HUBERT KIM

MECHATRONICS ENGINEER

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Home: Bay Area, CA
(willing to relocate)

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SKILLS

Register Level Programming
- C/C++ via TI CCStudio
- Processing (JS)

Data Acquisition & Simulation
- MATLAB | LabVIEW

Computer Aided Design
- NX | Ansys | SolidWorks

Custom-built Communications
- UART | I^2C

Circuit Debugging
- Logic Analyzer | Oscilloscope

EDUCATION

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

: *ICTAS Doctoral Scholarship*
March 2016–July 2020

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

: *Best Mechanical Engineering Experience Award* for Undergraduate
April 2015

SUMMARY

A mechatronics engineer bridging the low-level subsystems to the high-level control system. Competent in effectively decoupling the observed or anticipated nonlinearities from the integrated systems and problems

AREAS OF EXPERTISE

MECHATRONICS AND CONTROL ENGINEERING
May 2015 – Dec 2021

Gained as a Research Assistant | *Assistive Robotics Laboratory at* **Virginia Tech**

- Led Arm Haptic Feedback Project to develop a lightweight (500 g), cheap ($ 509), and backdriveable exoskeleton as exhibited in *HardwareX*
- Identified the Power-to-weight ratio for various (Bowden-cable, timing-belt, and direct-drive) mechanisms for the low-profile wearable design
- Iteratively isolated and evaluated servo drive system components (power dissipation, cross-platform communication, EMF shielding, and feedback resolution) to improve the entire system's bandwidth
- Advised teams to characterize the rigidity and inertia of the motor-load couplings for linear Series Elastic Actuator designs, including a team *Icarus* in the *2019 Cornell Cup Robotics*

Mar 2013 – May 2015

Gained as an Undergraduate Researcher | *Dynamic System Laboratory at* **NYU**

- Realized impedance matching of the smart materials as and compared with the simple resistive model finding increased power delivery by more than 60 %, as described in *Smart Materials and Structures*
- Conducted impedance measurement and sensitivity analysis on smart materials to find the surface resistance's effect in the physical circuit model as represented in *J. of Intell Mater Syst Struct*

CONCEPT DEVELOPMENT
May 2015 – Dec 2021

Gained as a Research Assistant | *Assistive Robotics Laboratory at* **Virginia Tech**

- Proposed a new concept of utilizing psychophysics to improve human perception in physical guidance, leading to a publication in *Scientific Reports*
- Discovered the quantified human perception to be 0.1—0.2 Nm for the arm under external loading and 0.4—0.8 Nm for the arm under motions, as presented in a *2020 ICRA* conference presentation
- Analyzed a novel topic of voluntary human arm bandwidth triggered by linear torque slope (12 mNm/°: 0.16 s and 95 mNm/°: 0.071 s of time delays), as evidenced by a journal paper in *IEEE Access*
- Decoupled the nonlinearity of voluntary human motion in physical guidance using the adaptive control algorithm reducing RMS position error by 7.97 % during the real-time augmentation