

Engineering Research at the University of South Alabama

Chemical and Biomolecular Engineering

Dr. Matthew Confer mpconfer@southalabama.edu

- Label-free infrared spectroscopic imaging of biological and material samples
- Small molecule quantum chemistry
- Environmental toxicology
- Zebrafish animal models
- Amyloid diseases
- Degradation of materials

Dr. Grayson Dennis gpdennis@southalabama.edu

- Unit Operations
- Instrumentation, controls, and process-realistic engineering education
- Computer-aided Process Engineering/Chemical Process Simulations
- Applied CO_2 capture materials
- Ionic liquids and ionic polymers for gas separations
- Additive Manufacturing

Dr. Edris Ebrahimzadeh ebrahimzadeh@southalabama.edu

- Cryogenic carbon capture and natural gas processing
- Dynamic modeling and control of chemical processes
- Process Simulation
- Engineering Education

Dr. Grant Glover glover@southalabama.edu

- Adsorbent materials including metal-organic frameworks (MOFs), carbons, and composites
- Fibers functionalized with nanostructures and quantum dots
- Surface chemistry

Civil, Coastal, and Environmental Engineering

Dr. John Cleary cleary@southalabama.edu

- Post-disaster structural evaluation and investigation
- Forensic analysis, investigation, and evaluation
- Large- and small-scale structural testing (including in-service)
- Construction vibration evaluation and investigation
- Concrete testing, experimentation, and evaluation

Dr. Trung Do trungdo@southalabama.edu

- Hurricane wind, wave, and surge
- Coastal and near-coast structures
- Community resilience and recovery
- Multi-hazard risk assessment and mitigation
- Performance-based design
- Wind turbines and wind energy
- Fatigue and fracture mechanics, fatigue crack propagation
- Structure life estimation
- Bridge engineering

Dr. Samantha Islam sislam@southalabama.edu

- Transportation and infrastructure systems and planning
- Application of econometric and statistical methods to highway/traffic safety, traffic congestion, transportation economics
- Highway safety, application of highway safety manual
- Resilience in transportation systems
- Design and operation of roundabouts
- Application of intelligent transportation systems (ITSs)
- Traffic operations and control
- Hurricane evacuation

Dr. Samantha Islam sislam@southalabama.edu

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Dr. Min-Wook Kang mwkang@southalabama.edu

- Advanced traffic signal operations and congestion management
- Highway safety analysis and countermeasure development
- Artificial Intelligence (AI) in transportation, geometric design, and optimization
- Driver behavior studies: distracted driving, fatigued driving, and dilemma zone
- Highway alignment and location optimization
- Hurricane evacuation

Dr. Rebecca Macdonald rmacdonald@southalabama.edu

- Engineering education

Dr. Stephanie Patch spatch@southalabama.edu

- Coastal community resilience adaptive planning
- Development and evaluation of adaptation strategies to sea-level rise
- Post-disaster structural and geotechnical evaluation
- High-resolution numerical modeling of coastal processes
- Coastal structures and their interaction with morphological changes during tropical cyclones
- Engineering education and citizen science

Dr. Eric Steward esteward@southalabama.edu

- Geotechnical engineering
- Design, analysis, and construction of foundations, slopes, retaining structures
- Load and resistance factor design (LRFD) of deep foundations
- Driven pile setup (freeze) prediction methods

- Soil/structure interaction
- Trenchless pipeline infrastructure installation and rehabilitation techniques
- Retention efforts directly or indirectly related to scholarship and leadership education for first-year engineering students and engineering students transferring from community colleges

Dr. Nigel Temple natemple@southalabama.edu

- Coastal resilience, vulnerability, and adaption
- Nature-based shore protection including living shorelines
- Coastal mapping, monitoring, and measurement studies
- Biological responses to physical processes (e.g., waves)
- Low-cost environmental sensing
- Citizen science, stakeholder-driven coastal research

Dr. Kaushik Venkiteshwaran kvenkiteshwaran@southalabama.edu

- Chemical and biological wastewater treatment
- Advanced oxidation targeting organic contaminant and pathogen destruction
- Developing bio-adsorbents for nutrient recovery and contaminant removal
- Modelling microbial interactions in natural and engineered environments
- Relating microbes to biological process performance
- Developing novel microbial cultures for wastewater treatment

Dr. Kevin White kwhite@southalabama.edu

- Drinking water, wastewater, & storm water treatment
- Constructed wetlands for wastewater and storm water treatment
- Onsite and small-community wastewater technologies and management
- Decentralized wastewater technologies and concepts
- Micro-pollutants (pharmaceuticals, etc.) in wastewater & their treatment
- Low-impact development (storm water management) practices

Dr. Shenghua Wu shenghuawu@southalabama.edu

- Asphalt technology and pavement engineering
- Smart, resilient and green pavement materials characterization and design
- Advanced laboratory characterization for asphalt binders and mixtures
- Pavement recycled materials, rehabilitation and maintenance, and sustainability
- Pavement performance and modeling, mechanistic-empirical pavement design

Electrical and Computer Engineering

Dr. Yousef El-Sharkh yel-shark@southalabama.edu

- Quantum computation and optimization
- Smart grid
- Distributed generation and microgrids
- Renewable and alternative energy systems and virtual power plants
- Integration of renewables with smart grid
- Phasor measurement units and wide area monitoring systems
- Multi-agent systems and distributive control
- Energy storage systems
- Power system planning and control, power quality, and power electronics
- Artificial intelligence (intelligent optimization techniques) in power system problems

Dr. Aurangzeb Khan akhan@southalabama.edu

- Multijunction super high efficiency solar cells (InGaP/GaAs/Ge/Si)
- GaAs/InGaP dual solar cells on low-cost Si and Ge substrates
- Defects in optoelectronic devices
- Microelectronics, design of integrated circuits, low voltage/low power VLSI, RF CMOS, simulation
- Radiation-hard electronic materials; nanostructures, nanoelectronics, solid state sensors for space applications
- Advanced materials for PhotoElectroChemical (PEC) hydrogen production, nanocomposites, carbon nanotubes and nanofibers

Dr. Saeed Latif slatif@southalabama.edu

- Antennas and sensors for biomedical devices
- Large-scale antenna arrays for 5G/6G wireless systems
- Metasurfaces/metamaterials for millimeter wave applications
- Miniaturized antennas for smallsat applications
- Transparent antennas using engineered and low loss materials

Dr. Samuel Russ sruss@southalabama.edu

- Embedded systems, including microprocessor-based design, sensors, nanosatellites, and robotic agriculture

- Consumer electronics including digital video recording and home networking
- Systems engineering for high-volume electronic manufacturing
- Signal integrity, design of high-speed digital systems
- Circuit-board design including high-speed design, design for signal integrity, and circuit-board cybersecurity

Dr. Adel Sakla asakla@southalabama.edu

- Programmable logic devices (PLDs)
- Embedded systems

Dr. Mohamed Shaban mshaban@southalabama.edu

- Signal and image processing for biomedical applications
- Machine and deep learning applications
- Edge AI optimization
- Time-series analysis

Dr. Edmund Spencer espencer@southalabama.edu

- Space plasma physics and space weather
- Instruments for space science and space plasma characterization
- Applied And Computational Electromagnetics
- RF and Analog Electronics

Dr. John W. Steadman jsteadman@southalabama.edu

- Bioengineering
- Medical electronics
- Electronic instrumentation
- Digital electronics
- Microcomputers

Dr. Tom Thomas tthomas@southalabama.edu

- Automated environmental monitoring, including air, water and soil monitoring for contaminants using chromatographic, spectroscopic or optical instrumentation
- Robotics and robotic sensors
- Hyperspectral image processing for target recognition and tracking, environmental monitoring and detection of disease

- Chemical adsorption, absorption and material separation using zeolite-based materials
- Engineering education

Dr. Daniela Touma dtouma@southalabama.edu

- Microgrids, Digital Twins & Intelligent Energy Management
- Renewable Energy Forecasting & Optimization
- Intelligent EV Infrastructure, Vehicle-to-Grid (V2G) & Vehicle-to-Building (V2B)
- Data-Driven Modeling of EV Energy Consumption
- AI-Enabled Wireless Power Transfer & Dynamic EV Charging
- AI/ML, Forecasting, Optimization & Intelligent Control
- Electromagnetic Modeling & Finite Element Method (FEM)
- AI & Emerging Technologies for Active & Team-Based Learning in Engineering Education

Dr. WeiWei Wang weiweiwang@southalabama.edu

- FPGA-Based AI Acceleration, Real-World Deployment of Intelligent Systems
- Edge AI and Intelligent Embedded Systems
- Fast Convolution Algorithms and Optimization, Hardware–Software Co-Design
- VLSI and Integrated Circuit (IC) Design
- Energy-Efficient AI Hardware Architectures
- Semiconductor and Microelectronics Education

Dr. Kolitha Warnakulasooriya kwarnakulasooriya@southalabama.edu

- Nature-Inspired Computing
- Swarm AI Systems and Agentic AI Systems
- Multi-Robot Systems, Swarm Robot Systems
- Safer Intelligence for Robotic/Aerial Robotic applications

Clive Woods clivewoods@southalabama.edu

- Novel microelectronic devices, including optical applications and imaging
- Models of semiconductor avalanching and electronic devices using avalanche breakdown
- Phototransistors and bipolar transistors using III-V semiconductors
- Band-gap engineered devices including multi-quantum-well photodetectors
- Acoustic charge transfer (ACT) devices and their applications

- Surface-acoustic wave (SAW) devices for signal processing
- High-frequency gravitational waves
- Superconducting devices

Dr. Fathi Aldukali (fathi.aldukali@southalabama.edu)

- System Dynamics & Control
- Advanced Linear Control
- Nonlinear & Robust Control: Sliding Mode Control
- State Estimation: Kalman Filter, Extended KF
- Hybrid Impulsive High-Order Sliding Mode Control
- Adaptive Sliding Mode Control (ASMC)

Mechanical, Aerospace and Biomedical Engineering

Dr. Melike Dizbay-Onat monat@southalabama.edu

- Sustainable carbon-based materials
- Environmental remediation
- Biomass and waste valorization
- Advanced porous materials and surface engineering
- Sustainable composites and circular materials
- Materials characterization and structure–property relationships.
- Sustainable manufacturing
- Engineering education
- STEM outreach

Dr. Kuang-Ting Hsiao kthsiao@southalabama.edu

- 3D printing of polymer composites
- Carbon fiber reinforced polymer (CFRP) composites
- Carbon nanofiber *z*-threaded CFRP (ZT-CFRP) multi-scaled composites
- Artificial intelligence in advanced manufacturing
- Void and defect characterization and modeling for polymer composites
- Micro/nano-fluids and suspensions in porous media
- Functionally graded materials
- Rheology, viscous flow, ER/MR fluids
- Transport phenomena in porous media
- Energy storage and harvesting

Dr. Mohammadreza Kamaldar mkamaldar@southalabama.edu

- Dynamic Systems and Control
- Adaptive and Predictive Control
- Robotics
- Mechatronics
- System Identification

Dr. Julia Kar jkar@southalabama.edu

- Medical imaging modalities such as MRI, ECG and Spectroscopy
- Clinical heart failure detection
- Magnetic resonance sequence (contrast, phase, SPAMM, perfusion, DENSE, T1/T2) development

Dr. Kshitij Mall mall@southalabama.edu

- Human and Robotic Entry, Descent, and Landing Systems for Mars Missions
- Analog Astronautics
- Optimal Control
- Space Mission Design
- CubeSat Technology
- Explainable Artificial Intelligence
- Space Systems and Astrophysics-Based Engineering
- Game-Based Mission Engineering involving Mosaic Warfare
- Modern Innovative Engineering Education including Experiential Learning

Dr. Carlos Montalvo cmontalvo@southalabama.edu

- Dynamic simulation coupled with applied estimation of custom made vehicles
- Experimental flight testing to improve the performance of autonomous aerospace vehicles
- Flight dynamics, control and design of unmanned vehicles with a focus on multi-body systems
- Reconfigurable control laws for overactuated systems
- Rocket ascent dynamics and controls
- Tethered aerospace vehicles including electric sails, parafoils and towed systems
- Autonomous surface vessel dynamics and controls for maritime operations

Dr. Anh-Vu Phan vphan@southalabama.edu

- Boundary integral analysis of non-relativistic and relativistic quantum mechanics
- Symmetric Galerkin boundary element method with applications to dynamic fracture mechanics, wave diffraction and moving boundary problems
- Computational biomechanics

Dr. Joseph Richardson jdrichardson@southalabama.edu

- Hypersingular integral equations in heat conduction and stress analysis including fracture mechanics
- Modeling strain gradient elasticity
- Modeling functionally graded materials
- Multipole methods accelerated with fast Fourier transforms
- Airfoil design and modeling
- Delaunay triangulations in representing and simulating random structure
- Nonlinear, unpredictable random number generation
- Ascent debris transport in supersonic flows
- Dynamic modeling of space tethers

Dr. Dhananjay T. Tambe dtambe@southalabama.edu

- Physical laws governing the function of cells, tissues, and organs
- Mechanical characterization of cells, tissues, and organs
- Tools for life sciences researchers and healthcare providers
- Specific biomedical focus areas: lung infection, orthopedic surgery tools and methods, and geriatrics care
- Monolayer stress microscopy and monolayer mechanics
- Creativity-focused activities in engineering education

Dr. Xianzhang Xu xxu@southalabama.edu

- AI for Computational Fluid Dynamics
- Physics-guided Machine Learning
- Unmanned Vehicles Control in Disturbed Environments
- Theoretical and Numerical Unsteady Aerodynamics
- Reduced-order Modeling and Control for Aerospace and Maritime Systems
- Optimal Control

Systems Engineering

Dr. Bhushan Lohar blohar@southalabama.edu

- Artificial intelligence, digital twins and AI agents
- Virtual reality integration
- Space systems engineering
- Mission engineering
- Autonomous Uncrewed Systems (Drones, Rovers, Boats and Submarines)
- Model-based systems engineering, system architectural patterns, system simulation
- Requirements engineering and management
- Requirements integration, verification, validation and testing

Dr. Sean Walker seanwalker@southalabama.edu

- Energy Systems and Alternative Energy Vehicles
- Multiple Criteria Decision Analysis
- Conflict Modeling
- Sociotechnical Systems