HUBERT KIM

Mechatronics Engineer

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(willing to relocate)

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MECHATRONICS EXPERIENCE

Sensors
- Loadcell/flex sensor
- Magnetic sensor
- Optical Encoder/Hall

Actuator Types
- Pulley-driven
- Direct-drive
- Worm/rotary geared

Communication & Debugging
- UART/I2C/CAN
- Oscilloscopes

Mechanical Prototyping
- 3D Printing
- CNC/ Laser Printing
- Hand Tools/ Sewing

EDUCATION

PhD,
Mechanical Engineering
Virginia Tech, *Blacksburg, VA*
Dec 2021

BS, *cum laude*,
Mechanical Engineering
NYU Tandon, *Brooklyn, NY*
May 2015

SUMMARY

A mechatronics engineer with specialties in prototyping actuators and designing user interfaces. Seeks to join team with dynamic and project—driven environment. Competencies include:

- **Designing Hardware** with sensors and actuators resulting in open—sourced publication
- **Processing and Analyzing Sensor Data** contributing to two publications and four co—authored papers
- **Programming User Interface for Quantitative Research** incorporating human psychophysical properties leading to two publications

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AREAS OF EXPERTISE

Mechatronic Product Development
Gained as a PhD Researcher | *Assistive Robotics Laboratory at* **Virginia Tech**

- Led Arm Haptic Feedback Team with rapid prototyping and embedded programming skills as evidenced by open—source paper, HardwareX
- Managed the hardware prototyping process with a graduate student resulting in cheap ($509), light—weight (500g) elbow joint actuator as described in HardwareX
- Collaborated with motor expert to solve Initial Pose Detection problem of Brushless DC motor in Field Oriented Control as exhibited in HardwareX
- Mentored two MS students in mechatronics topics and advised two senior design teams, including team that participated in 2019 Cornell Cup Robotics

Quantitative Research
Gained as PhD Researcher | *Assistive Robotics Laboratory at* **Virginia Tech**

- Administered a human subject experiment to discover how humans perceive torque input under various joint conditions, leading to two publications, *Scientific Reports* and *IEEE Access*
- Conducting quantitative studies to discover human perceptual threshold as 0.1—0.2 Nm for arm under external loading, and 0.4—0.8 Nm for arm under motion, as represented in *Scientific Reports.*
- Developed adaptive psychophysics software to measure kinesthetic perception resulting in *2020 ICRA* conference presentation
- Analyzed user data through signal processing (i.e., segmentation and PCA analysis), resulting in discovering the masking effect of torque stiffness and different active joint stiffness in arm's flex/ext. direction (error of 15.4° for flex. and 9 ° for ext. motion), as evidenced by journal paper in *IEEE Access.*

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SOFTWARE SKILLS

Embedded Programming
- C/C++ via CCStudio
- Maxon EPOS Firmware
- RoboteQ Firmware

Graphical User Interface
- Processing
- JavaScript

PCB Design
- Eagles

Data Acquisition & Simulation:
- MATLAB
- LabVIEW

3D CAD:
- NX
- SolidWorks
- Ansys

Statistics:
- JMP
- SPSS

HONORS

Doctoral Scholarship
ICTAS, Virginia Tech
March 2016–July 2020

Best Mechanical Engineering Experience Award for Undergraduate
NYU Tandon
May 2015

AREAS OF EXPERTISE continued

Modeling and Simulation of Physical Human—robot Interaction
Gained as PhD Researcher | *Assistive Robotics Laboratory at* Virginia Tech

- Operated project assessing physical Human—Robot Interaction through frequency-domain analysis ending with a poster presentation at 2016 IROS conference
- Carried out system identification of wearables with an impedance model as demonstrated in the poster

Signal Processing and Analysis
Gained as Undergraduate Researcher | *Dynamic System Laboratory at* NYU

- Conducted transfer function identification of smart material that led to validating physics-based model in energy harvesting field
- Performed impedance analysis on the smart materials to characterize the material's electro/mechanical properties using potentiostat ending with a journal from *J. of Intell Mater Syst Struct*
- Configured custom and off-shelf data acquisition systems leading to several journal publications (one first author, four authorships) and resulting in ICTAS funding (four-plus-year scholarship) for doctoral study

SELECTED PUBLICATIONS

The Effects of Torque Magnitude and Stiffness in Arm Guidance through Joint Torque Feedback
Kim, H., Asbeck, A. • 2022 • IEEE Access

Just Noticeable Differences for Elbow Joint Torque Feedback
Kim, H., Asbeck, A. • 2021 • Scientific Report

An Elbow Exoskeleton for Haptic Feedback Made with a Direct Drive Hobby Motor
Kim, H., Asbeck, A. • 2020 • HardwareX

Just Noticeable Differences for Joint Torque Feedback During Static Poses
Kim, H., Guo, H., Asbeck, A. • 2020 • ICRA

Voltage Attenuation along the Electrodes of Ionic Polymer Metal Composites
Kim, H., Cha, Y., Porfiri, M. • 2016 • J of Intell Mater Syst Struct