

# Kevin Green

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## Education

### Oregon State University

*Ph.D. Robotics*

Dissertation: Agile Bipedal Locomotion via Hierarchical Control by Incorporating Physical Principles, Learning, and Optimization

Advisors: Jonathan Hurst and Ross L. Hatton

**Corvallis, OR**

*Sep 2017–Aug 2022*

### University of Michigan

*B.S.E. Mechanical Engineering, Minor in Mathematics*

Summa Cum Laude

Advisor: C. David Remy

**Ann Arbor, MI**

*Sep 2013–Apr 2017*

## Professional Appointments/Employment

### Agility Robotics

*Software Engineer III, Robotics - Supervisor: Daniel Piedrahita*

**Salem, OR**

*Apr 2024– Present*

*Software Engineer II, Motion Planning - Supervisor: Daniel Piedrahita*

*Aug 2022–Apr 2024*

- Designed, implemented, and deployed a new nonlinear, MPC locomotion controller.
- Developed and deployed a RL locomotion policy for step recovery behaviors, which was the first RL policy to be deployed to customer deployments.
- Primary locomotion software engineer responsible for bringing up, tuning, and initial testing of two major Digit robot hardware revisions.

### Oregon State University: Dynamic Robotics Lab

*Graduate Research Fellow - Supervisors: Jonathan Hurst and Ross Hatton*

**Corvallis, OR**

*Sep 2017–Aug 2022*

- Developing bipedal control hierarchies that use machine learning and online optimization
- Developing physics-first RL and machine learning approaches for agile legged locomotion
- Implementing model predictive control footstep planning and operational space control inverse dynamics

### University of Michigan Health System: Department of Otolaryngology

*Undergraduate Research Assistant - Supervisors: Glenn Green and Dave Zopf*

**Ann Arbor, MI**

*May 2016–Jul 2017*

- Designed customized glasses for children with facial deformities from facial scans using 3D printing
- Created high fidelity surgical simulation models from raw CT data using Materialise Mimics and 3-Matic
- Processed and produced surgical reference models for Juvenile Nasopharyngeal Angiofibroma from patient CT data

### University of Michigan: RAM (Robotic and Motion) Research Lab

*Undergraduate Research Assistant - Supervisor: C. David Remy*

**Ann Arbor, MI**

*Jan 2014–May 2016*

- Designed, programmed, and tuned a virtual model control walking controller in simulation and hardware for a series elastic biped
- Designed, manufactured and programmed an active support system to catch a bipedal robot when it falls
- Prototyped and tested inductance based pneumatic muscle force and position sensors

### Whirlpool Corporation

*Engineering Intern - Supervisors: J M Hunnell and Alvaro Vallejo*

**Saint Joseph, MI**

*Jun–Aug 2013, May–Aug 2014*

- Designed, prototyped and evaluated novel systems to remove all puddled water from items in dishwashers
- Correlated a dynamic model of a washing machine to test data in order to predict the effects of design changes

## Selected Publications

**Kevin Green**, Yesh Godse, Jeremy Dao, Ross L. Hatton, Alan Fern, and Jonathan Hurst, "Learning spring mass locomotion: Guiding policies with a reduced-order model," *IEEE Robotics and Automation Letters*, vol. 6, no. 2, pp. 3926–3932, 2021.

Jonathan Hurst and **Kevin Green**, "Series elastic actuation," in *Encyclopedia of Robotics*, Marcelo H. Ang, Oussama Khatib, and Bruno Siciliano, Eds. Berlin, Heidelberg: Springer Berlin Heidelberg, 2020, pp. 1–12.

Ryan Batke, Fangzhou Yu, Jeremy Dao, Jonathan Hurst, Ross L. Hatton, Alan Fern, and **Kevin Green**, "Optimizing bipedal maneuvers of single rigid-body models for reinforcement learning," in *2022 IEEE-RAS International Conference on Humanoid Robots*, 2022.

Fangzhou Yu, Ryan Batke, Jeremy Dao, Jonathan Hurst, **Kevin Green**, and Alan Fern, "Dynamic bipedal maneuvers through sim-to-real reinforcement learning," in *2022 IEEE-RAS International Conference on Humanoid Robots*, 2022.

**Kevin Green**, John Warila, Ross L. Hatton, and Jonathan Hurst, "Motion planning for agile legged locomotion using failure margin constraints," in *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2022.

Jonah Siekmann, **Kevin Green**, John Warila, Alan Fern, and Jonathan Hurst, "Blind bipedal stair traversal via sim-to-real reinforcement learning," in *Robotics: Science and Systems*, 2021.

**Kevin Green**, Ross L. Hatton, and Jonathan Hurst, "Planning for the unexpected: Explicitly optimizing motions for ground uncertainty in running," in *2020 IEEE International Conference on Robotics and Automation (ICRA)*, 2020, pp. 1445–1451.

Taylor Apgar, Patrick Clary, **Kevin Green**, Alan Fern, and Jonathan Hurst, "Fast online trajectory optimization for the bipedal robot cassie," in *Robotics: Science and Systems*, 2018.

## Awards, Fellowships and Honors

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**2022:** Guinness World Record Fastest 100 m by a bipedal robot: 24.73 s

**2021:** World Record Fastest Unsupported Bipedal Robot 5k: 43:59.53 (Claimed, unverified)

**2021:** Co-author of Finalist: IEEE ICRA Best Paper Award in Cognitive Robotics

**2017:** Graduate Research Fellowship, National Science Foundation (NSF)

**2017:** Provost Distinguished Fellowship

**2016:** Best Undergraduate Research Presentation in Dynamics and Controls

*National*

*Oregon State University*

*University of Michigan*

## Service and Teaching

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### Teaching Experience.....

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| ○ ENGR 212 Dynamics. Oregon State University.            | Instructor of record |
| ○ ME 317 Intermediate Dynamics. Oregon State University. | Teaching Assistant   |
| ○ ROB 542 Actuator Dynamics. Oregon State University.    | Teaching Assistant   |
| ○ ROB 521 Research Robotics. Oregon State University.    | Teaching Assistant   |

### Mentorship.....

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| ○ Fangzhou Yu, Oregon State Robotics MS Student                      | RAI Institute     |
| ○ Ryan Batke, Oregon State Robotics MS Student                       | Sanctuary AI, RSL |
| ○ Jonah Siekmann, Oregon State Undergraduate and Robotics MS student | Agility Robotics  |
| ○ Yesh Godse, Oregon State Undergraduate                             | Agility Robotics  |
| ○ John Warila, Oregon State Undergraduate                            | Electric Era      |
| ○ Andrew Sanders, Oregon State Undergraduate                         | Garmin            |
| ○ Grace Stridick, University of Michigan UROP Student                | SpaceX            |

### Peer Reviewer.....

IEEE T-RO, IJRR, IEEE RA-L, Mechanism and Machine Theory, RSS, IEEE ICRA, IEEE IROS

## Technical Skills

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Proficient with: C++, Python, Eigen, Pytorch, IsaacSim, MuJoCo

Comfortable with: MATLAB, Typescript, AVRO, RBDL, JIRA, Trello, Confluence, Git & Github, bazel