Joseph Young

Houston, TX
jy46@rice.edu

Assistant Teaching Professor
Director, Professional Master's Program

Electrical & Computer Engineering
Rice University

Academic & Research Interests

Embedded Systems, Digital Health, Computer Vision.

Education

2018-2020 **Ph.D.**, *Rice University*, Houston, TX
Electrical & Computer Engineering (ECE)
GPA: 3.8/4.0
Thesis Title: *Addressing Indirect Functional Connectivity in Neuroscience via Graphical Information Theory: Causality and Coherence*

2015-2018 **M.S.**, *Rice University*, Houston, TX
Electrical & Computer Engineering (ECE)
Thesis Title: *Information Theoretic Analysis of the Neurophysiology Associated with Visual Task Learning*
GPA: 3.74/4.0

2011-2015 **B.S.**, *North Carolina State University*, Raleigh, NC
Electrical Engineering
GPA: 4.0/4.0 – *summa cum laude*

Positions

2021-Pres **Assistant Teaching Professor**
Director, Professional Master's Program
Department of Electrical & Computer Engineering, Rice University

- Perform innovation in the curricular, professional, and social aspects of the master's in electrical and computer engineering (MECE) program.
- Oversee digital health, computer vision, & computer engineering MECE capstone projects.
- Provide academic advising for MECE students.
- Teach at both the undergraduate & graduate levels.
- Host workshops on Arduinos, printed circuit board (PCB) design, digital health, and machine learning/artificial intelligence.

May-Aug 2017 **Electrical Engineering Intern**, *Sandia National Laboratories*, Albuquerque, NM

- Designed high performance server architecture, which included selecting processors, motherboards, racks, and networking equipment, as well as determining the layout of the server room to allow for proper equipment ventilation.
- Performed SolidWorks modeling of various prototypes, which included background research on equipment specifications and the design of prototypes that would be compatible with such equipment.
- Researched materials suited for space applications, which included intensive study of a number of NASA research documents and culminated in the writing of a document summarizing my findings and recommendations.

May-Jul 2015 **Electrical Engineering Intern**, *RTI International*, Research Triangle Park, NC

- Conducted tear-down analysis of LED lamps from elevated temperature testing. Efforts included identification of key components & determination of major electrical parameters such as board temperature, power consumption, & power factor at the end of tests. Used problem solving & electrical engineering skills to identify failures & determine root cause.

- Developed summary presentation of findings & participated in presentation of findings to Pacific Northwest National Labs (PNNL) & an industry group.
- The work was later assembled into a joint RTI-PNNL publication as part of DOE's Commercially Available LED Product Evaluation and Reporting (CALiPER) series.

Publications & Posters

2024 **Addressing confounds in functional connectivity analyses of calcium imaging** (link)
Dingding Ye*, Charan Santhirasegaran*, Ryan Pai*, Genevera I. Allen, & Joseph Young
2024 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)

2022 **The RISC-V at Rice (RVR) lab: Revamping computer engineering curriculum with RISC-V** (link)
Ray Simar & Joseph Young
RISC-V Summit 2022 (Poster)

2021 **Addressing indirect frequency coupling via partial generalized coherence** (link)
Joseph Young, Ryota Homma, & Behnaam Aazhang
Scientific Reports

2021 **Inferring functional connectivity through graphical directed information** (link)
Joseph Young, Curtis L Neveu, John H Byrne, & Behnaam Aazhang
Journal of Neural Engineering

2020 **Precise measurement of correlations between frequency coupling & visual task performance** (link)
Joseph Young, Valentin Dragoi, & Behnaam Aazhang
Scientific Reports

2019 **Multi-sensory stimuli improve distinguishability of cutaneous haptic cues** (link)
Jennifer Sullivan, Nathan Dunkelberger, Joshua Bradley, Joseph Young, Ali Israr, Frances Lau, Keith Klumb, Freddy Abnousi, & Marcia O'Malley
IEEE Transactions on Haptics

2017 **Understanding and controlling chromaticity shift in LED devices** (link)
J. Lynn Davis, Karmann Mills, Michael Lamvik, Curtis Perkins, Georgiy Bobashev, Joseph Young, Robert Yaga, & Cortina Johnson
RTI International
IEEE EuroSimE 2017 Conference in Dresden, Germany

2016 **CALiPER Report 20.5: Chromaticity shift modes of LED PAR38 lamps operated in steady-state conditions** (link)
J. Lynn Davis, Joseph Young, & Michael Royer
RTI International/U.S. Department of Energy/PNNL PNNL-25201

Teaching (Courses)

ELEC 243 **Electronic measurement systems** (Spr 2021; Co-taught with Dr. Chong Xie)
- Introduction to circuits, signals, systems, and digital signal processing for non-ECE majors.

ELEC 244 **Analog circuits laboratory** (Spr 2024, Spr 2023, Spr 2022, Spr 2021)
- Advanced hands-on circuits class covering diodes, operational amplifiers, and transistors.

ELEC 327 **Implementation of digital systems** (Spr 2024; Co-teaching with Dr. Michael Orchard)
- Fundamentals of microcontrollers, C, and printed circuit board (PCB) design.

ELEC 380 **Introduction to neuroengineering** (Fall 2023; Co-taught with Dr. Guillaume Duret)
- Introduction to quantitative modeling, stimulating, and recording of neural activity. Cross-listed as ELEC 587, BIOE 380, and NEUR 383.

ELEC 424 **Mobile & embedded system** (Fall 2023, Fall 2022, Fall 2021)
- Advanced hands-on software & hardware course focused on Linux kernel and driver development for mobile & embedded system applications in the space of autonomous systems. Cross-listed as ELEC 553 and COMP 424.

ELEC 490 **Undergraduate electrical & computer engineering research projects** (Spr 2023, Fall 2022)
- Research project on functional connectivity within rodent olfactory bulb using calcium recordings intended to be submitted as a conference paper in fall 2023.

ELEC 491 **Autonomous drones** (Spr 2023, Fall 2022)
- Research project on advancing the state of the art in the person re-identification (re-ID) problem within the mobile robotics context.

ELEC 491 **RISC-V at Rice (RVR) lab** (Spr 2023, Fall 2022; Co-taught with Ray Simar)
- Development of a RISC-V microcontroller board and instructions on building a RISC-V microprocessor that can be implemented in an FPGA.

ELEC 491 **Rice electric vehicle** (Spr 2022, Fall 2021; Co-taught with Dr. Gary Woods)
- Vertically Integrated Project (VIP) subteam focused on the development of an autonomous system for an electric vehicle in collaboration with the Rice Electric Vehicle (REV) club.

ELEC 590 **Graduate non-thesis research projects** (Sum 2023, Sum 2022)
- Continuations of RISC-V printed circuit board (PCB) design and autonomous drone MECE capstone projects.

ELEC 594 **MECE capstone project** (Spr 2024, Fall 2023, Spr 2023, Fall 2022, Spr 2022, Fall 2021, Spr 2021)
- Capstone projects for students in the professional master's in electrical and computer engineering (MECE) program. Course was labeled ELEC 590: MECE capstone projects in spring 2021.
- Projects include and/or have included:
    - Multiple-track phonocardiography (PCG) and artificial intelligence (AI) to detect heart anomalies (project sponsor: HealthSeers)
    - Developing an algorithm for urinary tract infection management: Evaluating current hospital practices, predicting urine culture results, and establishing a better practice advisory for antibiotic selection (project sponsor: UTIWizard)
    - Camera-based autonomous drones
    - RISC-V microcontroller printed circuit board (PCB) design
    - RISC-V integrated circuit design
    - Efficient hardware implementation of machine learning
    - Human-assisted robotic system
    - Building 4G/LTE mobile networks on software radio systems
    - Printed circuit board design of class D audio amplifier with feedback
    - Hardware accelerator for SHA-3 cryptography

ELEC 698 **ECE professional master's seminar series** (Spr 2024, Fall 2023, Spr 2023, Fall 2022)
- Seminars from external speakers on technical topics and a sequence of professional development activities.

Teaching (Summer Workshops)

ML/AI 101 **Introduction to ML/AI** (Sum 2023)
- Taught students about machine learning and artificial intelligence across domains.
- Enabled students to go from no programming experience to writing code in PyTorch.
- Was offered in collaboration with the Ion at Genesys Works, an organization focused on helping students in underserved communities.

PATHS-UP **Young scholars program** (Sum 2023, Sum 2022; Co-taught with Christopher Franklin; Link)
- Developed & co-instructed 6-week program focused on empowering underserved populations in the area of digital health. (PATHS-UP: Precise Advanced Technologies and Health Systems for Underserved Populations)
- Students built a DIY smart watch involving a pulse oximeter, pedometer, GPS, and machine learning.
- Students were also taught about Arduinos, basic programming, printed circuit board (PCB) design, and computer vision.

Maker 101 **Printed circuit board (PCB) workshop** (Sum 2021; Co-taught with Dr. Gary Woods & Ray Simar; Link)
- Hosted three separate day-long workshops covering the basics of C, Arduino, breadboards, and printed circuit board (PCB) design targeted to undergraduates of universities around the country.

Research

2022-Pres **Laser-speckle contrast imaging (LSCI) for blood perfusion monitoring**
- Using LSCI for blood perfusion monitoring to help gauge clinical success for revascularization in diabetic patients.
- Developing an embedded system enabling safe non-invasive measurement in a wearable form factor.
- Collaborators: Dr. Ashok Veeraraghavan (Rice) and Dr. Maham Rahimi (Houston Methodist)

2022-Pres **Development and validation of an automated measurement of child screen media use: Flash**
- Leveraging embedded systems to objectively record child screen time.
- FLASH-TV system combines NVIDIA Jetson single-board computer hardware with powerful computer vision algorithms for identification and gaze tracking.
- Collaborators: Dr. Ashok Veeraraghavan (Rice), Dr. Jennette Moreno (Baylor College of Medicine), and Dr. Teresia O'Connor (Baylor College of Medicine)

2023 **Epilepsy monitoring unit (EMU)**
- Focused on developing an advanced data acquisition system to study depression in admitted patients using implanted electrodes and cameras.
- Development centered on system synchronization controlled in software with exploration of future automation options.
- Collaborator: Dr. Sameer Anil Sheth (Baylor College of Medicine)

Skills & Background

Technical Linux kernel including driver development, shell commands and scripting, C, Python, PyTorch, MATLAB, Rust, printed circuit board (PCB) design, LaTeX, VLSI (Xilinx System Generator & Vivado HLS), Verilog, assembly language, R

Cultural Lived in Italy, Puerto Rico, and Ireland

Honors & Activities

2022-Pres Divisional advisor (DA) (engineering division) and faculty associate for Will Rice College
2021-Pres Chair of Master's in Electrical and Computer Engineering (MECE) committee
2024 Mentor for Rice R-STEM PATHS-UP Young Scholars Invent event
2024 Outstanding Faculty Associate Award, Will Rice College, Rice University
2024 Member of iRedefine Faculty Panel on at Electrical and Computer Engineering Department Head Association (ECEDHA) Annual Conference
2024 Awarded NTT Professional Development Travel Grant
2024 Judge for Rice University's Data to Knowledge (D2K) Showcase
2024 RISC-V Student Video contest judge (hosted by RISC-V International)
2024 Member of the 12th IEEE International Conference on Healthcare Informatics (ICHI) Program Committee
2024 Rice Datathon judge
2024 Future City Competition (STEM outreach for middle school students) judge
2023 Created an outreach video for Fort Bend ISD high school teacher's Career Day event
2023 Mentor for Rice R-STEM PATHS-UP Innovator Spotlight event
2023 Member of the 11th IEEE International Conference on Healthcare Informatics (ICHI) Program Committee
2023 Judge for Rice University's Data to Knowledge (D2K) Showcase
2023 Wrote 19 letters of recommendation as a Rice Health Professions Advising Committee (HPAC) member
2023 Graduation marshal for Will Rice College during Rice's undergraduate graduation ceremony
2023 Rice Center for Career Development (CCD) Career Champion Award
2022-2023 Faculty mentor for Rice ELEC 494 senior design team AUTOPARK: Autonomous parking golf cart
2021-2023 Member of ECE's diversity, equity, & inclusion committee
2021-2023 Faculty mentor for autonomous team of Rice Electric Vehicle (REV) club
2022 Judge for Rice University's Data to Knowledge (D2K) Showcase

2022	Invited to and attended Will Rice College's Favorite Professor Dinner
2022	Faculty mentor for ENGI 120/FWIS 188 project PCB Stencil Jig
2022	Oversaw four summer REU (research experiences for undergraduates) students working on the person re-identification (re-ID) problem in computer vision; One student was a Take Flight STEM Pathway program participant
2022	Member of panel on robotics, autonomy, and intelligent systems curriculum at Electrical and Computer Engineering Department Head Association (ECEDHA) Annual Conference
2021-2022	Member of ECEDHA Lab Pros
2021-2022	Faculty mentor for Rice ELEC 494 senior design team AUTOV: Development of a small-scale low-cost autonomous ground vehicle using cameras and low-power computing
2021	Invited to and attended Will Rice College's Favorite Professor Dinner
2021	Judge for Rice University's Data to Knowledge (D2K) Showcase
2021	Member of Innovation in Online Collaboration panel at ECE Lab Pros & ECE Makers Summit (link)
2021	Faculty mentor for ENGI 120/FWIS 188 project Dismount Alert Device
2020-2021	Member of Rice University Committee on Teaching
2018-2020	Graduate Student Liaison for ECE on Center for Teaching Excellence's (CTE) Graduate Advisory Board
2019-2020	VP of Administration for Rice Graduate Student Association
2017-2019	NSF Integrative Graduate Education and Research Traineeship (IGERT) awardee
2017	Rice ECE Distinguished Student Service Award
2009	Eagle Scout Award