*CV updated March 2021*

# Andrew S. Morgan

Yale University | Department of Mechanical Engineering and Material Science
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https://asmorgan24.github.io

## EDUCATION

**Yale University,** New Haven, CT — Expected Graduation 2022
*PhD in Engineering & Applied Science (Robotics)*
*Thesis Title:* "Learning Variant-Agnostic Models for Dexterous Manipulation with Underactuated Robotic Hands"
*Advisor:* Professor Aaron Dollar

**Yale University,** New Haven, CT — August 2017-May 2019
*MS in Engineering & Applied Science (Robotics), MPhil in Engineering & Applied Science (Robotics)*
GPA: Received *Honors* (equivalent of an A) in all ten graduate courses

**Youngstown State University,** Youngstown, OH — August 2013-May 2017
*BE in Electrical Engineering, BS in Computer Science, Minor in Mathematics*
*GPA:* 3.98/4.0 (summa cum laude from Honors College)

## RESEARCH INTERESTS

Robot Manipulation, Dexterous Manipulation, Robot Grasping, Compliant Mechanisms
Machine Learning, Deep Learning (DL), Reinforcement Learning (RL), Self-Supervised Learning
Optimal Control, Adaptive Control, Motion Planning, State Estimation

## WORK EXPERIENCE

**Technische Universität Darmstadt,** *Visiting Research Intern*, Darmstadt, Germany — March 2020-Present
- Intelligent Autonomous Systems (IAS) Group led by Professor Jan Peters
- Developed a Hybrid Model-based/Model-free RL method to accelerate policy acquisition (Model Predictive Actor-Critic)
- Explored optimal control formulations (LQR, MPC, MPPI, MBRL) in OpenAI gym environments

**Youngstown Business Incubator,** *Biz3D Instructor,* Youngstown, OH — June 2016-August 2017 (Summers)
- Taught five different groups of students (~80 total) ranging from late middle school to high school
- Developed a curriculum focused on entrepreneurship and FDM additive manufacturing (3D printing)
- Constructed memorable and practical real-life examples for 3D Printing practices in the workplace

**Auburn University,** *Research Experience for Undergraduates,* Auburn, AL — May 2016-August 2016
- Department of Computer Science and Software Engineering, advised by Prof. Richard Chapman
- Constructed a collision avoidance simulator in OpenGL for UAV see-and-avoid algorithm development
- Designed an independent UAV parachute recovery system as to adhere to recent FAA regulations

**ABB Inc.,** *Research and Development Engineering Intern,* Wickliffe, OH — May 2015-August 2015
- Tested ABB Power Systems and Power Generation (PSPG) controllers and peripherals for corresponding tasks of implementation in the R&D group
- Organized intern fundraising efforts for the selected charity organizations

## AWARDS AND HONORS

- Nominated for Best Paper in Manipulation (ICRA 2019) — Summer 2019
- National Science Foundation Graduate Fellow — Spring 2019
- Nominated for Best Paper in Manipulation (ICRA 2018) — Summer 2018
- Robert E. Apfel Graduate Fellowship — Fall 2017

- Best Honors Undergraduate Research Project – Youngstown State University — Spring 2017
- Tau Beta Pi Fellow — Spring 2017
- National Science Foundation Honorable Mention Fellow — Spring 2017
- Barry M. Goldwater Scholar — Spring 2016
- Tau Beta Pi Scholar — Summer 2016
- Ohio State Senate Recognition Award — Summer 2016
- Ohio State House of Reps. Recognition Award — Summer 2016
- ΤΒΠ National Engineering Society — Fall 2015
- ΦΚΦ National Honor Society — Spring 2015
- ΠΜΕ National Math Honor Society — Spring 2015
- Youngstown State University Scholars Program USXXI — Fall 2013
  *(4-year) Full-Funding Academic Merit Scholarship*

## SKILLS AND INTERESTS

- *Computer Skills:* Advanced programming capabilities in ROS, C, C++, Java, Matlab, Python, R, Arduino
  *Deep Learning Frameworks:* PyTorch, Tensorflow, Keras
  *Simulation Environments:* PyBullet, Gazebo, Mujoco
- *Language Skills:* Intermediate reading capabilities in Greek, German, and Spanish

## PUBLICATIONS

***Refereed Journal Articles:***

J10. Hang, K., Bircher, W. B., Morgan, A. S., and Dollar, A. M., "Manipulation for Self-Identification, and Self-Identification for Better Manipulation", *Science Robotics*, 2021.

J9. Morgan, A. S., Bircher, W. G., and Dollar, A. M., "Towards Generalized Manipulation Learning through Grasp Mechanics-based Features and Self-Supervision", *Transactions on Robotics*, 2021.

J8. Morgan, A.S., Hang, K., and Dollar, A. M., "Object-Agnostic Dexterous Manipulation of Partially Constrained Trajectories", *Robotics and Automation Letters* (with IROS option), Vol. 5, No. 4, pp. 5494-5501, 2020.

J7. Spiers, A., Morgan, A. S., Srinivasan, K., Calli, B., and Dollar, A. M., "Using Variable-Friction Finger Surfaces and Proprioceptive Sensing to Classify Objects during Robotic Within-Hand Manipulation", *Transactions on Haptics*, Vol. 13, No. 3, pp. 600-610, 2020

J6. Morgan, A.S., Hang, K., Bircher, W. G., Alladkani, F.M., Gandhi, A., Calli, B., and Dollar, A.M., "Benchmarking Pick-and-Place Manipulation with the Box and Blocks Test", *Special Issue on Benchmarking Robot Manipulation: Robotics and Automation Letters,* Vol. 5, No. 2, pp. 454-461, 2019.

J5. Hang, K.*, Bircher, W. G.*, Morgan, A. S., and Dollar, A.M., "Hand-Object Configuration Estimation using Particle Filters for Dexterous In-Hand Manipulation", *Special Issue on Soft Manipulation: International Journal of Robotics Research*, Vol. 37, No. 14, pp. 1760-1774, 2019 .

J4. Sintov, A., Morgan, A. S., Kimmel, A., Dollar, A. M., Bekris, K. E., and Boularias, A., "Learning a State Transition Model of an Underactuated Adaptive Hand", *IEEE Robotics and Automation Letters,* Vol. 4, No. 2, pp. 1287-1294, 2019.

J3. Hang, K., Morgan, A. S., and Dollar, A. M., "Pre-Grasp Sliding Manipulation Planning of Thing Objects Using Soft, Compliant, or Underactuated Hands", *IEEE Robotics and Automation Letters,* Vol. 4, No. 2, pp. 662-669, 2019. **Nominated for best paper in robot manipulation (ICRA 2019).**

J2. Morgan, A. S., Jones, Z., Chapman, R., and Biaz, S., "An Unmanned Aircraft "See and Avoid" Algorithm Development Platform using OpenGL and OpenCV", *Journal of Computing Sciences in Colleges*, Consortium for Computing in Colleges, Vol. 33, No. 2, pp. 229-236, 2017.

J1. Meyers, K., Morgan, A. S., and Conner, B. "3D printing to introduce design in a cornerstone project". *Global Journal of Engineering Education*, Vol. 18, Issue 1, 2016.

***Refereed Conference Papers (full manuscripts):***

C9. Morgan, A.S.*, Nandha, D.*, Chalvatzaki, G., D'Eramo, C., Dollar, A.M., and Peters, J., "Model Predictive Actor-Critic: Accelerating Robot Skill Acquisition with Deep Reinforcement Learning", *IEEE International Conference on Robotics and Automation (ICRA),* Xi'an, China, 2021.

C8. Patel, V. V., Morgan, A. S., and Dollar, A. M., "Highly Underactuated Radial Gripper for Automated Planar Grasping and Part Fixturing", *IEEE International Conference on Intelligent Robots and Systems (IROS),* Las Vegas, USA, 2020.

C7. Morgan, A. S., Hang, K., Bircher, W. G., and Dollar, A. M., "A Data-Driven Framework for Learning Spatial, Object-Agnostic Underactuated Dexterous Manipulation", IEEE *International Conference on Intelligent Robots and Systems (IROS)*, Macao, China, 2019.

C6. Morgan, A. S. *, Baines, R. L.*, McClintock, H., and Scassellati, B., "Unstructured Terrain Navigation and Topographic Mapping with a Low-cost Mobile Cuboid Robot", *IEEE International Conference on Intelligent Robots and Systems (IROS),* Macao, China, 2019.

C5. Morgan, A. S., Bircher, W. G., Calli, B., and Dollar, A. M., "Learning from Transferable Mechanics Models: Generalizable Online Mode Detection in Underactuated Dexterous Manipulation", *IEEE International Conference on Robotics and Automation (ICRA),* 2019.

C4. Bircher, W. G., Morgan, A. S., Hang, K., and Dollar, A. M., "Energy Gradient-Based Graphs for Planning Within-Hand Caging Manipulation", *IEEE International Conference on Robotics and Automation (ICRA),* 2019.

C3. Calli, B., Srinivasan, K., Morgan, A. S., and Dollar, A. M., "Learning Modes of Within-hand Manipulation." *IEEE International Conference on Robotics and Automation (ICRA),* Brisbane, Australia, 2018. **Nominated for best paper in robot manipulation.**

C2. Meyers, K., Morgan, A. S., and Conner, B. "3D Printing in a First-Year Engineering Design Project". *American Society for Engineering Education National Conference*, New Orleans, 2016.

C1. Morgan, A. S., Sharif, B., and Crosby, M. "Understanding a Novice Programmer's Progression of Reading and Summarizing Source Code". Koli Workshop 2014. Koli, Finland. 2014.

***Magazine Articles:***

M1. Morgan, A. S., Chapman, R., and Biaz, S., "DIY Drone Recovery Parachute", *Make Magazine,* Vol. 61, Feb/March Issue, pp. 42., 2018.

***Patents:***

P1. Morgan, A.S., and Kreatsoulas, N., Provisional Patent, April 2015, "IV Locking Device", Patent Application Number: 62/146,434.

## PRESENTATIONS

***Oral Talks:***

OP5. Coalition for Life Sciences-Life Science Fair 2019. Capitol Hill, Washington D.C., 2019
"Design Process Towards Robotic and Prosthetic Hands"

OP4. ICRA Workshop on Benchmarking in Manipulation, Montreal, Canada, 2019
"The Box and Blocks Test in Cluttered Robot Pick-and-Place Applications"

OP3. YSU's QUEST: a Forum for Undergraduate Research, Youngstown, OH, 2017
"Digital Licensing Platform for Retro Games"
**Best University Honors College Project Award**

OP2. NSF Emerging Researchers National Conference (ERN), Washington DC, 2017
"Computer Vision 'See and Avoid' Simulation using OpenGL and OpenCV"
**Second Place winner in Computer Sciences and Information Management**

OP1. Gulf Coast Undergraduate Research Symposium, Houston, TX, 2016
"Computer Vision 'See and Avoid' Simulation using OpenGL and OpenCV"

***Poster Presentations:***

PP5. International Conference on Robotics and Automation, Montreal, Canada, 2019
"Learning from Transferable Mechanics Models: Generalizable Online Mode Detection in Underactuated Dexterous Manipulation"

PP4. International Conference on Robotics and Automation, Montreal, Canada, 2019

"Energy Gradient-Based Graphs for Planning Within-Hand Caging Manipulation"

PP3. New England Manipulation Symposium, New Haven, CT, 2018
"Data Driven Detection of Manipulation States"

PP2. American Society for Engineering Education National Conference, New Orleans, LA, 2016
"3D Printing in a First-Year Engineering Design Project"

PP1. Koli Workshop, Koli, Finland, 2014
"Understanding a Novice Programmer's Progression of Reading and Summarizing Code"

## ORGANIZATIONS AND SERVICE

***Over 110 community service hours logged annually during undergraduate career (2013-2017)***

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| Pauli Murray College Graduate Affiliate | Aug. 2019 – Present |
| Pauli Murray Mellon Forum Coordinator | Aug. 2019 – Present |
| Yale Flipped Science Fair (FSF) Presenter and Organizer | Aug. 2018 – Present |
| Yale Science in the News Lecture Series Presenter | Aug. 2018 – Feb. 2020 |
| Yale Openhand Workshop Co-coordinator | Summer 2018 |
| Yale Engineering Day(s) Volunteer | Sept. 2017 – Sept. 2018 |
| YSU STEM 3D Printing Outreach Coordinator | Dec. 2014 – July 2017 |
| YSU Student Government Association Representative | Aug. 2014 – July 2017 |

***Academic Service (reviewer for the following conferences and journals):***

IEEE International Conference on Robotics and Automation (ICRA)
IEEE Robotics and Automation Letters (RAL)
IEEE/RSJ International Conference on Intelligent Robotics and Systems (IROS)
ASME Journal on Mechanisms in Robotics (JMR)
IEEE Transactions on Robotics (TRO)
IEEE Transactions on Automation Science and Engineering (TASE)
IEEE Transactions on Haptics (ToH)

## TEACHING ASSISTANTSHIPS

| | |
|---|---|
| Spring 2019 – Mechanical Engineering Capstone II | Yale University |
| Fall 2018 – Mechanical Engineering Capstone I | Yale University |
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| Spring 2016 – Honors First Year Engineering Computing | Youngstown State University |
| Fall 2015 – Honors First Year Engineering Concepts | Youngstown State University |
| Spring 2015 – Honors First Year Engineering Computing | Youngstown State University |
| Fall 2014 – Honors First Year Engineering Concepts | Youngstown State University |