CAIT was established in December 1999 to conduct advanced computer modeling & simulation and apply modern remote sensing & spatial technologies for enhancing infrastructure asset management and sustainable development with emphasis on surface transportation, aviation, energy & community.

**Mission**

The primary mission of the Center is to develop and implement advanced computer simulations and remote sensing technologies for building longer lasting airfield and highway pavements and intermodal facilities, monitoring and preserving the transportation infrastructure, and developing cost-effective solutions to the stated mission, which has national importance.

The center will accomplish the mission primarily by conducting research on projects of national significance in the areas of transportation infrastructure and national security using advanced computer simulations, airborne laser mapping and spaceborne satellite imagery for preserving the health of the nation's transportation infrastructure assets and ensuring security.

**Research Areas**

- Airborne and spaceborne remote sensing, spatial technologies, and 3D visualization expertise for transportation planning and environmental applications
- Transportation corridor assessment and sustainable community development
- Intelligent Transportation Systems (ITS) technologies to improve public safety
- Advanced finite element modeling and simulation of transportation structures, high performance materials, asset management
- Highway safety audits, roadside safety structure evaluation, crash simulation
- Nondestructive evaluation and finite element dynamic analysis, mechanistic pavement analysis and design, pavement management
- Aviation safety and security studies

**Innovation in Technology, Computer Modeling, Materials, Methods**

**Innovation in Transportation Safety, Efficiency, Security, Simulation**

**Innovation in Remote Sensing and Spatial Technologies, 3-D Visualization**

- Transportation Safety Analysis
  Vehicle crash simulations, 3-D modeling of airport obstruction space & approach surface

- Material Characterization and Modeling
  - In situ nondestructive evaluation (NDE) for structure and material characterization
  - Modern asphalt, rubber-modified asphalt, and polymer characterization laboratory facilities (Superpave binder testing equipment and mix gyratory compactor equipment, Gyratory Testing Machine, CoreLok specific gravity device, environmentally controlled asphalt dynamic testing machine)
  - Micromechanical analysis of hot mix asphalt mixtures and polymeric matrix composites

- Infrastructure Assets – Preservation, improvement, safety, and security needs
I-55 Study Result: Modified binder sections outperformed control asphalt section

Airport & Highway Pavements and Bridge Assets
1999-2004 Sponsors: Mississippi DOT, U.S. Department of Transportation (DOT) Federal Highway Administration, iBSi

Pavement nondestructive testing and evaluation by falling weight deflectometer (FWD), Ground Penetrating Radar, Thermal Infrared Imaging, and three dimensional-finite element (3D-FE) computer simulations; subgrade soil evaluation using dynamic cone penetrometer (DCP)

ITS Technologies
Assisted City of Oxford for high accuracy GPS markers and terrain mapping/GIS workplan related to the $1.5 million ITS project, Mississippi, 2001

Remote Sensing for Environmental Assessment
2000-2004 Transportation related air quality analysis project sponsored by U.S. DOT Research and Special Programs Administration/ Mississippi State University

Remote Sensing and Geospatial Technologies for Corridor Assessment

Remote Sensing for Landuse and Transportation/Urban Planning
Automated surface and landuse mapping from high resolution satellite imagery

Funding Support to UM Students
– 2 PhD, 4 MS (completed), 7 other MS & 12 BS students

Research & Professional Collaboration
- University/industry collaboration: Roger King (Director NCRST-E, Mississippi State University), Ray Brown (Director NCAT, Auburn university, Alabama), Tulio Sulbaran (Univ of Southern Mississippi), Ivory Williams (Jackson State University), WEI, Jackson, Mississippi, SimWright, Inc.–Florida.
- International collaboration: Mackenzie University, São Paulo, Brazil; ABPv – Brazilian Pavement Association; Trieste University and Pisa University, Italy; University of Minho, Portugal; Tokyo Denki University, Japan; PROGRESSTECH, Russia; Ulster University, Belfast, Northern Ireland
- Co-sponsor: International Conference series on Maintenance and Rehabilitation of Pavements and Technological Control; Second (July 29-August 1, 2001, Auburn, Alabama, USA); Third (July 7-10, 2003, Guimarães, Portugal); Fourth (August 18-20, 2005, Belfast, Northern Ireland); 2005 Recycling Conference, São Paulo, Brazil; 2005 Environment Conference on Sustainable Transportation in Developing Countries, Abu Dhabi; 2006 Airports Conference, São Paulo, Brazil.

CAIT Remote Sensing and Geospatial Data Analysis Laboratory
Intergraph Registered Research Laboratory
3-D Visualization and Terrain Modeling Facility

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