

WOOLIM HONG

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EDUCATION

Ph.D., Texas A&M University, College Station, TX, USA

- Doctor of Philosophy in Mechanical Engineering
- Fields of Specialty: Controls and Systems, Robotics (Rehabilitation Robotics)
- Advisor: Dr. Pilwon Hur

Jan. 2018 – Present

M.S., Texas A&M University, College Station, TX, USA

- Master of Science in Electrical Engineering
- GPA: 3.88 / 4.0
- Fields of Specialty: Controls and Systems, Robotics (Rehabilitation Robotics)
- Advisor: Dr. Shankar P. Bhattacharyya / Co-advisor: Dr. Pilwon Hur
- Thesis: Transfemoral Prosthesis Control for Inclined Walking Using Impedance Control and Bezier Polynomial Based Optimization

Aug. 2015 - Dec. 2017

B.S., Handong Global University, Pohang, Rep. of KOREA (including Military Service)

- Bachelor of Science in Electrical Engineering (Cum laude)
- GPA : Overall (140 credits) 3.70 / 4.0 (3.85 / 4.5), Upper (70 credits) 3.76 / 4.0 (3.97 / 4.5)
- Fields of Specialty: Signal Processing, UWB Radar Systems
- Advisor: Dr. Joonyong Lee

Mar. 2008 - Aug. 2014

HONORS & AWARDS

GenDepot Poster Award

Nov. 2017

Electrical and Computer Engineering Graduate Student Travel Grant

Sep. 2016

Graduate Program Enhancement Scholarship

Fall 2015 - Spring 2016

Non-Res Competitive Scholarship

Fall 2015 - Spring 2016

Honor Student Scholarship

Fall 2013

Team Leader Scholarship

Fall 2012

RESEARCH INTERESTS

Controls and Systems

Developing controller and systems for powered lower limb prosthesis

Rehabilitation Robotics

Designing cost effective powered lower limb prosthesis for transfemoral amputees

Signals and Systems

Signal Processing for robust sensor signals and communication systems

PUBLICATIONS

1. Woolim Hong, Dr. Pilwon Hur. "Transfemoral Prosthesis Control for Slope Walking with Principal Component Analysis", *41th Annual Meeting of the American Society of Biomechanics (ASB 2017)*
2. Victor Paredes, **Woolim Hong**, Shawanee Patrick, and Dr. Pilwon Hur. "Upslope Walking with Transfemoral Prosthesis using Optimization based Spline Generation", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2016)*
3. Han U. Yoon, Lanna Lytle, Yi-Tsen Pan, Namita Anil Kumar, **Woolim Hong**, Daniel McGowan, and Pilwon Hur. "Identifying a Perceptual Mapping from Bidirectional Skin Stretch Patterns to Motor Space Perceptions: A Preliminary Study", *40th Annual Meeting of the American Society of Biomechanics (ASB 2016)*
4. MoonA Lee, JoonYong Lee, HongEun Park, **Woolim Hong**, HoSeop Kim. "Statistical Modeling of UWB Indirect Reflection in Indoor Environment", *24th Joint Conference on Communications and Information (JCCI 2014), 2014.A1-4*

CAREER EXPERIENCES

Research Experiences

- **Inclined Walking with Transfemoral Prosthesis** *Aug. 2015 - Dec. 2017*
Advisor: Dr. Pilwon Hur
 - Downslope walking pattern is quite different from the upslope walking pattern
 - Propose a new method to cover all slopes walking with automatic transition
- **An Approach to Quantify the Patient Improvement by Equine Assisted Activities and Therapeutics** *Aug. 2015 - Present*
Advisor: Dr. Pilwon Hur
 - Proposed a new methods to assess cooperation between complex systems in real-time while advancing the merits and the effectiveness of equine assisted therapy
 - Used custom-developed wearable wireless IMUs (Inertia Measurement Unit)
 - Modeled the complex systems to quantify the movement of the rider & the horse
- **Upslope Walking with Transfemoral Prosthesis using Optimization based Spline Generation** *Aug. 2015 - Aug. 2016*
Advisor: Dr. Pilwon Hur
 - Controlled the prosthesis to mimic the human walking in both flat ground & upslope without any mode changes
 - Generated the stable, robust human walking trajectory that the lower limb prosthesis follows
 - Proposed the spline generation method to make the upslope walking trajectory converge to the flat ground trajectory
 - Used a low gain PD controller for terrain adaptation
 - Used the non-linear, linear control method to control the prosthesis to follow the human walking trajectory
- **Human racking using UWB radar sensor network, National Research Foundation of Korea** *Sep. 2012 - Jun. 2014*
Advisor: Dr. Joonyong Lee
 - Indirectly reflected signals cause false alarms while tracking a moving target using UWB
 - Modeled UWB indirect reflection signals in indoor environment statistically
 - Used CLEAN-Algorithm and resulted in modeling with Saleh-Valenzuela (S-V) model
 - Identified the channel characteristics and calculated cluster & ray arrival rate through Poisson arrival
 - Expecting to improve the accuracy of moving target detection
- **Detecting Breathing object and Finding Breathing pattern by using UWB radar** *Sep. 2012 - Jun. 2013*
Advisor: Dr. Joonyong Lee
 - Most interesting project award in Capstone Design Competitive Exhibition *Nov. 2012*
 - Designed an algorithm for detecting breathing object and finding breathing pattern
 - Used Cross-Correlation, CLEAN-algorithm, TOA method and Least Mean Squared Error Estimation
 - Detected the breathing pattern by focusing the change of chest when the object was breathing

Research Presenting Experiences

- 41th Annual Meeting of the American Society of Biomechanics (ASB 2017) *Aug. 2017*
 - Transfemoral Prosthesis Control for Slope Walking with Principal Component Analysis
- LG Techno Conference 2017 at New York *Apr. 2017*
 - Selected Presentation
 - Transfemoral Prosthesis Control for Inclined Surface Using Principal Component Analysis
- South Central American Society of Biomechanics (SCASB) *Mar. 2017*
 - Powered Prosthesis Control for Slope Walking Using Principal Component Analysis
- 2016 Korean-American Biomedical Scientist Symposium (KABMS) *Nov. 2016*
 - The control method for the flat ground and the upslope walking with transfemoral prosthesis
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2016) *Oct. 2016*
 - Upslope Walking with Transfemoral Prosthesis using Optimization based Spline Generation
- Hyundai Global Top Talent Forum 2016 at San Diego *Aug. 2016*
 - Selected Presentation
 - The Future Mobility for the Elderly & Disabled - Lower Limb Prostheses & Exoskeletons
- ENG-LIFE Workshop 2016 : At the Interface of Engineering and Life Sciences *Apr. 2016*
 - Equine Assisted Therapy - Co-ordination between the Horse and the Rider for Enhanced Motor Outcomes
- 2016 Texas Systems Day at Austin, TX *Apr. 2016*
 - Unifying the controller for the flat ground and the upslope walking with transfemoral prosthesis

Undergraduate Teaching Assistant

- ECE30081: Signals and Systems
- ECE30085: Probability and Random Variable Processes

Spring 2014

Fall 2013

TECHNICAL SKILLS

Engineering Tools

- MATLAB, Mathworks
- Mathematica, Wolfram Research,
- Xilinx ISE, Xilinx
- PulsON220, Time Domain
- LTspice, Linear Technology Corporation,
- FreePCB / ViewMate
- Electronics Explorer board (EE board) / WaveForm, Texas Instruments

Operating Systems

- Linux
- ROS (Robot Operating System)

Programming Languages

- C/C++/C#
- VHDL

EXTRA-CURRICULAR ACTIVITIES

Overseas Volunteers, Institute of Asian Culture and Development (IACD)

- Medical Volunteers, Jordan *Jan. 2014 - Feb. 2014*
 - Volunteer medical services to Syrian refugees in Jordan
- Overseas Volunteers, Syria *Jul. 2009 - Aug. 2009*
 - Made cultural exchanges and taught English and Mathematics to children in Syria
- Overseas Volunteers, Syria *Jul. 2008 - Aug. 2008*
 - Held Korean culture event and taught English and Mathematics to children in Syria

Volunteer in Gyeongbuk Braille Library

- Edited and revised the electronic books for education for the blind *Summer & Winter 2012*

Leadership Activities

- Director of Day Closing Worship in Handong Global University (HGU) *Sep. 2013 - Jun. 2014*
- Leader of Student Bible Study *Sep. 2013 - Dec. 2013*
- Leader of Faculty Group Bible Study (FGBS) *Mar. 2013 - Jun. 2013*
- “Charity bazaar for helping patients in hospice”, Project Manager *Nov. 2012 - Dec. 2012*
 - Delivered the funding to Saemmul Hospice and volunteered for patients
- Leader of ‘Team’ *Fall 2012*
 - Won the first prize in the team activity ideas contest *Fall 2012*
 - ‘Team’ is a traditional student group of HGU
 - Each member of HGU is placed in a ‘Team’ with 30 other students, having a team professor

Military Service at Republic of Korea army

- Commendation from a Major General (20th Division) *Feb. 2010 - Dec. 2011*

Aug. 2011