# HAO-YU (HOWARD) LIAO, Ph.D.

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LinkedIn; G. Scholar; Web of Sci.; ORCID

## RESEARCH INTERESTS

Robotic Remanufacturing, Cyber-Physical Systems, Deep Learning, Human-Robot Collaboration, Manipulation Control, Intelligent Automation, Remote Sensing, AI Applications in Ecosystem Services.

## EDUCATION

**PhD** **University of Florida, Environmental Engineering Sciences** May 2024

- **GPA: 3.97/4.0**
- PhD Dissertation: "Consideration of operator safety and robotic capability in human-robot collaboration for e-waste disassembly: a combination of optimization and artificial intelligence techniques," *University of Florida*. ufdc.ufl.edu/ufe0060572/00001

**Machine Learning Certificate (ECE)** **University of Florida, Department of Electrical & Computer Engineering** May 2023

**MS** **National Taiwan University, Bioenvironmental Systems Engineering** July 2016

- **GPA: 3.93/4.0**
- MS Thesis: "Applying the tabu search to develop an urban flood warning system," *National Taiwan University*. doi.org/10.6342/NTU201601908

**BS** **National United University, Civil and Disaster Prevention Engineering** July 2014

- **GPA: 4.0/4.0**
- BS Independent study: Liao, H.-Y., Wen-Cheng Liu, 2014, "Applying one-dimensional river routing model and artificial neural networks to forecast water stage of the tidal river during typhoons," Supported by the *Ministry of Science and Technology of Taiwan* under grant no. 102-2815-C-239-028-E (in Chinese with English abstract).

**Information System Training Program of Department of Computer Science and Information Engineering, National Taiwan University**

- Data Structure & Advanced C++ Programming (Ref. No. 2950288) 2018
- Advanced JavaScript and Front-End Engineering (Ref. No. 2770167) 2017
- Interactive Data Visualization with D3.js - Basic (Ref. No. 2760167) 2017
- PHP & MYSQL Active Webpages Programming (Ref. No. 2760125) 2017
- Linux (Ref. No. 2770196) 2017
- Python Programming (Ref. No. 2750187) 2016
- HTML5, CSS3, jQuery, Bootstrap - Frontend Web Development (Ref. No. 2750079) 2016

## PUBLICATIONS (scholar.google.com/citations?hl=en&user=cSZdfP8AAAAJ)

**Journal Publications (11)**

J1 **H.-Y. Liao**, P. Terrin, J. R. Petters, and S. Behdad, 2025, "A Disassembly Scoring Framework for Human–Robot Collaboration Based on Robotic Capabilities," *Journal of Mechanical Design*, *147*(6), 062002. doi.org/10.1115/1.4068476 **DFMLC Best Paper Award**

J2 **H.-Y. Liao**, Y. Chen, B. Hu, X. Liang, and S. Behdad, 2025, "Forecasting the Range of Possible Human Hand Movement in Consumer Electronics Disassembly Using Machine Learning," *Journal of Computing and Information Science in Engineering*, *25*(5), p.051001. doi.org/10.1115/1.4067987

J3 **H.-Y. Liao**, Behzad Esmaeilian, S. Behdad, 2024, "Automated evaluation and rating of product repairability using artificial intelligence-based approaches," *Journal of Manufacturing Science and Engineering*, *146*(2), **(IF: 4.0).** doi.org/10.1115/1.4063561

J4 Y. Chen, **H.-Y. Liao**, S. Behdad, B. Hu, 2023, "Human Activity Recognition in an End-Of-Life Consumer Electronics Disassembly Task," *Applied Ergonomics* **(IF: 3.94)**, **Co-first author.** doi.org/10.1016/j.apergo.2023.104090

J5 **H.-Y. Liao**, Y. Chen, B. Hu, and S. Behdad, 2022, "Optimization-Based Disassembly Sequence Planning Under Uncertainty for Human–Robot Collaboration." *Journal of Mechanical Design*, 145(2), 022001. **(IF: 3.441)** doi.org/10.1115/1.4055901

J6 **H.-Y. Liao**, S. Behdad, 2021, "Markov Chain Optimization of Repair and Replacement Decisions of Medical Equipment," *Resources, Conservation and Recycling,* 105609. **(IF: 10.204) Ranking: 5/54** in Engineering, Environmental doi.org/10.1016/j.resconrec.2021.105609

J7 **H.-Y. Liao**, W. Cade, S. Behdad, 2021, "Forecasting Repair and Maintenance Services of Medical Devices Using Support Vector Machine." *Journal of Manufacturing Science and Engineering*, 144(3), 031005. (**IF: 3.033**) doi.org/10.1115/1.4051886

J8 Pan, T.-Y., H.-T. Lin, **H.-Y. Liao**, 2019, "A Data-Driven Probabilistic Rainfall-Inundation Model for Flash-Flood Warnings," Water, 11, 2534. (**IF: 2.524**) doi.org/10.3390/w11122534

J9 **H.-Y. Liao**, T.-Y. Pan, H.-K. Chang, C.-T. Hsieh, J.-S. Lai, Y.-C. Tan and M.-D. Su, 2019, "Using Tabu Search Adjusted with Urban Sewer Flood Simulation to Improve Pluvial Flood Warning Via Rainfall Thresholds," Water, 11, 348. (**IF: 2.524**) doi.org/10.3390/w11020348

J10 Chen, C.-K., M.-J. Chang, H.-K. Chang, **H.-Y. Liao** and Y.-F. Cheng, 2019, "Hourly Streamflow Forecasting for Agriculture Water Supply Using Artificial Neural Network," *Journal of Taiwan Agricultural Engineering*, vol. 65, iss. 3. (in Chinese with English abstract) (EI-Compendex) 10.29974/JTAE.201909_65(3).0006

J11 **H.-Y. Liao**, T.-Y. Pan, Y.-C. Tan, J.-S. Lai and M.-D. Su, 2018, "Applying the Tabu Search to Optimize a Rainfall-Inundation Warning Threshold: Case Studies in Wenshan, Taipei City, and Xindian, New Taipei City," *Journal of Taiwan Agricultural Engineering*, vol. 64, iss. 1. (in Chinese with English abstract) (EI-Compendex) 10.29974/JTAE.201803_64(1).0002

**Book Chapter Publications (2)**

B1 B. Esmaeilian, **H.-Y. Liao**, and S. Behdad, 2025, "Circular Economy through blockchain and Data Analytics." *Blockchain for Good*. CRC Press. 170-188. ISBN 9781032598062. doi.org/10.1201/9781003456346-10

**Peer-Reviewed Full Conference Papers (7)**

P1 **H.-Y. Liao**, P. Terrin, J. R. Petters, and S. Behdad, 2024, "A disassembly score for human-robot collaboration considering robots' capabilities," *ASME 2024 International Design Engineering*

*Technical Conferences and Computers and Information in Engineering Conference, IDETC/CIE*, August 25-18, 2024, Washington, DC, USA. doi.org/10.1115/DETC2024-143517

P2 **H.-Y. Liao**, Y. Chen, B. Hu, X. Liang, and S. Behdad, 2023, "Forecasting the range of possible human hand movement in consumer electronics disassembly using machine learning," *Proceedings of the ASME 2023 18th International Manufacturing Science and Engineering Conference*, June 12-16, 2023, New Brunswick, New Jersey, USA. doi.org/10.1115/MSEC2023-104792

P3 **H.-Y. Liao**, S. Behdad, 2022, "Human Hand Motion Prediction in Disassembly Operations," *ASME 2022 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, IDETC/CIE*, August 14-17, 2022, St. Louis, Missouri, USA. doi.org/10.1115/DETC2022-89967

P4 **H.-Y. Liao**, Y. Chen, B. Hu, S. Behdad, 2022, "Optimization-Based Disassembly Sequence Planning Under Uncertainty for Human-Robot Collaboration," *ASME 2022 17th International Manufacturing Science and Engineering Conference, MSEC*, June 27-July 1, 2022, West Lafayette, Indiana, USA. doi.org/10.1115/MSEC2022-85383

P5 **H.-Y. Liao,** W. Cade, S. Behdad, 2021, "Machine Learning to Predict Medical Devices Repair and Maintenance Needs," *ASME 2021 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, IDETC/CIE 2021*, Aug. 19, 2021, virtual meeting. doi.org/10.1115/DETC2021-71333

P6 S. Hu, X. Zhang, **H.-Y. Liao**, X. Liang, M. Zheng, S. Behdad, 2021, "Deep Learning and Machine Learning Techniques to Classify Electrical and Electronic Equipment," *ASME 2021 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, IDETC/CIE 2021*, Aug. 19, 2021, virtual meeting. doi.org/10.1115/DETC2021-71403

P7 **H.-Y. Liao**, W. Cade, S. Behdad, 2021, "Forecasting Repair and Maintenance Services of Medical Devices Using Support Vector Machine." *Proceedings of the ASME 2021 16th International Manufacturing Science and Engineering Conference, MSEC 2021*, June 21, 2021, virtual meeting. (**Peer-Reviewed Full Paper**) doi.org/10.1115/MSEC2021-63966

**Conference Presentations (17)**

C1 C. Zhao, **H.-Y. Liao**, D. C. Gogineni, C. Koylu 2024, "Mapping Flows of Nature-based Outdoor Recreational Services at Large-scale based on Crowdsourced Data and Multimodal Learning," *A Community on Ecosystem Services (ACES) conference*, Dec. 9-12, 2024, Austin, Texas, USA. conference.ifas.ufl.edu/aces/index.php

C2 **H.-Y. Liao**, C. Zhao, 2024, "Advancing Ecosystem Services Assessment Through Geospatial Artificial Intelligence (GeoAI): A Comprehensive Review and Future Directions," *The Symposium on Spatiotemporal Data Science*, Jul 23-24, 2024, Virginia Tech Research Center, Virginia, VA, USA. stds2024.stcenter.net/index.php/test/#CLT-1-i

C3 **H.-Y. Liao**, S. Behdad, 2023, "An artificial intelligence-based framework to assess product repairability," *2023 Production and Operations Management Society, POMS*, May 25, 2023, Orlando, FL, USA. pomsmeetings.org/conf-2023/documents/Full-Schedule-PDF.pdf

C4 **H.-Y. Liao**, S. Behdad, 2021, "Deep Transfer Learning to Evaluate Product Repairability," *The 2021 INFORMS Annual Meeting*, October 24-27, 2021, Anaheim, CA.

C5 **H.-Y. Liao**, W. Cade, S. Behdad, 2020, "Machine Learning, Frequency Analysis and Markov Chain Model for Analyzing Product Repair and Maintenance Service Decisions," *IDETC/CIE 2020*, virtual meeting, technical presentation. event.asme.org/Events/media/library/resources/idetc-cie/IDETC-Virtual-Technical-Session-Breakdown.pdf

C6 **H.-Y. Liao**, M.-J. Chang, F.-Z. Lee, J.-S. Lai and G.-F. Lin, 2019, "Suspended Sediment Concentration Forecasting at Downstream Water Intake During Reservoir Desilting Operation," *The Conference of 3rd International workshop on Sediment Bypass Tunnels (IWSBT)*, Taipei, Taiwan, April 9-12.

C7 **H.-Y. Liao**, M.-J. Chang, F.-Z. Lee, J.-S. Lai, 2018, "Artificial Intelligences Application on Suspended Sediment Concentration Forecasting," *The Conference of Taiwan Agricultural Engineering*, Kaohsiung, Taiwan, November 9. (in Chinese with English abstract) www.twaes.org.tw/soae/Public/Data/2019052817451967.pdf

C8 Lin, Y.-J., **H.-Y. Liao**, H.-K. Chang, H.-T. Ouyang, J.-S. Lai, B. J.-D. Jou and Y.-C. Tan, 2018, "Application of Time Series Models For Flood Forecasting: A Case Study in Dawulun River," A*sia Oceania Geosciences Society-European Geosciences Union Joint Conference (AOGS-EGU),* Tagaytay, Philippines, February 04-08.

C9 Lin, Y.-J., **H.-Y. Liao**, H.-K. Chang, R.-K. Shang, H.-C. Kuo, J.-S. Lai and Y.-C. Tan, 2017, "A Web-Based Tamsui River Flood Early-Warning System with Correction Of Real-Time Water Stage Using Monitoring Data," *The Conference of American Geophysical Union (AGU)*, New Orleans, American, December 11-15. ui.adsabs.harvard.edu/abs/2017AGUFMNH41A0150L

C10 **H.-Y. Liao**, T.-Y. Pan, Y.-C. Tan, J.-S. Lai and M.-D. Su, 2017, "Analyzing the Impacts of The Cumulative Rainfalls with Different Durations as Disastrous Rainfall Features on Multi-Variable Rainfall-Flood Warning Mechanism," *The Conference of Taiwan Agricultural Engineering*, Kaohsiung, Taiwan, November 8. (in Chinese with English abstract) www.twaes.org.tw/soae/Public/Data/2018030218010943.pdf

C11 Lai, J.-S., H.-K. Chang, **H.-Y. Liao**, Y.-J. Lin and M.-J. Chang, 2017, "Influence of Spatial Precipitation Variability on Flood Inundation Simulation," *The Conference of International Conference on Mesoscale Convective Systems and High-Impact Weather in East Asia (ICMCS-XII)*, Taipei, Taiwan, October 17-20.

C12 Lin, Y.-J., M.-R. Chen, H.-K. Chang, **H.-Y. Liao**, J.-S. Lai and Y.-C. Tan, 2017, "Flood Warning System of Tamsui River Using Ensemble Rainfall Forecasting," *13$^{th}$ APRU Multi-Hazards Research Symposium*, Beijing, China, August 28-29. (English abstract)

C13 **H.-Y. Liao**, R.-K. Shang, H.-K. Chang, J.-S. Lai, S.-C. Lin and Y.-C. Tan, 2017, "Developing the Tamsui River Flood Early-Warning System," *The Conference of Taiwan Geographic Information Society (TGIS)*, Taipei, Taiwan, July 3-4. (Chinese abstract)

C14 **H.-Y. Liao**, T.-Y. Pan, M.-D. Su, M.-C. Hsieh and Y.-C. Tan, 2016, "Optimization of Rainfall Thresholds for A Flood Warning System to Taiwan Urban Areas During Storm Events," *The Conference of European Geophysical Union (EGU)*, Vienna, Austria, April 17-22. ui.adsabs.harvard.edu/abs/2016EGUGA..1810875L

C15 **H.-Y. Liao**, T.-Y. Pan, Y.-C. Tan, M.-C. Hsieh and M.-D. Su, 2015, "Research on Rainfall Threshold for Flood Warning System of Deterministic Algorithm- A Case of Xinzhuang, New Taipei City," *The Conference of Taiwan Agricultural Engineering*, Taipei, Taiwan, October 14. (in Chinese with English abstract) www.twaes.org.tw/soae/Public/Data/2016041518111407.pdf

C16 **H.-Y. Liao**, T.-Y. Pan, Y.-C. Tan, M.-C. Hsieh and M.-D. Su, 2015, "Improvement of Rainfall Thresholds for A Flood Warning System in Taiwan – A Case Study of Xinzhuang Rain Gauge," *The Conference of Federation of Engineering Institutions of Southeast Asia and the Pacific (FEIAP)*, Taipei, Taiwan, July 5-7.

C17 **H.-Y. Liao**, T.-J. Lin, T.-Y. Pan, Y.-C. Tan and M.-C. Hsieh, 2014, "A Study on the Deterministic Algorithm of the Rainfall Threshold for Flood Warning System," *The Conference of Taiwan Agricultural Engineering*, Kaohsiung, Taiwan, October 29. (in Chinese with English abstract) www.twaes.org.tw/soae/Public/Data/2015060214573977.pdf

## HONORS AND AWARDS

**UF Postdoctoral Travel Award,** UF Postdoc Association and Postdoctoral Affairs (UFPDA) 2024

**DFMLC Best Paper Award,** International Design Engineering Technical Conferences (IDECT) 2024

**Florida AWMA Scholarship Award,** Florida Section Air & Waste Management Association (FLAWMA) 2022

**Don Maurer Memorial Scholarship Award,** Department of Environmental Engineering Sciences University of Florida 2022

**MSEC Student Travel Award,** North American Manufacturing Research Conference (NAMRC) and International Manufacturing Science and Engineering Conference (MSEC) 2022

**MSEC Student Travel Award,** NAMRC and MSEC 2021

**International Academic Conferences Scholarship,** Research Center of Climate Change and Sustainable Development, 2018

**International Academic Conferences Scholarship,** Research Center of Climate Change and Sustainable Development 2017

**International Academic Conferences Scholarship,** Ministry of Science and Technology of Taiwan 2016

**Kuo Hsi-Liu Foundation Scholarship,** Kuo Hsi-Liu Foundation 2016

**Chi-Sing Irrigation Association Scholarship,** Chi-Sing Irrigation Association 2015

**College Student Research Scholarship,** Ministry of Science and Technology of Taiwan 2013

**Academic Achievement Award,** National United University 2013

**Academic Achievement Award,** National United University 2011

**Academic Achievement Award,** National United University 2011

## WORK AND RESEARCH EXPERIENCE

**Department of Agronomy, Institute of Food and Agricultural Sciences (IFAS)**, University of Florida

**Post-Doctoral Associate** 2024 to Current

- Develop GeoAI models applied to large-scale remote sensing data and data analysis in Pro ArcGIS for ecosystem change detection and monitoring.
- Apply object detection models such as DeepForest to detect millions of trees for carbon storage evaluation by Kernel Density Estimation (KDE).
- Rescale NAIP 60 cm low-resolution remote-sensing images into 10 cm high-resolution images with SR3 model in large-scale aerial photos.
- Develop the CLIP (Contrastive Language-Image Pretraining) pipeline by zero-shot learning and prompt engineering to identify recreational activities.
- Apply the large foundation models using Gemma-3 and Qwen2.5 with crowd-sourced images to classify recreational images for cultural ecosystem service assessments.

**Green Engineering Technologies for the Community of Tomorrow**, University of Florida

**Graduate Research Assistant** 2020 to 2024

- Project 1: "***FW-HTF-RL*: The Future of Remanufacturing: Human-Robot Collaboration for Disassembly of End-of-Use Products** ". #2026276
  - Developed real-time hand motion forecasting models using ConvLSTM and YOLO for human-robot collaboration in remanufacturing.
  - Developed a new Sequence-based correction (SBC) algorithm with IMU-based deep learning modes such as CNN, LSTM, and GoogLeNet for the human activity recognition system
  - Build GRU, LSTM, and BNN with Monte Carlo Dropout and Bagging algorithm for three-dimensional hand motion (x, y, z) possible movement area on IMU sensors.
  - Proposed an optimization model with the multi-attribute utility function for disassembly sequence planning and work settings in human-robot collaboration.
  - Proposed a disassembly scoring framework considering component weight, shape, size, accessibility, and positioning to evaluate robotic capabilities using UR5e as an example.
  - Analyzed the risk of safety for human operators and wrote academic papers on human-robot collaboration research

- Project 2: "***GOALI*: Data-Driven Remanufacturing: Foundation for Modeling the Impact of Product Middle-of-Life Data on End-of-Life Recovery Decisions**". #2017971
  - Data analysis and life cycle analysis by implementing frequency analysis to evaluate the performance of different healthcare medical devices.
  - Developed the DTMC (Discrete-Time Markov Chain) optimization decision-making model for the medical device in repair or replacement determination, increasing income benefits.

- Developed a repair and maintenance forecasting model using Support Vector Machine in medical devices.
- Build an automated rating system of 111 different brands of smartphone repairability by K-mean clustering and ConvNeXt, GoogLeNet, ResNet, and VGG with an ablation study

**Research Center of Climate Change and Sustainable Development**, National Taiwan University, Taipei, Taiwan
**Research Assistant** 2016 to 2019 Dec.

- Executed the "**Development and Application of Operational Information Platform for Precipitation and Inundation Forecasting to Disaster Reduction**" project.
  - Developed a web-based Tamsui River flood early-warning system by using HTML, CSS3, JavaScript, MySQL, PHP, and Python. Link
  - Developed a web-based Taipei summer storm experiment (TASSE) information system using Google Maps API and 3D visualization by using CesiumJS.
  - Developed Machine learning models (Support Vector Machine, and Back Propagation Neural Network) for forecasting flooding.
  - Validated the accuracy of machine learning models, updated parameters in offline learning, and deployed the models in real-time forecasting combined with IoT technology.
  - Watershed delineation by using QGIS and applying Google Maps API to show real-time information on drainage locations and water level.

**Center for Weather Climate and Disaster Research**, National Taiwan University, Taipei, Taiwan
**Research Assistant** 2014 to 2016

- Executed the "**Service Corps of Disaster Emergency Operation Team of WRA, MOEA**" project.
- Executing the "**Applying Data Driven and Optimization Theory to Build a Fast and Practical Flooding Warning Mechanism**" project.
  - Updated approximately 600 stations of rainfall thresholds monthly by self-coding with MATLAB, which speeds up the renewal process.
  - Wrote report of rainfall thresholds for the Water Resource Agency (WRA).
  - Participated in emergency response personnel in WRA to monitor the warning area that may cause inundation.
  - Developed new data-driven methods for rainfall thresholds in flooding prediciton.

## TEACHING EXPERIENCE

Environmental Engineering Sciences, University of Florida, Gainesville, FL
**Teaching Assistant** 2023
Course: *ENV 4601* **Environmental Resources Management** Syllabus

- Graded assignments.
- Taught undergraduate courses when needed.
- Prepared solutions for each assignment and supervised exams.

Environmental Engineering Sciences, University of Florida, Gainesville, FL
**Guest Lecturer** 2022
Course: *ENV 6932* **System Analysis for Sustainable Design and Lifecycle Decisions** Syllabus

- Presented the lecture for multi-attribute utility function, frequency analysis, and the house of quality (product planning matrix).

Environmental Engineering Sciences, University of Florida, Gainesville, FL
**Guest Lecturer** 2021
Course: *ENV 6932* **Artificial Intelligence and Machine Learning with Engineering Applications**

- Presented the technical modules on supervised learning algorithms and AI-driven decision-making in environmental systems.

Bioenvironmental Systems Engineering**, National Taiwan University**, Taipei, Taiwan
**Teaching Assistant** 2014
Course: Special Topics on Bioenvironmental Systems Engineering

- Graded assignments.
- Assisted invited speakers for each seminar.

## MENTORING EXPERIENCE

- Active Learning Program (ALP) Spring 2025 Intern, University of Florida, 2025
  - Mentored undergraduate students for the project: Bootstrap responsive website development.
- Active Learning Program (ALP) Fall 2024 Intern, University of Florida, 2024
  - Mentored undergraduate students for the projects:
  - Project 1: Perform manual data annotation of urban tree canopy on NAIP aerial images for the regulation service
  - Project 2: Assess the content of Flickr photographs with an image labeling software (i.e., LabelMe) to assign images into different outdoor recreation classes and cross-verify human annotations for cultural service.
- Research project "Leveraging Machine Learning for Accurate Classification of Tennis Skill Levels and Training Phases", 2023-2024
  - Mentored a high school student who was recognized at the symposium for outstanding performance:
    - State Recognition Award in Florida Junior Science and Humanities Symposium (JSHS), 2024
    - First place in the computer science category at the 2024 Alachua County Science Fair, 2024
    - Finalist in the 2024 Florida State Science and Engineering Fair (SSEF), 2024
  - Writing guidance for the machine learning research paper published in the *International Journal of High School Research* (Peer-reviewed full paper). doi.org/10.36838/v7i4.1

## GRANT PROPOSAL WRITING EXPERIENCES

**Technical Writer**, "Collaborative Research: Inclusive and Advanced Learning of Education in Robotics (I-ALERT)", submitted to *NSF RITEL* program, 2024. (NSF, $737,161, PI: Dr. Sara Behdad)

**Technical Writer**, "Advanced Autonomous Solutions for Marine Debris Collection and Recovery", submitted to *NSF TRAILBLAZER* program, 2023. (PI: Dr. Sara Behdad)

**Technical Writer**, "Applying Data Driven and Optimization Theory to Build a Fast and Practical Flooding Warning Mechanism", MOST 104-2625-M-002-017- (in Chinese forms with English report

content), Submitted to National Science and Technology Council (NSTC) Program, Taiwan, Funded 386,000 TWD (Around 12,450 USD), 2016 (PI: Dr. Tsung-Yi Pan)

## SERVICE AND INVOLVEMENT

- **Academic Reviewer**: www.webofscience.com/wos/author/record/KRO-8697-2024.
  - Robotics and Computer-Integrated Manufacturing
  - ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC-CIE)
  - Environmental Monitoring and Assessment
  - Earth Science Informatics
  - Energy, Ecology and Environment
  - The Journal of Supercomputing
  - Scientific Reports
  - Limnology
  - Water
  - Sensors
  - Algorithms
  - Biomimetics
  - Information
  - Data
  - Remote Sensing in Earth Systems Sciences
  - The Journal of Supercomputing
  - Signal, Image and Video Processing

- **Competition Attendance**
  - Binary Prediction with a Rainfall Dataset, 2025 Link (Howard Liao)
    1. Solo ranking **11/4,381 (top 0.25%)**
    2. Building AutoGluon pipeline to predict rainfall events
  - Detect AI vs. Human-Generated Images, 2025 Link (Howard Liao)
    1. Solo ranking **41/554 (top 7%)**
    2. Building PyTorch based deep learning model to detect fake or real images.
  - ESSIE Poster Symposium, 2024 Link
    1. Presented the project "Automated evaluation and rating of product repairability using artificial intelligence-based approaches".
  - ASABE Robotics Student Design Competition, July 9-13, 2023, Omaha, Nebraska, USA
    1 Built URDF file for manipulation by Moveit2 and ROS2.
    2 The manipulation collected cotton from cotton trees.
    3 Social media: x.com/UF_ABE/status/1679172578479599616; Poster: Link

- **Professional Member**
    1 Chi Epsilon (XE).
    2 Kaggle. www.kaggle.com/haoyuliao14116

## INVITED TALKS FOR PRESENTATIONS

- **H.Y. Liao** et al., (2024), Plenary Vision Panel, "Advancing Ecosystem Services Assessment Through Geospatial Artificial Intelligence (GeoAI): A Comprehensive Review and Future Directions," *The*

*Symposium on Spatiotemporal Data Science*, Virginia Tech Research Center, Virginia, VA, USA, July 23.

- **H.Y. Liao** et al., (2023) "Forecasting the range of possible human hand movement in consumer electronics disassembly using machine learning," *MSEC*, Rutgers University, New Brunswick, New Jersey, USA, June 14.
- **H.Y. Liao** et al., (2022) "Human Hand Motion Prediction in Disassembly Operations", *IDETC/CIE*, St. Louis, Missouri, USA, August 16.
- **H.Y. Liao** et al., (2022) "Optimization-based Disassembly Sequence Planning under Uncertainty for Human-Robot Collaboration," *The Future of Human-Robot Partnerships in Remanufacturing Workshop*, Virtual, August 11.
- **H.Y. Liao** et al., (2022) "Optimization-based Disassembly Sequence Planning under Uncertainty for Human-Robot Collaboration," *MSEC*, Purdue University, West Lafayette, Indiana, USA, July 1.
- **H.Y. Liao** et al., (2021) "Machine Learning to Predict Medical Devices Repair and Maintenance Needs," *IDETC/CIE*, Virtual, August 19.
- **H.Y. Liao** et al., (2021) "Forecasting Repair and Maintenance Services of Medical Devices Using Support Vector Machine," *MSEC*, Virtual, June 22.
- **H.Y. Liao** et al., (2020) "Machine Learning, Frequency Analysis and Markov Chain Model for Analyzing Product Repair and Maintenance Service Decisions," *IDETC/CIE*, Virtual, August 17.

## PROFESSIONAL SKILLS

- **Programming:** Python, MATLAB, C++, HTML+CSS+JavaScript, PHP+MySQL
- **AI frameworks:** PyTorch, TensorFlow+Keras, Scikit-learn, OpenCV, Azure ML, cuML, AutoGluon
- **AI platforms:** Hugging Face, Kaggle
- **Cloud & HPC:** HiPerGator HPC, Google Cloud
- **Robotics:** ROS2, Gazebo, Moveit 2, Nav2, UR5e
- **Geospatial tools**: Google Map API, Leaflet, CesiumJS, QGIS, ArcGIS Pro
- **Environmental decision support tools:** Pcswmm 2006, EPA WARM, EPA SWMM
- **Others:** AutoCAD, Linux, Git, Anaconda

## CERTIFICATIONS (Link)

| | |
|---|---|
| Data Parallelism: How to Train Deep Learning Models on Multiple GPUs | 2025 |
| Completed 5-Day Gen AI Intensive | 2025 |
| Machine Learning (ECE) | 2023 |
| Professional Civil Engineer in Taiwan (PE in Civil) (No. 014887) | 2018 |
| Data Structure & Advanced C++ Programming (Ref. No. 2950288) | 2018 |
| Advanced JavaScript and Front-End Engineering (Ref. No. 2770167) | 2017 |
| Interactive Data Visualization with D3.js - Basic (Ref. No. 2760167) | 2017 |
| PHP & MYSQL Active Webpages Programming (Ref. No. 2760125) | 2017 |
| Linux (Ref. No. 2770196) | 2017 |
| Python Programming (Ref. No. 2750187) | 2016 |
| HTML5, CSS3, jQuery, Bootstrap - Frontend Web Development (Ref. No. 2750079) | 2016 |

## PROJECTS & OPEN-SOURCE CONTRIBUTIONS

- **Foundation Models & Multimodal AI:** Built DeepSeek-Janus Pro-based multimodal AI models pipeline for text-image understanding. Link

- **Personal Finance AI Agent:** Developed a generative AI agent via the Gemini model on finance reasoning for sell, buy, and hold actions. Link
- **AI in Autonomous Systems:** Build a reinforcement learning agent using Deep Q-Network to play Connect-X. Link
- **AI-driven Product Repairability Scoring**: Developed ML models for automated repairability assessment. Link
- **Deep Learning for Song Classification**: CNN, GoogLeNet, and ResNet-50 models to classify non-progressive vs. progressive songs. Link
- **Building ML Models to Play Tic Tac Toe:** Implemented various ML models to play against humans. Link
- **Deep Colorization for Grayscale Images:** Built a Fully Convolutional Network (FCN) to transform grayscale images to colorful images. Link
- **Image Semantic Segmentation and Detection for Hard Drive Devices:** Developed models to identify hard drive components with GoogLeNet and ResNet-50 on semantic images via FCN. Link
- **Image Classification of Different Types of Bricks:** Built Edge Histogram Descriptor (EHD to extract each image's features and Probabilistic Generative Classifier (PGC) to classify 4 types of bricks and non-brick objects. Link

## CONTACT REFERENCES

**Dr. Sara Behdad**
Associate Professor, Engineering School of Sustainable Infrastructure & Environment, University of Florida
412 Black Hall, University of Florida, Gainesville, FL, 32611
https://www.essie.ufl.edu/people/name/sara-behdad/
Phone: (352) 294-7547
Email: sarabehdad@ufl.edu

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