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. Carl Knopf** cknopf@southalabama.edu
- Computer-aided process design
- Supercritical fluid processing
- Piston-driven/oscillatory mixing

**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. 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

**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
- Graphical concept of operations (CONOPS)

Dr. Henry Lester hlester@southalabama.edu
- Systems modeling, analysis, and optimization
- Complex operational infrastructure and management systems and processes
- Systems vulnerable to disruptions

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
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. 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 (ITRs)
- 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
- Construction management
- Forensic engineering

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. Arka Pandit apandit@southalabama.edu
- Sustainability of complex-adaptive systems
- Resilience of interconnected urban infrastructure systems
- Novel material development for nutrient removal and recovery
- Use of adsorptive nanoparticles for wastewater treatment
- Infrastructure design under ‘new normal’
- Application of ‘infrastructure ecology’ principles for adaptive urban systems

Dr. Stephanie Smallegan ssmallegan@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
Engineering Research at the University of South Alabama

Civil, Coastal, and Environmental Engineering continued...

**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
- 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. Georgios Lazarou glazarou@southalabama.edu
- Wireless and wired network and next generation internet technologies
- Development of network and cloud management and monitoring software systems
- Network and future internet architectures
- Dynamic and adaptable protocols and algorithms
- Statistical modeling
- Simulation of network and intelligent automated systems based on machine learning and pattern recognition

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
Engineering Research at the University of South Alabama

Electrical and Computer Engineering continued...

Dr. Adel Sakla asakla@southalabama.edu
- Programmable logic devices (PLDs)
- Embedded systems

Dr. Mohamed Shaban mshaban@southalabama.edu
- Image processing for medical applications
- Digital signal analysis for electroencephalography
- Machine and deep learning applications
- Internet of medical things

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) by inductive link
- Transcutaneous energy transmission (TET)
- Simulation of electromagnetic effects by finite element method (FEM)
- Optimization methods, including multi-objective and single-objective algorithms
- Smart Grids
- System automation with programmable logic controllers (PLCs)

Dr. JinHui Wang jwang@southalabama.edu
- 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 avalanche 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. Hee Seok Kim hkim@southalabama.edu
- Solid-state energy harvesting materials and systems
- Electron and phonon transport phenomena in semiconducting materials
- Bridging the gap between materials and device technologies in thermoelectrics
- Flexible biocompatible power management systems
- Wearable hybrid electronics for human health monitoring

Dr. Richard Kramer rkramer@southalabama.edu
- Formulation of low temperature solid propellants for long-term residence on Mars
- Formulation of liquid and hybrid rocket engine power cycles
- Analytical estimation of aerodynamic coefficients for supersonic vehicles
- Analysis of combustion in liquid, solid and hybrid rocket engines
- Conceptual design of throttleable solid rocket motors
- Conceptual design of advanced chemical, electric and nuclear propulsion systems
- Conceptual design of scramjet, detonation wave ramjet, and combined cycle engines
- System engineering of interceptor missiles and launch vehicles

Dr. Todd Lillian toddlillian@southalabama.edu
- Modeling, simulation, and reconstruction of DNA including supercoil dynamics and looping mechanics
- Compliant mechanism (or flexure) design and analysis
Engineering Research at the University of South Alabama
William B. Burnsed Jr. Department of Mechanical, Aerospace and Biomedical Engineering continued...

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

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 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
- Creativity-focused activities in engineering education