Julia Ebert

PhD Candidate · Robotics Researcher · Cambridge, MA

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Education

Cambridge, MA 2022 (expected) 2019	**Harvard University** PhD Candidate in Computer Science MS in Computer Science › Department of Energy Computation Science Graduate Fellow (DOE CSGF) · Siebel Scholar · 3.96 GPA › Thesis: *A Framework for Distributed Perception and Decision-making in Autonomous Robot Collectives*
London, UK 2016	**Imperial College London** Master of Research (MRes) in Bioengineering, with Distinction › Marshall Scholar › Thesis: *Assisting Balance Recovery with a Lower Limb Exoskeleton*
Boston, MA 2015	**Northeastern University** BS in Behavioral Neuroscience, Minor in Computer Science › Goldwater Scholar · summa cum laude · 3.98 GPA

Skills

Computer Science	Algorithm development · Python (including NumPy, Pandas, Django) · C/C++ (including embedded programming,AVR, Arduino, OpenMP) · Robot Operating System (ROS) · Linux · Git/version control · MATLAB · JavaScript (including Vue.js) · Java
Engineering & Fabrication	Computer-aided design (OnShape, Fusion 360) · Electronics design (Eagle) and production · 3D printing · CNC milling · Soldering · Laser cutting · Molding and casting

Experience

Cambridge, MA 2016 –	**Harvard University Self-Organizing Systems Research Group,** Prof. Radhika Nagpal PhD research assistant › 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. › Created Kilosim, an open-source multi-robot simulator (C++) capable of efficiently simulating hundreds of robots at up to 1000x real time. › Collaborating with MIT researchers to create heterogeneous robot swarm for inspection on space stations. › Designing and manufacturing LARVAbot: a collective of bioinspired robots to perform aggregate locomotion. Includes designing custom PCB, embedded programming, CAD and 3D printing of robot, and algorithm design for aggregate movement. › Teaching and mentoring: Supervised REU summer project and ETH masters thesis. Served as teaching fellow for undergraduate robotics course (ROS, Turtlebots).
Livermore, CA 2018 –	**Lawrence Livermore National Laboratory,** Dr. Michael Schneider Summer internship, ongoing collaboration › Designing multi-agent algorithms for orbit tracking (space situational awareness, SSA) and maneuver detection with satellite constellations. › Programmed, refactored, and documented research codebase (Python) for SSA, now used extensively by SSA researchers at LLNL. › Developed a simulator and visualization tools (Python) for collective orbit observation by low earth orbit satellites.
London, UK 2015 – 2016	**Imperial College Human Robotics Group,** Prof. Etienne Burdet and Dr. Ildar Farkhatdinov Post-graduate research assistant › 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.

Boston, MA 2011 – 2015	**Northeastern University Action Lab,** Prof. Dagmar Sternad Undergraduate research assistant, including 6-month co-op ⟩ Programmed HapticMaster robot (C++) and conducted human-subject experiments control of objects with complex dynamics, resulting in two publications. ⟩ 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.
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, conducted pilot experiments, and presented results at conference.

Interests & Activities

Outreach	NPR *Brains On* podcast guest · FIRST Lego League judge · Harvard *Science in the News* public lecture
Personal	Curling (Harvard club curling team) · Web design & development · Open source 3D print models

Publications

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. 🔗