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.

### 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

### Remote Sensing for Environmental Studies and Disaster Impact Assessment

- 2000-2004 Transportation related air quality analysis project sponsored by U.S. DOT / Mississippi State University

### Remote Sensing and Geospatial Technologies for Corridor Assessment; Landuse and Urban Planning

- Automated surface and landuse mapping from high resolution satellite imagery; 2007-2010 Pakistan-USAID transportation project

### Transportation Safety Analysis

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

### ITS Technologies, Traffic Management

- 2001 Assisted City of Oxford for high accuracy GPS markers and terrain mapping/GIS workplan related to the $1.5 million ITS project, Mississippi.
- 2007-2010 Pakistan-USAID ITS-based traffic management project, Karachi, $94,000

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CAIT Remote Sensing and Geospatial Data Analysis Laboratory
Intergraph Registered Research Laboratory
GIS, 3D Visualization and Terrain Modeling
Infrastructure Assets – Preservation, improvement, safety, and security needs

Airport, Highway, and Bridge Assets

- 1999-2006 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 (GPR), Thermal Infrared Imaging, and three dimensional-finite element (3D-FE) computer simulations; subgrade soil evaluation using dynamic cone penetrometer (DCP)

Material Characterization and Modeling

- In situ nondestructive evaluation (NDE) for structure and material characterization
- Modern asphalt, modified asphalt, and polymer characterization laboratory facilities
- Superpave performance grade binder testing equipment
- Mix gyratory compactor equipment, Gyratory Testing Machine
- Environmentally controlled asphalt dynamic testing machine
- Micromechanical analysis of hot mix asphalt mixtures and polymeric matrix composites
- Waste and byproducts of tire rubber and coal tar in asphalt highways and roads
- Asphalt pavement design, performance modeling, and maintenance management

Superpave Asphalt Equipment

- Asphalt Binder Test Equipment
- Asphalt Mixing and Dynamic Test Equipment
- Fumehood and Test Accessories

Asphalt Mix Test Equipment

- Gyration Testing Machine
- Superpave Gyration Compactor
- Asphalt Dynamic Testing Machine (FHWA Grant)
- Other Tests: Resilient Modulus, Indirect Tensile Strength, Creep Compliance, and Fatigue Tests

Funding Support to UM Students – 2 PhD, 4 MS (completed), 9 other MS & 18 UG students; currently 2 PhD, 3 MS, and 6 Other UG students

Collaborator in Road Research –

Dr. Wei-Yin Chen, Professor of Chemical Engineering, University of Mississippi (Clean Coal Combustion and Tar Application Adviser to CAIT)

Dr. João Merighi, Professor of Roads and Airports, Mackenzie University, São Paulo, Brazil

Dr. Mir Shabbar Ali, Professor of Civil Engineering, Chair of Infrastructure and Urban Planning, NED University, Karachi, Pakistan

Professional Collaboration

IJP – International Journal of Pavements, 2002-
iSMARTi – international Society for Maintenance And Rehabilitation of Transport infrastructure, 2005

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); Fifth (July 2007, Park City, Utah); Sixth (July 2009, Torino, Italy)

2005 Recycling Conference, São Paulo, Brazil;
2005 Environment Conference on Sustainable Transportation in Developing Countries, Abu Dhabi;
2006 Airports Conference, São Paulo, Brazil;
2007 Pavements conference, Thessoliniki, Greece;
2008 International Conference on Sustainable Transport Infrastructure, April 24-26, Beijing, China;
2008 Global Warming and Air Quality Workshop, July 12, Karachi (sponsored by NED University and CAIT in cooperation with Pakistan Higher Education Commission and USAID).

CAIT Founder and Director: Professor Waheed Uddin
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