Seungyeon Baek

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LinkedIn

Education

Aug. 2023 – Current
Texas Tech University, Lubbock, Texas
Doctor of Philosophy in Electrical Engineering
GPA: 3.50 / 4.0
Course Highlights: Information Theory, Digital Signal Processing

Jan. 2022 – Dec. 2023
Texas Tech University, Lubbock, Texas
Master of Science in Industrial Engineering
GPA: 3.50 / 4.0
Course Highlights: Biomedical Design and Manufacturing, Adv. Cognitive Engineering

Mar. 2019 – Aug. 2021
Hansung University, Seoul, Republic of Korea
Master of Science in Industrial and Management Engineering
Thesis title: A Study on Design Guidelines for Universal Safety
GPA: 4.40 / 4.5
Course Highlights: System Safety Analysis, Work Assessment, Biomechanics, Data Mining

Mar. 2015 – Feb. 2019
Hansung University, Seoul, Republic of Korea
Bachelor of Science in Industrial and Management Engineering & Computer Engineering (Double Major)
GPA: 3.44 / 4.5

Research Interests

Informatics, Decision Making, Recommender System, Biomedical Imaging, Machine learning, Development and Evaluation, Electronic health records systems, Human Factors, Cognition

Leading Projects

Jun. 2023 – Current
"Classification of Cataract disease Types by Various Features"
PI: Jowoon Chong, TTU
- Utilized statistical analysis and machine learning techniques to develop a robust method for the classification of cataract diseases types
- Trained RestNet50 encoder along with various machine learning classification models such as Support Vector Machine (SVM), Extreme Gradient Boosting (XGBoost), Artificial Neural Network and Residual Neural Network (ResNet)

Apr. 2023 – Current
"GeneHub: a Web-based Platform for Clinical Genetic Navigation"
PI: Vasylyeva, Tetyana, TTUHSC, NSF i-corp
- Developed a user-friendly online platform integrating expertise in web programming and UI/UX design, GeneHub consolidates genetic background, clinical features, treatment options, and ongoing clinical trials for various genetic conditions
- Implemented generative AI models to generate informative contents for enhance the platform contents
- To improve the functionality and design of the platform, which was conducted in-depth interviews with healthcare professionals, geneticists, and potential end-users, incorporating their feedback to shape the design and functionality of the platform

Jan. 2022 – Jun. 2023
"Nursing Students' Cognitive Challenges and Efforts during EHR Use"
PI: Sandra, Caballero & Changwon, Son, TTUHSC Sim Center
- Identified specific challenges faced by nursing students using EHR systems in the domains of sensory, perceptual, and motor activity
- Planned experiments and used Hierarchical Task Analysis (HTA) to systematically understand and analyze the cognitive processes involved in EHR usage
- Conducted data collection and risk assessment to identify potential challenges and mitigate issues

Jan. 2022 – Jun. 2023
"A Memory-based Approach to First Incident Responders' Mental Health"
PI: Changwon, Son, TTU
- Investigated the impact of VR exposure on traumatic memories, exploring the extent of the effect and how it varies based on the VR content and level of immersion
- Conducted an extensive literature review to contextualize the research within existing knowledge
- Developed and designed research methodologies and surveys to systematically collect relevant data, establishing the groundwork for thorough analysis

Publications

[1] Vaughn, A., Son, C., **Baek, S.**, Caballero, S., & Decker, S. (2023, October). A Mixed-Methods Approach to Understanding Nursing Students' Cognitive Challenges and Workarounds during EHR-related Tasks. In Proceedings of the Human Factors and Ergonomics Society Annual Meeting (p. 21695067231192633). Sage CA: Los Angeles, CA: SAGE Publications. https://doi.org/10.1177/21695067231192633

[2] Vaughn, A., Son, C., **Baek, S.**, Caballero, S., & Decker, S. (2023). Identifying EHR Novice Users' Cognitive Challenges: Mapping Critical Nursing Tasks Using HTA. In Proceedings of the International Symposium on Human Factors and Ergonomics in Health Care (Vol. 12, No. 1, pp. 24-30). Sage CA: Los Angeles, CA: SAGE Publications. https://doi.org/10.1177/2327857923121007

[3] **Baek, S.**, & Jeong, B. Y. (2021). Universal Safety Design (USD) and Sustainability: Comparison of guidelines between Universal Design (UD) and USD. Applied Sciences, 11(10), 4413. https://doi.org/10.3390/app11104413

[4] **Baek, S.**, Jeong, B. Y. (2020). Universal Safety & Design (USD) Guideline in the Era of an Aged and Sustainable Society. Journal of Ergonomics Society of Korea, 39(4), 303-312.

Papers In Preparation

[1] **Baek, S.**, Sheikhrezaei, K. The Application of DMAIC Model in Genetic Research System, (Draft available)

[2] Son, C., **Baek, S.** Safety II to Safety 4.0: A smart procedure System for Industry 4.0, HFES, (Draft available)

Patents

Baek, S. Y., Fine dust reduction system for bus stops, KR-Application No.10-2020-0085967

Additional Projects

Aug. 2023 – Current
"A Biometric Authentication Technique Using Smartphone Fingertip Photoplethysmography (PPG) Signals" (Manager: Bengie, Ortiz), TTUHSC, NSF i-corp
- Developed a classification method for smart devices that removes Motion and Noise Artifacts (MNA) from the raw PPG signal before identifying a person using the MNA reduced PPG signal.

Jan. 2023 – Current
"Inhalation injury grading using transfer learning based on bronchoscopy images and mechanical ventilation period" (Manager: Jowoon, Chong), TTUHSC
- Utilized CycleGAN to estimate the severity of a burn wound and assist in determining whether surgery should be performed

Jan. 2023 – Aug. 2023
"Identifying of Fashion trend and matching rate using machine learning"
(Manager: Julie, Chang & Jowoon, Chong)
- Developed a solution to help clothing copyrights and make records for personal design history by using machine learning skills.

Jul. 2019 – Dec. 2019
"A Study on the Improvement of Usability of School furniture – Desks and Chairs"
(Manager: ByungYong, Jeong), Korean Agency for Technology and Standards
- Revised the national standard (KS) based on the latest anthropometric results and student health examination data statistics.
- Funded by the National Institute of Technology and Standards

Apr. 2018 – Nov. 2018
"Development of De-Identification Solution for Privacy Protection in Personal Big Data"
(Manager: YeonChul, Cha), Korea Information Secu rity Industry Association
- Presented a solution for protecting personal information by using a web server based on the Spring Framework. The process involves reviewing data, performing de-identification, and evaluating the results according to the established system flow.

Class Projects

- (Total Quality Systems) **"The Application of DMAIC Model in Genetic Research System"**, 2023
- (Human Factor - UI/UX) **"Evaluation and Initial Prototype Design of the Texas Tech University Registration System"**, 2022
- (Advanced Cognitive Engineering) **"Improving Patient Matching in Healthcare Systems by Alleviating Patient Access Representatives Cognitive Workload"**, 2022
- (Data Analytics) **"Analyzing construction accident database to identify which type of accident is caused by which cause, and to find out the correlation between workplace size and accidents"**, 2020

Experience

Jun. 2023– Current
Research Assistant - Texas Tech University
- Biomedical Imaging
- Machine learning

Jan. 2022 – Jun. 2023
Research Assistant & Teaching Assistant- Texas Tech University
- Advanced Cognitive Engineering
- System Safety Engineering

Mar. 2019 – Jul. 2021
Graduate Assistant- Hansung University
- Work Design
- Safety and Health management

Sep. 2018 – Dec. 2018
Intern – Centum Tech
- Data management
- Research and Development assistant

Aug. 2016 – Dec. 2017
Undergraduate Research Assistant- Hansung University
- Big data, Database
- Customer Relationship Management(CRM)

Awards and Honors

- President's Innovative Award ($10,000), Texas Tech University, 2023-2024
- TTU Distinguished Graduate Fellowship, Texas Tech, 2023
- Graduate Scholarship ($10,000), Texas Tech University, 2023
- Best paper award, University Safety Design and Sustainability, Hansung University, 2021
- Bronze prize, Korea Patent Attorneys Association, *Youth Invention Contest*, Hosted by the Korea University Invention Association, 2018

Skills

- Programming: MATLAB, Python, Java, C/C++, HTML5, CS33, SQL, Javascript
- Statistics programs: R, SPSS, STATA, Tableau, PowerBI, Excel
- Languages: Korean, English

Leadership, Outreach and Community service

2022 -2023
- ***Korean Student Association***, Vice President, Texas Tech University
- ***Human Factors and Ergonomics Society(HFES)***, Vice President, Texas Tech University