Brian Cho

PhD student, Kahlert School of Computing, University of Utah
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Research Interest

Robot Learning, Machine learning, Reinforcement learning, Motion Planning, Surgical Automation, Continuum Robots, Robot Manipulation

Education

University of Utah **Salt Lake City, UT**
PhD, Computing: Robotics *2020-Present*
Committee: Alan Kuntz (Chair), Tucker Hermans, Daniel Brown, Jake Abbott, Robert J. Webster III

Hanyang University **Republic of Korea**
MS, Electrical and Electronic Engineering *2018*
Thesis: "Robotic Application of Reinforcement Learning to a Central Pattern Generator"
Advisor: Youngjin Choi

Hanyang University **Republic of Korea**
BS, Electronic Systems Engineering *2016*

Experience

University of Utah **Salt Lake City, UT**
PhD student, Kahlert School of Computing and Robotics Center *2020-Present*
Develop a state-of-the-art deep neural network capable of accurately predicting the complete shape of tendon-driven continuum robots
Proposes an automated sensing method for accurately mapping subsurface anatomy in robot-assisted surgery

Korea Institute of Science and Technology (KIST) **Republic of Korea**
Research Intern, Center for Intelligent & Interactive Robotics *2018-2019*
Develop task and motion planning algorithms for robot manipulation to safely retrieve target objects in clutter
Deploy the algorithms on physical robots integrated with a vision system

Hanyang University **Republic of Korea**
Master student, Biorobotics Lab *2016-2018*
Implementation of locomotion adaptation ability for environmental uncertainty of robotic salamander via reinforcement learning
Implementation of determined gestures with the physical robot hand

Journal Papers

1. Jordan Thompson, **Brian Y. Cho**, Robert J. Webster III, and Alan Kuntz, "Uncertainty Aware Forward and Inverse Kinematics for Tendon-Driven Continuum Robots via Mixture Density Networks," *Under review at Journal of Medical Robotics Research (JMRR)*, 2024.
2. **Brian Y. Cho**, Daniel Esser, Jordan Thompson, Bao Thach, Robert J. Webster III, and Alan Kuntz, "Accounting for Hysteresis in the Forward Kinematics of Nonlinearly-Routed Tendon-Driven Continuum Robots via a Learned Deep Decoder Network," *IEEE Robotics and Automation Letters (RA-L)*, 2024.
3. Sanghun Cheong, **Brian Y. Cho**, Jinhwi Lee, Jeongho Lee, Donghwan Kim, Changjoo Nam, Changhwan Kim, and Sungkee Park, "Obstacle Rearrangement for Robotic Manipulation in clutter using a Deep Q-Network," *Intelligent Service Robotics*, 2021.

4. **Younggil Cho**, Sajjad Manzoor and Youngjin Choi, "Adaptation to Environmental Change using Reinforcement Learning for Robotic Salamander," *Intelligent Service Robotics*, vol. 12, No. 3, pp. 209-218, 2019.

5. Sajjad Manzoor, **Younggil Cho**, and Youngjin Choi, "Neural Oscillator based CPG for Various Rhythmic Motions of Modular Snake Robot with Active Joints," *Journal of Intelligent and Robotic Systems*, vol. 94, No. 3-4, pp. 641-654, 2019.

Publications in Refereed Conference

1. Britton Jordan, Daniel S. Esser, Jeonghyeon Kim, **Brian Y. Cho**, Robert J. Webster III, and Alan Kuntz, "Exploring Modal Switch in Metamaterial-based Robots," *IEEE International Conference on Intelligent Robots and Systems (IROS)*, 2024, in press.

2. Jordan Thompson, **Brian Y. Cho**, Daniel S. Brown, and Alan Kuntz, "Modeling Kinematic Uncertainty of Tendon-Driven Continuum Robots via Mixture Density Networks," *International Symposium on Medical Robotics (ISMR)*, 2024, in press.

3. **Brian Y. Cho** and Alan Kuntz, "Efficient and Accurate Mapping of Subsurface Anatomy via Online Trajectory Optimization for Robot Assisted Surgery," *IEEE International Conference on Robotics and Automation (ICRA)*, 2024, in press.

4. Bao Thach, **Brian Y. Cho**, Alan Kuntz, and Tucker Hermans, "Learning Visual Shape Control of Novel 3D Deformable Objects from Partial-View Point Clouds," *IEEE International Conference on Robotics and Automation (ICRA)*, pp. 8274-8281, 2022.

5. **Brian Y. Cho**, Tucker Hermans, and Alan Kuntz, "Planning Sensing Sequences for Subsurface 3D Tumor Mapping," *International Symposium on Medical Robotics (ISMR)*, 2021.

6. Changjoo Nam, Jinhwi Lee, Sanghun Cheong, **Brian Y. Cho** and Changhwan Kim, "Fast and Resilient Manipulation Planning for Target Retrieval in Clutter," *IEEE International Conference on Robotics and Automation (ICRA)*, 2020.

7. Sanghun Cheong, **Brian Y. Cho**, Jinhwi Lee, Changhwan Kim, and Changjoo Nam, "Where to Relocate?: Object Rearrangement inside Cluttered and Confined Environments for Robotic Manipulation," *IEEE International Conference on Robotics and Automation (ICRA)*, 2020.

8. Jinhwi Lee, **Younggil Cho**, Changjoo Nam, Jonghyeon Park, and Changhwan Kim, "Efficient Obstacle Rearrangement for Object Manipulation Tasks in Cluttered Environments," *IEEE International Conference on Robotics and Automation (ICRA)*, 2019.

Teaching Experience

Teaching Assistant courses

1. CS 4300, Introduction to Artificial Intelligence, University of Utah

Technical Skills

Python, C++, MATLAB, Robot Operating System (ROS), MoveIt, OMPL, Rviz, Pytorch, TensorFlow, Latex, Git