College fencing clubs · Cycling
Music	Northeastern University pep band, drumline, and wind ensemble · Clarinet · Saxophone · Percussion
Other	3D printing · Web design and development · Graphic design · Writing · Baking