HUBERT KIM

Research Scientist

E-mail: jk.hubert.kim@gmail.com

Mobile: 917.834.0377

Home: Bay Area, CA
(willing to relocate)

Web: hubertjkim.com

LinkedIn: ~/hubertjkim

SKILLS

Firmware Developing

Digital Signal Processing

User Interface Design

Human Subject Testing

Adaptive Control and Machine Learning

Numerical Simulation and Path Planning

EDUCATION

Ph.D.,
In Mechanical Engineering
Virginia Tech, *Blacksburg*, VA
Sept 2021

Dissertation: Joint Torque Feedback for Motion Training with an Elbow Exoskeleton

B.S., *cum laude*,
In Mechanical Engineering
NYU Tandon, *Brooklyn*, NY
May 2015

SUMMARY

A haptic researcher with specialties in embedded programming and control theory. Seeks to join an engineering team with a project-driven environment to improve the human and robot perception. Competent in:

- Developing concepts into prototypes with manufacturing and programming skills resulting in an open-sourced publication.
- Designing and executing quantitative research with analytical tools resulting in 2 journal articles.
- Solving problems in frequency-domain with modeling and simulation skills contributing 1 peer-reviewed journal and 4 co-authored papers.

AREAS OF EXPERTISE

Mechatronic Product Development

Gained as a Ph.D. Researcher | *Assistive Robotics Laboratory at* **Virginia Tech**

- Led Arm Haptic Feedback Team with rapid prototyping and embedded programming as evidenced by an open-source paper, HardwareX.
- Interviewed and cooperated with a programming role M.S. student ended up developing a direct-drive, light-weight wearable robot.
- Collaborated with a Motor Expert to solve the Initial Pose Detection problem of a Brushless DC motor as exhibited in the HardwareX.
- Mentored two professionals in mechatronics topics and advised 2 Senior Design teams, including a team that participated in the 2019 Cornell Cup Robotics.

Human-centered Research

Gained as a Ph.D. Researcher | *Assistive Robotics Laboratory at* **Virginia Tech**

- Managed quantitative human subject studies leading to discover human perceptual threshold when wearing an exoskeleton.
- Oversaw design iterations of the adaptive User Interface to measure kinesthetic perception resulting in the 2020 ICRA conference presentation.
- Collaborated with a statistical expert to deal with statistical model selection, outlier handlings resulting in two journal papers, including a paper in Scientific Reports.
- Analyzed the user data resulting in the discovery of active human joint stiffness in the haptic field.

Modeling and Simulation of Physical Human-robot Interaction

Gained as a Ph.D. Researcher | *Assistive Robotics Laboratory at* **Virginia Tech**

- Operated a project of assessing physical Human-Robot Interaction via control design technique ending up poster presentation at 2016 IROS conference.
- Carried out system identification of wearables as demonstrated by the development of the impedance controller in the poster.

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TECHNICAL SKILLS

Embedded Programming (C/C++ via CCStudio):
- UART/ I2C/ CAN
- Vector Control of Brushless DC
- Debugging w. Oscilloscopes/ logic analyzers

Data Acquisition and Simulation:
- MATLAB
- LabVIEW

3D CAD:
- NX/SolidWorks

Statistics:
- JMP
- SPSS

Data Processing with NN:
- Python
- Tensorflow (Jupiter)

HONORS

Doctoral Scholarship
ICTAS, Virginia Tech
Mar 2016 – July 2020

Best Mechanical Engineering Experience Award for Undergrad
NYU Tandon
May 2015

INTERESTS

Basketball

Weightlifting

Sci-Fi Novel

AREAS OF EXPERTISE continued

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

- Conducted the transfer function identification of the smart material that led to validating the physics-based model in the energy harvesting field.
- Configured custom and off-the-shelf data acquisition systems leading to several journal publications (1 first author, 4 authorships) and resulting in ICTAS funding (4-year scholarship) for the doctoral study.

SELECTED PUBLICATIONS

The Effects of Torque Magnitude and Stiffness in Arm Guidance through Joint Torque Feedback
Kim, H., Asbeck, A. [Submitted]
• 2021 • IEEE Access

Just Noticeable Differences for Elbow Joint Torque Feedback
Kim, H., Asbeck, A. [Under review]
• 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

SCHOLARLY REVIEWS

Machine Learning Model Comparisons of User Independent & Dependent Intent Recognition Systems for Powered Prostheses
• 2020 • IEEE Robotics and Automation

Probabilistic Model-based Learning Control for Task-oriented Intention-driven Training with Soft Rehabilitation Robots
• 2020 • Transactions on Mechatronics