HUBERT KIM

Experimental Roboticist

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

Mobile: 917.834.0377

Home: Bay Area, CA

Web: hubertjkim.com

LinkedIn: ~/hubertjkim

SKILLS

Firmware Developing

Hardware Fast Prototyping

Finite State Machine

Digital Signal Processing

User Interface Design

Statistical Analysis

Human Subject Testing

Adaptive Control Technique

Path Planning Technique

EDUCATION

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

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

SUMMARY

A haptic scientist with a can-do personality looking to improve daily life through a smarter physical Human-Robot-Interaction. As a founding member of a start-up laboratory, explored new concepts through rapid prototyping while examining the fundamentals of human perception studies through quantitative analysis. Seeks to join a research team with a project-driven environment to enhance the mutual perception between humans and robots.

PROFESSIONAL EXPERIENCE

Ph.D. Researcher | *Assistive Robotics Laboratory* Advisor: Alan T. Asbeck
Sept 2015 - Sept 2021

Mechatronics
Researching, developing, and optimizing solutions for the low-latency, full back-drivable exoskeleton and its user interface to deliver gentle and transparent torque feedback.

- Conceptualize (first-principles analysis, DFM/DFA), build, and iterate prototypes using rapid prototyping technologies: free body diagrams - hardboard realization - validation.
- Addressed real-time communications (UART, I2C, CAN, GPIO) with Maxon, RoboteQ, and Texas Instrument (TI) microcontrollers.
- Designing the C/C++ (ARM Cortex-M4 architecture) interrupt priorities, peripherals, and clock configurations with TI microcontrollers, and debugging via oscilloscopes, logic analyzers.
- Prototyped various actuator mechanisms, including pulley-driven, geared motor, full soft-sleeve, direct-drive with magnetic sensors, various load cells, and IMUs.
- Provided a solution of Initial Pose Detection of BLDC motor when using Field Oriented Control in TI MotorWare to the wearable application.
- Mentored M.S. students and supervised several senior design teams. The workshop documents are open-sourced.

Quantitative Analysis
Designing and executing quantitative human subjects research studies using custom-made wearables.

- Designed the multimodal experiment for measuring kinesthetic perception with the knowledge of the musculoskeletal system and the anthropometric data.
- Developed user study materials for adaptive User Interface, IRB application, facilitation, management of Personally Identifiable Information (PII).
- Gathered and processed the user data with MATLAB (segmentation/peak findings/linear regression) and statistically analyzed it with JMP and SPSS (PCA, parametric and non-parametric analysis).
- Interpreted the results relating to the characteristics of human sensory organs located on the muscles and tendons.

HUBERT KIM

Experimental Roboticist

TECHNICAL SKILLS

Embedded System Programming:
- C / C++ (CCStudio)
- Java Script

Data Acquisition:
- MATLAB
- LabVIEW

3D CAD:
- NX
- SolidWorks
- Ansys

Statistics:
- JMP
- SPSS

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

HONORS

Doctoral Scholarship
ICTAS, Virginia Tech
Mar 2016 – July 2020

Best Mechanical Engineering Experience Award for Undergrad
NYU Tandon
May 2015

Inno/Vention Competition with Prototyping Fund
NYU Entrepreneurs Lab
Sept 2014- May 2015

Founder's Day Award
NYU Tandon
April 2015

PROFESSIONAL EXPERIENCE continued

Undergrad. Researcher | *Dynamic System Laboratory* Advisor: Maurizio Porfiri
March 2013 - May 2015

Signal Processing
Characterized electromechanical property of the smart material via frequency analysis techniques and validated the physics-based simulation.

- Configured custom and off-the-shelf data acquisition systems (high-speed camera, LabVIEW data acquisition).
- Derived the transfer functions of the mechanical/electrical data in frequency domain using MATLAB (curve-fitting).
- Investigated the effect of the water temperature, underwater level on energy harvesting capability.

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 • Sci Rep

An elbow exoskeleton for haptic feedback made with a direct drive hobby motor
Kim, H., Asbeck, A.
• 2020 • HardwareX Vol. 8, e00153

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