Engineering Research at the University of South Alabama

Chemical and Biomolecular Engineering

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

Dr. Silas Leavesley leavesley@southalabama.edu
- Novel biomedical and clinical imaging and detection methods
- Illumination technologies in imaging
- Hyperspectral imaging and analysis
- Microscopy, endoscopy, and small-animal fluorescence imaging

Dr. Brooks Rabideau brabideau@southalabama.edu
- Predicting thermodynamic and transport properties of ionic liquids
- Molecular simulations of biomass dissolution
- Binary adsorption in metal-organic frameworks using molecular simulation
- Yield stress determination using squeezing flow
- Noninvasive imaging of paste extrusion using MRI velocimetry
- Self-assembly of nanoparticle superlattices

Dr. Nicholas Sylvester nsylvest@southalabama.edu
- Microcontinuum fluid mechanics
- Multicomponent adsorption
- Solid-liquid mass transfer

Dr. Christy Wheeler West cwwest@southalabama.edu
- Effects of molecular scale environment on reactive chemical systems
- Behavior of reactive chemical systems
- Synthesis of efficient oxide-supported noble metal catalysts using supercritical fluid deposition
- Novel quaternary ammonium salts for phase-transfer catalysis and metal recovery

Dr. Kevin West kevinwest@southalabama.edu
- Solution chemistry and molecular thermodynamics
- Ionic liquids and supercritical fluids
- Lipidic ionic liquids for separation of nonpolar species
- Supercritical fluids as solvents
- Synthesis methods for components of metal-organic frameworks (MOFs)

Engineering Research at the University of South Alabama
Systems Engineering

Dr. Robert Cloutier rcloutier@southalabama.edu
- Model-based systems engineering
- Model-based engineering
- Digital Thread/Digital Twin
- System Architecture Patterns
- Metaverse for systems engineering
- Graphical concept of operations (CONOPS)

Dr. Kari Lippert klippert@southalabama.edu
- Metaverse for systems engineering
- Systems Engineering

Dr. Bhushan Lohar blohar@southalabama.edu
- Model-based systems engineering, system architectural patterns, system simulation
- Space systems engineering
- Mission engineering
- Product line engineering and feature modeling
- Concept of operations and operational concepts
- Requirements engineering and management
- Requirements integration, verification, validation and testing
- Artificial intelligence and digital twins

Dr. John Usher usher@southalabama.edu
- Systems simulation, modeling and analysis
- Design and analysis of production systems
- Application of artificial intelligence in manufacturing
- Database design and development

Dr. Sean Walker seanwalker@southalabama.edu
- Power-to-Gas for energy storage, utility ancillary services and support of hydrogen vehicle fleets
- Use of Power-to-Gas to generate synthetic natural gas from landfill gas and agricultural biogas
- Use of repurposed electric vehicle (EV) batteries for residential and commercial energy storage
- Applications of game theoretic models to environmental management decision making

Engineering Research at the University of South Alabama
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. Min-Wook Kang mwkang@southalabama.edu

- Advanced traffic operations and congestion management
- Highway safety analysis and modeling
- Artificial Intelligence (AI) in transportation, geometric design, and optimization
- Driver behavior studies: distracted driving, fatigued driving, and dilemma zone

Dr. Rebecca Macdonald rmacdonald@southalabama.edu

- Engineering education

Dr. Husam Omar omarh@southalabama.edu

- Durability of reinforced concrete structures
- Behavior of structures subjected to extreme wind forces
- Computer modeling of linear and non-linear structures
- Modeling of space and lunar structures

Dr. Stephanie Patch spatch@southalabama.edu

- Coastal community resiliency
- 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

Continued…

Engineering Research at the University of South Alabama

Civil, Coastal, and Environmental Engineering continued…

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. Bret Webb bwebb@southalabama.edu
- Coastal resilience, vulnerability, and adaptation
- Highways and bridges in the coastal environment
- Natural hazards including coastal storms and sea level rise
- Nature-based shore protection including living shorelines
- Coastal mapping, monitoring, and measurement studies

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

Engineering Research at the University of South Alabama
Electrical and Computer Engineering

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

- Smart grid
- Distributed generation
- 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. Na Gong nagong@southalabama.edu

- Artificial Intelligence (AI) technology
- Intelligent data-enabled computing circuits and systems
- Viewer-aware mobile systems
- Multi-level (device/circuit/architecture/application) efficient and privacy-preserving VLSI circuits and systems
- Energy-efficient computing
- Memory systems for video, vision, and deep learning
- Neuromorphic computing
- Embedded vision

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. Hulya Kirkici hkirkici@southalabama.edu

- Electrical insulation
- Pulsed power engineering
- Breakdown characteristics of dielectrics
- Compact plasma switches
- Pulsed plasmas
- Laser and lidar systems

Dr. Saeed Latif slatif@southalabama.edu

- Antennas and sensors for biomedical devices
- Large-scale antenna arrays for 4G/5G wireless systems
- Metasurfaces for millimeter wave applications
- Miniaturized antennas for satellite applications
- Antennas for radar detection and biomedical imaging
- Antenna concepts 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

Continued...

Engineering Research at the University of South Alabama

Electrical and Computer Engineering continued…

Dr. Mohamed Shaban mshaban@southalabama.edu
- Signal and image processing for biomedical applications
- Machine and deep learning applications
- Edge AI optimization

Dr. Edmund Spencer espencer@southalabama.edu
- Space plasma physics and space weather
- Instruments for space science and space plasma characterization
- Interaction of solar wind with the earth's magnetosphere

Dr. John W. Steadman jsteadman@southalabama.edu
- Bioengineering
- Medical electronics
- Electronic instrumentation
- Environmental monitoring
- 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
- Wireless power transfer (WPT), inductive power transfer (IPT), transcutaneous energy transmission (TET)
- Simulation of electromagnetic effects by finite element method (FEM)
- Optimization methods, including single-objective and multi-objective algorithms, and artificial intelligence in power systems
- Smart grids, including renewable energy, microgrids, energy management systems (EMS), and vehicle-to-grid (V2G)

Dr. JinHui Wang jwang@southalabama.edu
- Artificial Intelligence (AI) technology
- Very-large-scale integration (VLSI) circuits and systems
- Three-dimensional integrated-circuit (3D IC) design
- Neuromorphic computing hardware based on CMOS and emerging devices
- Hardware-enabled privacy preserving in cyber security
- Novel memory design including SRAM and DRAM
- Non-volatile memories based on emerging devices such as memristors
- Cooling techniques for electronic devices
- Wireless sensor networks and Internet of Things (IoT)
- Electronic subsystems for Unmanned Aerial Vehicles (UAVs)

Dr. 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

Engineering Research at the University of South Alabama

William B. Burnsed Jr. Department of Mechanical, Aerospace and Biomedical Engineering

Dr. Lanier S. Cauley lcauley@southalabama.edu
- Thermodynamics

Dr. Melike Dizbay-Onat monat@southalabama.edu
- Natural fiber derived activated carbons
- Physical and chemical activation methods
- Physical adsorption
- Porous materials
- Bio-based composites
- 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. 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. Carlos Montalvo cmontalvo@southalabama.edu
- Dynamic simulation coupled with applied estimation of custom made aircraft
- Experimental flight testing to improve the performance of autonomous aerospace vehicles
- Flight dynamics, control and design of unmanned aerial vehicles with a focus on multi-body systems
- Reconfigurable control laws for multirotor vehicles
- Rocket ascent dynamics and controls
- Tethered aerospace vehicles including electric sails and parafoils

Dr. David A. Nelson danelson@southalabama.edu
- Human thermoregulation and thermoregulation modeling
- Biological effects of non-ionizing radiation
- Medical device design
- Heat transfer enhancement

Dr. Anh-Vu Phan vphan@southalabama.edu
- Symmetric Galerkin boundary element method with applications to dynamic fracture mechanics, wave diffraction and moving boundary problems
- Computational biomechanics

Continued...

Engineering Research at the University of South Alabama

William B. Burnsed Jr. Department of Mechanical, Aerospace and Biomedical Engineering continued…

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
- Monolayer stress microscopy and monolayer mechanics
- Creativity-focused activities in engineering education