MICHAEL SEOKYOUNG HAN

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HIGHLIGHT

A highly multidisciplinary Ph.D. candidate with a strong background in Mechanical Engineering, specializing in robotics. Have a comprehensive understanding of the overall development process with over 10 years of diverse experiences in designing and implementing robotic systems. From intense model-based systems to data-driven machine learning models, have various experiences in the system realization. Eager to take on new challenges and explore innovative concepts making the world better tomorrow.

EDUCATION

Ph.D. Candidate in *Mechanical Engineering*
University of Louisville, Louisville, KY, USA — Jan. 2021 - Spring 2024(Exp)
Research Focus : **Soft robotics, Kinematics and dynamics, Position/Force control, Machine-learning, Human-robot interaction, Robot Manipulation, Sensor system, Signal processing, Optoelectronic system**

M.S. in *Mechatronics*
Gwangju Institute of Science and Technology(GIST), Gwangju, Korea — Aug. 2015
Research Focus : **Motion control, Tendon-driven robotic system, Iterative learning control**
Thesis Title : Development of a Tensegrity Robot and Feedforward Control via Iterative Learning Control Algorithm

B.S. in *Mechanical and Automotive Engineering*
Kookmin University, Seoul, Korea — Aug. 2013

AWARDS AND HONORS

Winner Prize, Hackerthon Pitch Competition, $1500, Humana Foundation, USA — 2023
Application for providing correlation between dog's behavior and heart rate
NSF LaunchIt I-Corp Innovation Award, $1600, NSF, USA — 2023
Smart device for dogs
Graduate Student Travel Award, University of Louisville, USA — 2023, 2021
IEEE ROBOSOFT, MRS(Materials Research Society) meetings
Winner Prize, Mechatronics Capstone Project, GIST, Korea — 2014
Anti-collision system for automobile doors
Winner Prize, International Micro-Robot Competition, Japan — 2012
Scholarship, Autonomous Vehicle Robot Competition, $1500, Samsung, Korea — 2011
Grade Scholarship Award, Kookmin University, Korea — 2012

PROFESSIONAL SKILLS

Coding Language : **Matlab, Python, Embedded C**
Mechanical Design and Testing Tool : **SolidWorks, COMSOL, 3D Printing, CNC, Laser Cutting, Zemax, NI Labview, Simulink**
Misc : **Github, ROS, Illustrator, Latex**

PROFESSIONAL EXPERIENCE

Ph.D. Candidate, Research Assistant Jan. 2021 - Present
University of Louisville, KY, USA Funded by NSF
Advisor : Dr. Cindy K. Harnett

- Devised **soft tactile sensor**, which can detect lateral as well as normal force
- Designed **adaptive grasping controller** with an own-developed **optoelectronic** soft tactile sensor
- Constructing **highly-anthropomorphic robotic manipulator** system

Robotics R&D Engineer Aug. 2016 - Apr. 2019
University of Texas Health Science Center(UTHealth), Houston, TX
Spun-off ColubrisMX.Inc, Series A(2017, $16M), Currently EndoQuest Robotics
Supervisor : Dr. Dongsuk Sin

- Constructed an **automated calibration system** based on a learning control method for verification surgical apparatuses assembly.
- Developed control strategies for **tendon-driven minimally invasive surgical robot** systems. Especially, **kinematics of the articulated robot** structures and **motion control based on optimization and machine-learning** were the main focus.
- Researched how to bridge a gap between the system model and real hardware to make **high accuracy motion**, which has to do with controlling undesirable movement of robot such as hysteresis, friction, etc.

Research Associate Aug. 2015 - Jul. 2016
Gwangju Institute of Science and Technology(GIST) Funded by Korea Atomic Energy Research Institute
Advisor : Dr. Hyosung Ahn

- Conducted research to identify dynamics of **a tensegrity robot** to maintain its stable posture and make consistent locomotion
- Designed **iterative learning controller** generating improved movement after repetitive motion study

Research Intern Jan. 2012 - Aug. 2013
Kookmin University

- Led an undergraduate team developing an autonomous vehicle robot(**sensor fusion, SLAM algorithm**)

PUBLICATIONS

Journal Articles

1. **Michael S. Han**, Cindy K. Harnett, "Journey from Human Hands to Robot Hands : Biological Inspiration of Anthropomorphic Robotic Manipulators", Bioinspiration & Biomimetics, 2024
2. **Michael S. Han**, Cindy K. Harnett, "Soft, All-Polymer Optoelectronic Tactile Sensor for Stick-Slip Detection", Advanced Materials Technologies, 2022
3. Yoon, S., Cheon, S.Y., Park, S., Lee, D., Lee, Y., **Han, S.**, Kim, M. and Koo, H., "Recent advances in optical imaging through deep tissue: imaging probes and techniques", Biomaterials Research, 2022
4. S. Jin, **S. Han**, "Gain optimization of kinematic control for wire-driven surgical robot with layered joint structure considering actuation velocity bound", The Journal of Korea Robotics Society, 2020
5. S. Jin, S. Lee, J. Lee, **S. Han**, "Kinematic Model and Real-Time Path Generator for a Wire-Driven Surgical Robot Arm with Articulated Joint Structure", Applied Sciences, 2019

Peer-Reviewed Conference Publications

1. *(Accepted)* **Michael S. Han**, J-T. Lin, Cindy K. Harnett, "A Bio-Inspired Robotic Finger Driven and Shape-Sensed by Soft Optical Tendons", RoboSoft IEEE, 2024, San Diego

2. *(Accepted)* Paul Bupe, Jr., Yuhao Jiang, J-T. Lin, Tram Nguyen, **Michael S. Han**, Daniel M. Aukes, C. K. Harnett, "Embedded Optical Waveguide Sensors for Dynamic Behavior Monitoring in Twisted-Beam Structures", RoboSoft IEEE, 2024, San Diego
3. Christopher J. Kimmer, **Michael S. Han**, Cindy K. Harnett, "Strained Elastic Surfaces with Adjustable-Modulus Edges (SESAMEs) for Soft Robotic Actuation", ICRA IEEE, 2023, London
4. **Michael S. Han**, Dan O. Popa, Cindy K. Harnett, "Anti-Slipping Adaptive Grasping Control with a Novel Optoelectronic Soft Sensor", RoboSoft IEEE, 2023, Singapore
5. **S. Han**, K. Jeong, H. Ahn, "Iterative Learning Control for Trajectory Tracking of Tensegrity Robot", Control Automation Robotics & Vision on IEEE, 2014

Conference Extended Abstracts and Posters

1. **Michael S. Han**, "Measurement of Lateral Force and Slipping Based on Optical Fiber Mechanism", Materials Research Society, 2021 Fall

Patents

1. **Michael S. Han**, Cindy K. Harnett, "Optoelectronic Soft Tactile Sensor for a Stick-Slip Control", US Patent Application No.18/220,443, 2024/1/11
2. **S. Han**, T. JANG, D. Kim, H. KIM, J. LEE, K. Nam, Y. Park, D. Shin, "End effector and end effector drive apparatus", AU2020210173B2, application date Jun. 2017
3. T. JANG, D. Kim, H. KIM, J. LEE, K. Nam, Y. Park, D. Shin, **S. Han**, "Surgical apparatus", EP3799822A1, application date Dec. 2017