

# Julia Ebert

PhD candidate in computer science, seeking to create robust, autonomous multi-robot systems.

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## Education

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<b>Cambridge, MA</b> 2021 (expected) 2019	<b>Harvard University</b> PhD Candidate in Computer Science MS in Computer Science <ul style="list-style-type: none"><li>› Department of Energy Computation Science Graduate Fellow (DOE CSGF) · Siebel Scholar · 3.96 GPA</li><li>› Thesis: <i>A Framework for Distributed Perception and Decision-making in Autonomous Robot Collectives</i></li></ul>
<b>London, UK</b> 2016	<b>Imperial College London</b> Master of Research in Bioengineering, with Distinction <ul style="list-style-type: none"><li>› Marshall Scholar</li><li>› Thesis: <i>Assisting Balance Recovery with a Lower Limb Exoskeleton</i></li></ul>
<b>Boston, MA</b> 2015	<b>Northeastern University</b> BS in Behavioral Neuroscience, Minor in Computer Science <ul style="list-style-type: none"><li>› Goldwater Scholar · summa cum laude · 3.98 GPA</li><li>› Honors Thesis: <i>Asymmetric Learning in an Asymmetric Bimanual Task</i></li></ul>

## Skills

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<b>Computer Science</b>	Linux · Python (including NumPy, Pandas, Django) · C/C++ (including OpenMP, AVR, Arduino, embedded programming) · Database design · MATLAB · JavaScript (including Vue.js) · LaTeX · Java
<b>Engineering &amp; Fabrication</b>	Computer-aided design (OnShape, Fusion 360) · Electronics design (Eagle) and production · 3D printing · CNC milling · Soldering · Laser cutting · Sewing · Molding and casting · Vinyl cutting

## Experience

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<b>Cambridge, MA</b> 2016 –	<b>Harvard University Self-Organizing Systems Research Group</b> , Prof. Radhika Nagpal PhD research assistant <ul style="list-style-type: none"><li>› Developing a framework for collective spatial decision-making in simulated and physical robot collectives. Includes developing bio-inspired and Bayesian decision and movement algorithms, and robust low-bandwidth communication.</li><li>› Created Kilosim, an open-source multi-robot simulator (C++) capable of efficiently simulating hundreds of robots at up to 1000x real time.</li><li>› Designing and manufacturing LARVAbot: a collective of robots to perform aggregate locomotion, inspired by the movement of sawfly larvae. Includes designing custom PCB, embedded programming, CAD and 3D printing of robot, and algorithm design for aggregate movement.</li></ul>
<b>Livermore, CA</b> 2018 –	<b>Lawrence Livermore National Laboratory</b> , Dr. Michael Schneider Summer practicum, ongoing collaboration <ul style="list-style-type: none"><li>› Designing multi-agent algorithms for orbit tracking (space situational awareness, SSA) and maneuver detection with satellite constellations.</li><li>› Programmed, refactored, and documented research codebase (Python) for SSA, now used extensively by SSA researchers at LLNL.</li><li>› Developed a simulator and visualization tools (Python) for collective orbit observation by low earth orbit satellites.</li></ul>
<b>London, UK</b> 2015 – 2016	<b>Imperial College Human Robotics Group</b> , Prof. Etienne Burdet and Dr. Ildar Farkhatdinov Post-graduate research assistant <ul style="list-style-type: none"><li>› Developed algorithms for human-robot co-control of the LOPES exoskeleton in standing a walking balance recovery. Tested with human participants and modeled in Simulink.</li></ul>
<b>Boston, MA</b> 2011 – 2015	<b>Northeastern University Action Lab</b> , Prof. Dagmar Sternad Undergraduate research assistant, including 6-month co-op <ul style="list-style-type: none"><li>› Programmed HapticMaster robot (C++) for human-subject experiments on prediction and stability in control of objects with complex dynamics; conducted pilot experiments.</li></ul>

- › Designed and programmed (Matlab) experiments to assess ability of humans to learn and retain a motor task with rhythmic and discrete components. Conducted multi-month data collection (including with EEG) and analyzed results for Honors thesis.
- › Analyzed data (Matlab) to assess the effect of a prolonged motor experiment on cognitive fatigue in human subjects.

**Nahant, MA**  
May – Aug. 2015

**Northeastern University Marine Science Center**, Prof. Joseph Ayers

Summer research assistant

- › 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 (rheotaxis).

**Watertown, MA**  
July – Sept. 2014

**Interactive Motion Technologies**

Software development co-op

- › Developed a backend and interface (Python + Django) for integrating clinical stroke assesment tools into a rehabilitation robot.

**Tübingen, DE**  
July – Dec. 2013

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

Research co-op

- › Designed and programmed a learning task in which subjects learned to map high-dimensional hand joint movements to move a 2D cursor, and conducted pilot experiments.

## Teaching & Outreach

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2021	<b>Co-supervisor</b> , ETH masters student thesis
Summer 2019	<b>REU mentor</b> for Kilobot research and outreach project
Fall 2018, Fall 2019	<b>Teaching staff</b> , How To Make (Almost) Anything, Harvard section
Nov. 2018	<b>Speaker</b> , Science in the News fall lecture series: "Brains and Bodies: How to Make Smart Robots" <a href="#">🔗</a>
Spring 2018	<b>Teaching fellow</b> , Harvard CS 189: Autonomous Robot Systems <a href="#">🔗</a>
April 2018	<b>Guest</b> , <i>Brains On!</i> science podcast live show <a href="#">🔗</a>
2014 – 2015	<b>Teaching assistant</b> , Northeastern CS 2500: Fundamentals of Computer Science (2 semesters)

## Publications

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**J Ebert**, M Gauci, F Mallmann-Trenn, and R Nagpal. 2020. Bayes Bots: Collective Bayesian Decision-Making in Decentralized Robot Swarms. In *2020 IEEE International Conference on Robotics and Automation (ICRA)*, 7186-7192. [🔗](#)

I Farkhatdinov, **J Ebert**, G van Oort, M Vlutters, E van Asseldonk, and E Burdet. 2019. Assisting Human Balance in Standing with a Robotic Exoskeleton. *IEEE Robotics and Automation Letters*, 4, 2, 414–421. [🔗](#)

**J Ebert**, M Gauci, and R 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. [🔗](#)

S Bazzi, **J Ebert**, N Hogan, and D Sternad. 2018. Stability and Predictability in Dynamically Complex Physical Interactions. In *2018 IEEE International Conference on Robotics and Automation (ICRA)*, 5540–5545. [🔗](#)

S Bazzi, **J Ebert**, N Hogan, and D Sternad. 2018. Stability and predictability in human control of complex objects. *Chaos*, 28, 10. [🔗](#)