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SUMMARY OF QUALIFICATIONS

- **Conducting Patient-Based Experiments** with a focus on developing experimental methodologies and analyzing data
- **Development of Non-contact based Optical Imaging** (tomography, microscopy, endoscopy, and computed tomography scan) and Sensing
- **Development of Biomedical Imaging and Sensing** (optical coherence tomography, phase sensitive imaging, and near-infrared spectroscopy, etc.)
- **Optical Fiber-based Sensing** (distributed acoustic sensing, gas sensing, lensed optical fiber fabrication, etc.)
- **Computing Analysis** (machine learning/deep learning analysis, programming)
- **Commercial Small Unmanned Aircraft (SUA) System Remote Pilot**

SKILLS

- Programming
 - MATLAB ★★★★★
 - LabVIEW ★★★★★
 - Python ★★★★★☆
 - HTML / CSS ★★★★★☆
- Optical system Simulation & Design
- Language
 - Korean ★★★★★
 - English ★★★★★☆
 - Vietnamese ★☆☆☆☆
 - Spanish ★☆☆☆☆
- 3D CAD Modeling
 - Solidworks ★★★★★☆
 - Blender ★★★★★☆
- Machine Learning & Deep Learning (Data predictive analysis)
- Problem solving ★★★★★
- SUA control ★★★★★

Education

- 2013 ~ 2020 **M.S. & Ph.D.** in Optics Gwangju Institute of Science and Technology (GIST), South Korea
- 2013 ~ 2013 **Intern** in GIST, South Korea
- 2011 ~ 2012 **Exchange Student**, Department of Electrical Engineering, Michigan Tech University, USA
- 2007 ~ 2013 **B.S.** in Electrical Engineering, University of Suwon, South Korea

Position and Employment

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2025 ~ **Biomedical Engineer**, Guidehouse.Inc, USA
2020 ~ **Postdoctoral researcher fellow** in National Institutes of Health (NIH), USA
2013 ~ 2020 **Research assistant**, GIST, South Korea
2013 ~ 2013 **Internship**, GIST, South Korea
2008 ~ 2010 **Sergeant**, performing military service, South Korea

Leadership Activity

2020 ~ **Research mentor** of postbaccalaureate at the National Institutes of Health
2019 ~ 2020 **Representative** of the department at GIST
2018 ~ 2020 **Laboratory manager** in Applied Optics Lab at GIST
2009 ~ 2010 **Military squad leader**

Service Activity

Journal Review

2020 ~ Journal of Biomedical Optics
2020 ~ Biomedical Optics Express

Organization

2013 ~ 2020 Research assistant at GIST
2017 ~ 2019 Teaching assistant; physics and optical experiments

PATENTS

2024 Real-time Dynamic Assessment of Cellular Metabolism Through Optical Imaging and AI Techniques (USA; submitted)
Soongho Park, Amir Hossein Gandjbakhche, Thien Nguyen, Jinho Park

2023 Single source-detector separation approach to calculate tissue oxygen saturation (USA; submitted)
Thien Nguyen, Amir Hossein Gandjbakhche, **Soongho Park**, Brian Y. Hill
U.S. Patent Application: 63/434,827

2023 A System and Protocol for Monitoring Pregnancy Health (USA; submitted)
Amir Gandjbakhche, Thien Nguyen, Zeyu Zhang, **Soongho Park**, George Downey, Alireza Kaligh, Kosar Khaksari
HHS: E-198-2022-0-US-01

2021 Photoacoustic Signal Measuring Apparatus and Method (South Korea)
Soongho Park, Byeong Ha Lee, Youngguae Kim, Sunghwan Rim
Patent Number: 10-2206350

2021 Apparatus and Method for Measuring Properties of the Elastic Object Using Optical Signal (South Korea)
Soongho Park, Byeong Ha Lee, Youngguae Kim, Sunghwan Rim
Patent Number: 10-2206444

2020 Cable Identification Device Using Optical Fiber (South Korea)
Soongho Park
Patent Number: 10-2078796

2016 Location Confirmation System of a Bicycle Using Augmented Reality (South Korea)
Soongho Park, Jonghyun Eom
Patent Number: 10-16334060000

PROJECTS

04.2024 ~ Present	Integrated Assessment of Vascular Function Using NIRS and Brachial Artery FMD
<p>This study aims to comprehensively assess vascular health by integrating near-infrared spectroscopy (NIRS) and brachial artery flow-mediated dilation (FMD) analysis. NIRS provides real-time monitoring of tissue oxygenation and hemoglobin levels, offering insights into tissue perfusion dynamics. Concurrently, FMD, assessed via ultrasound, evaluates endothelial function—a critical indicator of vascular health. By combining these modalities, the study seeks to correlate tissue oxygenation with endothelial function, providing a deeper understanding of vascular physiology and potentially enhancing diagnostic and treatment strategies for cardiovascular and vascular diseases. <u>My role in this project is to develop and advance the experimental methods, conduct the experiments, and analyze the data.</u></p>	
08. 2020 ~ 03.2024	Continuous Noninvasive Monitoring of the Placental Oxygenation during Pregnancy
<p>My objective is to conduct research aimed at creating secure, non-invasive, and portable equipment that can evaluate placental oxygenation to establish a standardized oxygenation dataset that can be correlated with pregnancy outcomes. The focus of this study is on assessing baseline oxygenation in both laboring and non-laboring patients, as well as in patients with pregnancy-related complications. <u>To achieve this goal, I have developed a near-infrared spectroscopy (NIRS) device that can monitor oxygen saturation and am currently exploring a technique for identifying placental oxygen saturation using this device.</u> Additionally, <u>I am undertaking a parallel study that investigates the connection between placental oxygen saturation and the dynamic behavior of cells at the cellular level by analyzing the concentration of oxygen using <i>Dynamic Full-field Optical Coherence Tomography</i>.</u></p>	
01. 2019. ~ 08. 2020.	Study on Elastic Modulus and Non-contact Intraocular Pressure Measurement Techniques Based on Multi-phase Optical Interferometer
<p>A surface acoustic wave (SAW) was generated in the imitated eye with a pulsed laser and the waveguide characteristics of the SAW were investigated. My aim was to devise a non-invasive method for measuring intraocular pressure by leveraging the SAW detection technique in conjunction with a multi-phase optical interferometer. As part of this endeavor, <u>I designed a system capable of detecting the elastic characteristics of SAW signals by employing a 3x3 optical fiber coupler.</u></p>	

01. 2018 ~ 01. 2019.	Development of Phase-complementary Non-contact Photoacoustic Bio-imaging System
<p>The purpose of this study was to undertake a comprehensive analysis of reconstructing photoacoustic images through a non-invasive approach. The primary objective was to simulate the image of the photoacoustic signal as it propagates through a sample and then reconstruct and image the signal detected through experimental procedures. In order to visualize the photoacoustic signal, <u>I developed a system that leverages the property that the index of the media changes by the photoacoustic signal propagates, and I was responsible for visualizing the signal.</u></p>	
01. 2017 ~ 12. 2017.	Noncontact Photoacoustic Microscopy Using Full-field Optical Coherence Tomography (OCT)
<p>Conventional photoacoustic microscopy/tomography is a system that sequentially captures internal images of a biological sample using a contact-type ultrasound probe. One of the drawbacks of photoacoustic imaging is its reliance on physical contact with the sample, which can cause contamination, and its application is limited by the need for index-matched media. In addition, temporal resolution is low because signal detection is performed sequentially. To solve these problems, we built a system capable of acquiring high-resolution optoacoustic images based on a full-field optical coherence imaging system. As part of this project, <u>I designed a full-field OCT system configuration and devised an acoustic measurement algorithm utilizing signal triggering.</u></p>	
01.2015. ~ 01. 2017.	Development of a non-invasive blood glucose measurement method using photoacoustic technology based on an optical interferometer
<p>The aim of this project was to design an optical interferometer signal processing algorithm and detect photoacoustic signals on the skin's surface. As part of this project, <u>I built the configuration of the photoacoustic signal generation system for blood glucose and formulated the algorithm for detecting the signal.</u></p>	
01.2014. ~ 01.2017.	Fiber Distributed Acoustic Sensor (DAS) Technology Research for Acoustic wave Detection and Analysis
<p>The purpose of this project is to study the basic technology of DAS to detect the presence, location, and type of adjacent moving objects using optical fiber backscatter signals. DAS is a technology for long-range monitoring using a single optical fiber, and can be used for security, oil and/or gas pipeline abnormality detection, etc. In this project, <u>I was assigned the role of analyzing the characteristics of an object using a backscattered signal into the optical fiber.</u></p>	

AWARDS AND HONORS

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- 2024 Accept financial support and Multiscale Biophotonics Short Course, University of California, Irvine
- 2024 **Best Presentation Award (2nd Place)**, SPIE. Photonics West 2024, (Co-authors)
- 2023 **Best Presentation Award (2nd Place)**, SPIE. Photonics West 2023, (Co-authors)
- 2022 **An awardee of the travel award** (\$1500) from the Center on Compulsive Behaviors- 2022 SEED Grant runner-up.
- 2020 **Invited Talk**, Optical Society of Korea Summer Meeting (Conference), South Korea
- 2019 **Best Poster Award**, Gwangju / Jeonnam Province Physics Conference, South Korea
- 2019 **RA Scholarship**; Excellent research achievements within the department in GIST, South Korea
- 2019 **Best Poster Award**, Annual Biophotonics Conference 2019, South Korea
- 2019 **Best Student Paper Award**, Conference on Optoelectronics and Optical Communications, South Korea.
- 2019 **Sunseom Scholarship**; Scholarship awarded to students with unique ideas and patents, South Korea.
- 2018 **Best Student Paper Award**, Photonics Conference, South Korea.
- 2018 **Best Student Paper Award**, Conference on Optoelectronics and Optical Communications, South Korea.
- 2018 **Gwangju Civic Invention Competition (3rd Prize)**, South Korea.
- 2017 **GIST startup Idea Contest (3rd Prize)**, South Korea.
- 2016 **Best Student Paper Award**, Korean Optical Society Conference, South Korea.
- 2015 **GIST Startup Idea Contest (3rd Prize)**, South Korea.
- 2015 **Best Student Paper Award (3rd)**, CLEO Pacific Rim International Conference, South Korea.
- 2014 **Grand Prize**, Gwangju City Science and Engineering idea contest, South Korea.

RESEARCH ACTIVITY

Publications in peer-reviewed journals

1. **Park, Soongho**, Julie Mathew, Eric Leifer, Sharon Osgood, Claudia Gomez, Hans Ackerman, and Yogendra Kanthi. "Enhanced accuracy of NIRS-vascular occlusion testing through incorporation of conduit artery diameter." ***Journal of Physics: Photonics*** (2026).
2. **Park, Soongho**, Thien Nguyen, Tony M. George, Otiti A. Mayo, John E. Mutersbaugh, Guoyang Luo, Roberto Romero, and Amir H. Gandjbakhche. "From Traditional to Cutting-Edge: A Review of Fetal Well-being Assessment Techniques." ***IEEE Transactions on Biomedical Engineering*** (2024).
3. Nguyen, Thien, **Soongho Park**, Asma Sodager, Jinho Park, Dahiana M. Gallo, Guoyang Luo, Roberto Romero, and Amir Gandjbakhche. "A Wireless and Wearable Multimodal Sensor to Non-Invasively Monitor Transabdominal Placental Oxygen Saturation and Maternal Physiological Signals." ***Biosensors*** 14, no. 10 (2024): 481.
4. Park, Jinho, Thien Nguyen, **Soongho Park**, Brian Hill, Babak Shadgan, and Amir Gandjbakhche. "Two-Stream Convolutional Neural Networks for Breathing Pattern Classification: Real-Time Monitoring of Respiratory Disease Patients." ***Bioengineering*** 11, no. 7 (2024): 709.

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5. Jinho Park, Aaron James Mah, Thien Nguyen, **Soongho Park**, Leili Ghazi Zadeh, Babak Shadgan, and Amir Gandjbakhche. "Modification of a Conventional Deep Learning Model to Classify Simulated Breathing Patterns: A Step toward Real-Time Monitoring of Patients with Respiratory Infectious Diseases." ***Sensors*** (2023)
6. Wan-Chun Su, Hadis Dashtestani, Helga O. Miguel, Emma Condy, Aaron Buckley, **Soongho Park**, Thien Nguyen, Selin Zeytinoglu, John Millerhagen, Nathan Fox, Amir Gandjbakhche. "Simultaneous Multimodal fNIRS-EEG Recordings Reveal New Insights in Neural Activity During Motor Execution, Observation, and Imagery." ***Scientific Report*** (2023)
7. Thien Nguyen, **Soongho Park**, Brian Hill, Amir H. Gandjbakhche. "Single Source-Detector Separation Approach to Calculate Tissue Oxygen Separation Using Continuous Wave Near-infrared Spectroscopy." ***IEEE Open Journal of Engineering in Medicine and Biology*** (2023)
8. Mah, Aaron James, Thien Nguyen, Leili Ghazi Zadeh, Atrina Shadgan, Kosar Khaksari, Mehdi Nourizadeh, Ali Zaidi, **Soongho Park**, Amir H. Gandjbakhche, and Babak Shadgan. "Optical Monitoring of Breathing Patterns and Tissue Oxygenation: A Potential Application in COVID-19 Screening and Monitoring." ***Sensors*** (2022)
9. **Soongho Park**, Vinay Veluvolu, William S. Martin, Thien Nguyen, Jinho Park, Dan Sackett, Claude Boccara, and Amir Gandjbakhche. "Label-free, non-invasive, and repeatable cell viability bioassay using dynamic full-field optical coherence microscopy and supervised machine learning." ***Biomedical Optics Express*** (2022)
10. **Soongho Park**, Thien Nguyen, Emilie Benoit, Dan L. Sackett, Marcial Garmendia-Cedillos, Randall Pursley, Claude Boccara, and Amir Gandjbakhche. "Quantitative evaluation of the dynamic activity of HeLa cells in different viability states using dynamic full-field optical coherence microscopy." ***Biomedical Optics Express*** (2021)
11. Thien Nguyen, Emma E. Condy, **Soongho Park**, Bruce H. Friedman, and Amir Gandjbakhche. "Comparison of Functional Connectivity in the Prefrontal Cortex during a Simple and an Emotional Go/No-Go Task in Female versus Male Groups: An fNIRS Study." ***Brain Sciences*** (2021)
12. Thien Nguyen, Kosar Khaksari, Siddharth M. Khare, **Soongho Park**, Afrouz A. Anderson, Janine Bieda, Eunjung Jung, Chaur-Dong Hsu, Roberto Romero, and Amir H. Gandjbakhche. "Non-invasive transabdominal measurement of placental oxygenation: a step toward continuous monitoring." ***Biomedical Optics Express*** (2021)
13. Nguyen Thien, Helga O. Miguel, Emma E. Condy, **Soongho Park** and Amir Gandjbakhche. "Using Functional Connectivity to Examine the Correlation between Mirror Neuron Network and Autistic Traits in a Typically Developing Sample: A fNIRS Study.", ***Brain Sciences*** (2021)
14. **Soongho Park**, Juhyung Lee, Youngguae Kim and Byeong Ha Lee. "Nanometer-Scale Vibration Measurement Using an Optical Quadrature Interferometer based on 3 × 3 Fiber-Optic Coupler.", ***Sensors*** (2020)
15. **Soongho Park**, Sunghwan Rim, Youngguae Kim, and Byeong Ha Lee. "Noncontact photoacoustic imaging based on optical quadrature detection with a multiport interferometer.", ***Optics Letters*** (2019)
16. **Soongho Park**, Sunghwan Rim, Ju Wan Kim, Jinho Park, Ik-Bu Sohn, and Byeong Ha Lee. "Analysis of Design and Fabrication Parameters for Lensed Optical Fibers as Pertinent Probes for Sensing and Imaging.", ***Sensors*** (2018)

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17. Jonghyun Eom, Jun Geun Shin, **Soongho Park**, Sunghwan Rim, and Byeong Ha Lee. "An All-Fiber-Optic Combined System of Noncontact Photoacoustic Tomography and Optical Coherence Tomography.", ***Sensors*** (2016)