NTC@Maryland is one of the five National Transportation Centers funded by the U.S. Department of Transportation (USDOT) and managed by its Office of the Assistant Secretary for Research and Technology, with additional funding support from state and local entities.

Center Theme: Strategic Transportation Policies, Investments and Decisions for Economic Competitiveness

Research Focus Areas Include:

1. Freight efficiency for domestic shipping and for our international land, air, and sea ports;
2. Highway congestion mitigation with multi-modal strategies; and
3. Smart investments in intercity passenger travel facilities such as high speed rail.

Education, Outreach and Technology Transfer:

1. Education, workforce development, and diversity;
2. Outreach, training, conference and T2 activities.

Research Thrusts at NTC@Maryland

- Congestion Mitigation
- Transportation and Economic Development
- Transportation System Safety and Security
- Emergency Preparedness
- Urban Development and Sustainability

NTC@Maryland Director

Dr. Lei Zhang

"With the resources this new Center brings and the support from our university and community, we will further strengthen the role of our transportation program as an international leader in promoting economic competitiveness."

NTC@UMD Consortium Impact

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<td>External Partners</td>
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Praise for NTC@Maryland

"I congratulate the University of Maryland on being selected to lead a new National Center...and given their excellent civil and environmental engineering transportation program, I’m confident the University is strongly positioned to lead the consortium."

-Congressman Steny Hoyer

"With the growing volume of traffic, an aging infrastructure and a need for smarter, more seamless movement of freight, this new UMD-led center will offer informed guidance on how best to invest precious transportation dollars. I am very proud that our engineering expertise and leadership has been recognized in this tangible way."

- Dr. Wallace Loh

President, University of Maryland
Economic Development refers to the actions for creating conditions for economic growth.

**How does transportation effect the economy?**

1. **Movement of People**
   - The average American spends 38 hours in traffic delay.
   - In Washington, D.C. the average driver spends 67 hours in traffic delay.

2. **Movement of Goods**
   - Demand for freight movement will nearly double from 2005 to 2035. Most will be moved by trucks.

3. **Transportation Demand and Investment**
   - Impacted by available modes and associated costs.
   - Funded by:
     1. Fares
     2. Fuel Taxes
     3. Tolls…

**Relation to Economic Competitiveness**

**Related Work at NTC@Maryland**

Effectiveness and Equity of future transportation Financing Options at the Federal and State Levels

U.S. National and Inter-Regional Travel Demand Analysis: Person-Level Micro-Simulation Model and Application to High-Speed Rail Demand Forecasting

Revenue Management and Operations Optimization for High Speed Rail

Impact of Highway Investment on the Economy and Employment across U.S. Industrial Sectors

Modeling Vehicle Ownership Decisions for the State of Maryland
Congestion Mitigation

Relation to Economic Competitiveness

Economic Costs of Congestion
National: $121 Billion, $818 per commuter

State of Maryland:
The metropolitan Washington, D.C. region ranked as the most congested city in the US in 2011.

Congestion Mitigation Strategies

Connected and Automated Vehicles

Active/Integrated Traffic Management
• Advanced Traffic Signal Control
• Variable Speed Limits
• Managed Lanes
• Traveler Information Systems

Demand Management Strategies
• Tele-Working and New Technology
• Flexible Work Hours
• Car-pooling
• Increased Public Transportation
• Dynamic Tolling

Related Work at NTC@Maryland

Quantifying the Cost Effectiveness of Freeway Service Patrol Programs

Integration of Variable Speed Control and Travel Time Information to Minimize Recurrent Highway Congestion

HOV Lane Performance Monitoring System

Data Collection of Freeway Travel Time Ground Truth with Bluetooth Sensors

Integrated Management of Maintenance and Traffic
Improved Safety

**Relation to Economic Competitiveness**

In the US, motor vehicle crashes cost $871 billion annually in economic losses and societal harm.

![Image of a damaged car]

NHTSA 2010 Motor Vehicle Crash Unit Costs
- Property Damage Only: $3,900
- Minor Injury: $2,800
- Moderate-Critical Injury: $2,800-1.1 Million
- Fatal Injury: $1.4 Million

**Research Focus Areas**

**Human Factors**
- Seatbelt Use
- Impaired Driving
- Older Drivers
- Teen Drivers
- Distracted Driving
- Ped/Bike Safety

**Infrastructure**
- Intersections
- Rural Highways
- Urban Freeways
- Traffic Incident Management
- Work Zone

**Vehicles**
- Advanced Warning Systems
- Connected Vehicles
- Automated Vehicles

**Related Work at NTC@Maryland**

Design and Implementation of a Detection, Control, and Warning System (DCWS) for Dilemma Zone Applications

![Image of traffic lights]

Simulation-Based Secondary Incident Filtering Method

Effects of Automated Speed Enforcement in Maryland Work Zones

![Image of a white car on a road]

Evaluating the Integration of Variable Speed Control with Ramp Metering from the Traffic Safety Perspective

![Image of a traffic sign and road signs]
Emergency Preparedness

Relation to Economic Competitiveness

Emergency events can disrupt local, national, and international economies

Hurricane Katrina Impact:
1. $96-125 Billion in damages
2. Total economic impact of $250 billion
3. In 2005,
   - US 3rd quarter GDP was 3.8%
   - US 4th quarter GDP was 1.3%

Mass evacuations require:
1. Multi-modal evacuation advanced planning
2. Plan for returning the transportation network back to normal operation

Evacuation preparation for foreseen and unforeseen events

- Foreseen Events:
  Hurricane or Blizzard
  Allows for road closures, advanced warning and communication

- Unforeseen Events:
  Terrorist Attack, Earthquake
  On the fly evacuation with little or no warning

Related Work at NTC@Maryland

Optimal Scheduling of Evacuation Operations

An Integrated Multi-Modal Emergency Evacuation System for the Baltimore Metropolitan Area

Improving Traffic Signal Timing for Evacuation

A Region-Wide Evacuation & Traffic Monitoring System (I-495/I-95)
Freight Efficiency

Relation to Economic Competitiveness

The efficient and timely delivery of goods drives economic performance.

Freight Delay Costs:
National:
• 4.2 Billion of delay per year
• 2.9 Billion gallons of excess fuel
• Total cost of $78 Billion (TTI)

State of Maryland:
The total cost of freight delay on Maryland’s Primary Trucking Routes was $172.4 Million in 2013

Freight Congestion Costs on Maryland’s Freeway/Expressways

Efficiency and Reliability in Freight Transportation Systems

Dynamic Decision Making for Less-Than-Truckload Trucking Operations

Transfer Coordination in Intermodal Freight Transportation Systems

Economic Impact Study of Intercounty Connector: Logistics and Freight Impact Assessment

Ex-Post Value for Money Analysis of Public Private Partnerships in Freight Transportation Infrastructure

Freight Research Areas:

• Inter-Modal Exchanges and Logistics
• Efficiency of Port Operations
• Federal Regulations
• Truck Rest Stops
• Truck Safety
• Travel Time Reliability
• Freight impact on the economy
Relation to Economic Competitiveness
Inefficient land development has produced negative impact on the environment, economy, and quality of life. NTC@Maryland conducts research to promote sustainable transportation modes, green transportation system improvement, and environmentally-friendly new technologies.

Research Areas:
- Most efficient use of existing infrastructure for meeting travel needs
- Improved transit services
- Car sharing
- Mixed-use land development
- Promoting bicycle friendly land use and biking facilities
- Walkable communities
- Electric and alternative-fuel vehicles
- Car/van-pooling incentives
- Parking management
- Bike sharing
- Transit-oriented development
- High speed rail and reduction of carbon footprint for long-distance trips
- Travel behavior and user adoption of green transportation options
- Regulation and policy analysis

Related Work at NTC@Maryland
No More Freeways:
Urban Land Use-Transportation-Environment Dynamics without Freeway Capacity Expansion

Quantification of System-wide Life Cycle Benefits of Recycled Materials in Highways

Feasibility and Benefit of an Activity-Based Travel Demand Model for Maryland

Integration of Fixed and Flexible-Route Public Transportation Services
Within the NTC@Maryland Consortium, three universities have been recognized by U.S. Department of Education for promoting diversity:

- Arizona State: Hispanic
- University of Maryland: Asian and Pacific Islander
- Morgan State University: African American

NTC@Maryland regularly sponsors research and T2 seminar series to provide learning opportunity to our students and the community.

### Course Offerings and Degree Programs

<table>
<thead>
<tr>
<th>University</th>
<th>Faculty</th>
<th>Research Staff</th>
<th># Degree-granting programs</th>
<th># Transportation Course</th>
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<td>ODU</td>
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<td>UNO</td>
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<td>LSU</td>
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<tr>
<td>Total</td>
<td>103</td>
<td>69</td>
<td>34</td>
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</tr>
</tbody>
</table>

### Career Placement of Our Students

<table>
<thead>
<tr>
<th>Government</th>
<th>Industry</th>
<th>Academia/Research</th>
</tr>
</thead>
</table>

### Diversity

- Arizona State: Hispanic
- University of Maryland: Asian and Pacific Islander
- Morgan State University: African American

### Student Achievements

2014 NTC@Maryland Student of the Year
Mr. Mark Franz (accepting his award at TRB 2014)

Our students have won many prestigious award such as:
- TRB Fred Burggraf Young Research Award
- ARTBA Future Leader Award
- ITS Scholarship and Best Paper Awards
- IRF Outstanding Student Achievement Award
- TRF Best Student Paper Award
- NSF Graduate Student Fellowship Award
- Eisenhower Graduate Fellowship Award
- Best MS Thesis and PhD Dissertation Awards from various Professional Organizations.
- Etc.
Outreach & Technology Transfer

Conference/Workshop Participation, Organization, and Sponsorship

- Organizer and Host of the 2014 TRB Innovations in Travel Modeling Conference in Baltimore, MD
- Sponsor of the 2014 International Transportation and Economic Development Conference
- Maryland Quality Initiative Conference
- Transportation Research Board Annual Conference
- Intelligent Transportation System World Congress, and many more…

Community Involvement

- Science Fair at Imagine Andrews Public Charter School (In picture: a young future engineer)
- Development of Emergency Evacuation Plan at
- Mentoring High School Students (In picture: 4 mentees from Charles Flower High at their research presentation event)

Technology Transfer

The NTC@Maryland actively promotes workforce development and technology transfer by supporting:

- Field Tours of Transportation Facilities and Research Labs
- Seminar and Webinar Series
- National Freight Academy
- National Operations Academy
- International Collaborations, etc.

Real-World Transportation Solutions Adopted by Agencies & Community

Ocean City Travel Time Prediction System

Comprehensive Highway Corridor Planning Tool for Maryland SHA

Design & Evaluation of a Dynamic Dilemma Zone Protection System for a High Speed Rural Intersection