

Mitigating Road Congestion: An Overview



**SIRIPHONG (TOI) LAWPHONGPANICH
INDUSTRIAL AND SYSTEMS ENGINEERING
UNIVERSITY OF FLORIDA
GAINESVILLE, FLORIDA 32611**

Outline

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- **Background**
 - Types of road congestion
 - Road congestion in the U.S.
- **Strategies for congestion mitigation**
 - Demand Management
 - Supply Management
 - Other

Background

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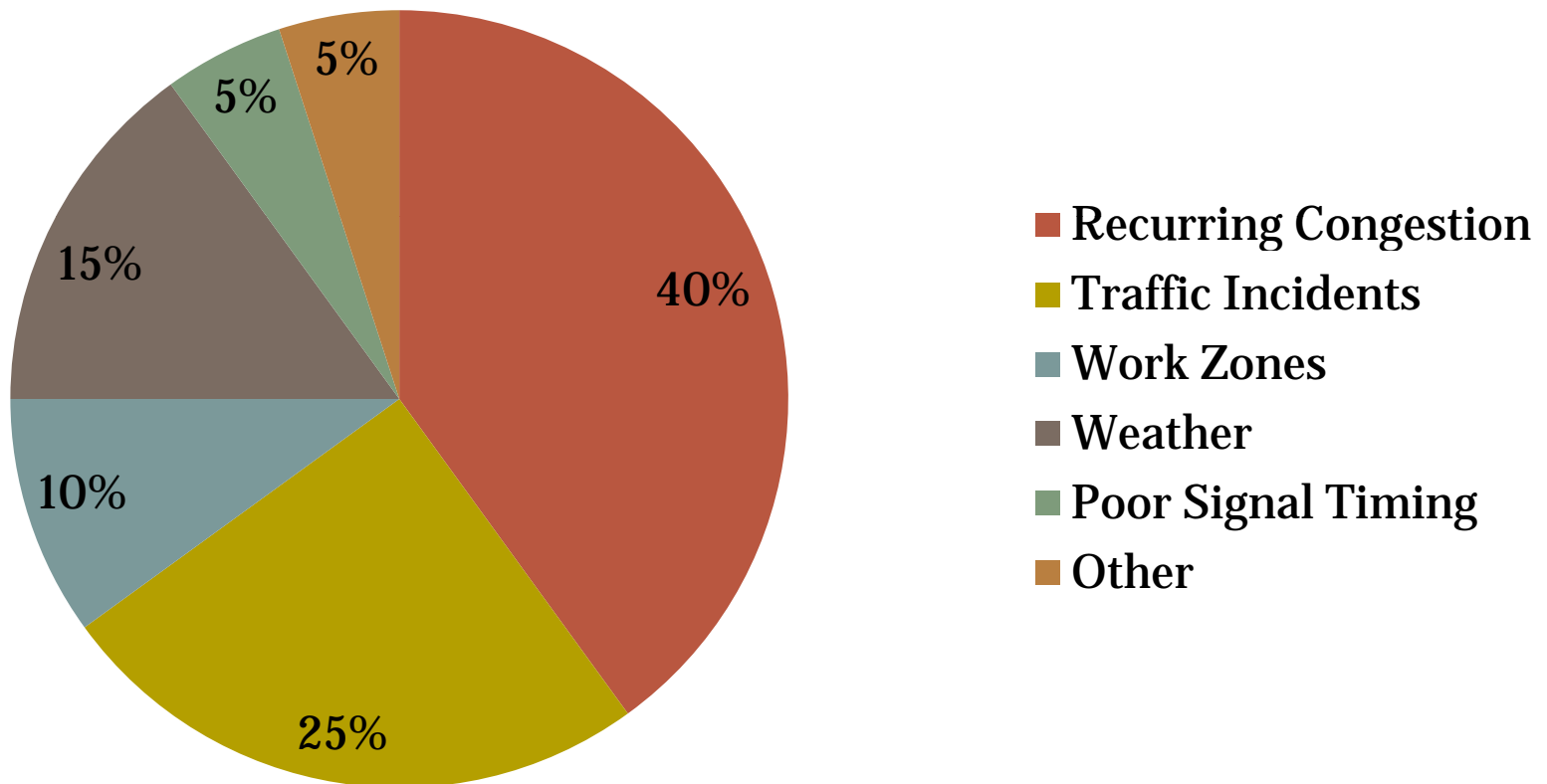
Types of Road Congestion

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- **Congestion occurs when**
 - Excessive traffic volume results in travel speeds slower than normal or “free flow” speeds.
- **Recurring congestion**
 - Peak-hour traffic
- **Non-recurring congestion**
 - Traffic incidents
 - Work zones
 - Weather
 - Poor signal timing
 - Other

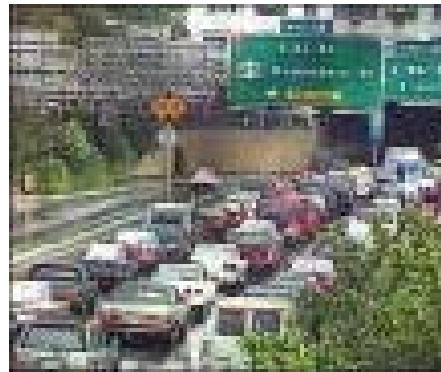
Types of Road Congestion

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Road Congestion in the U.S.

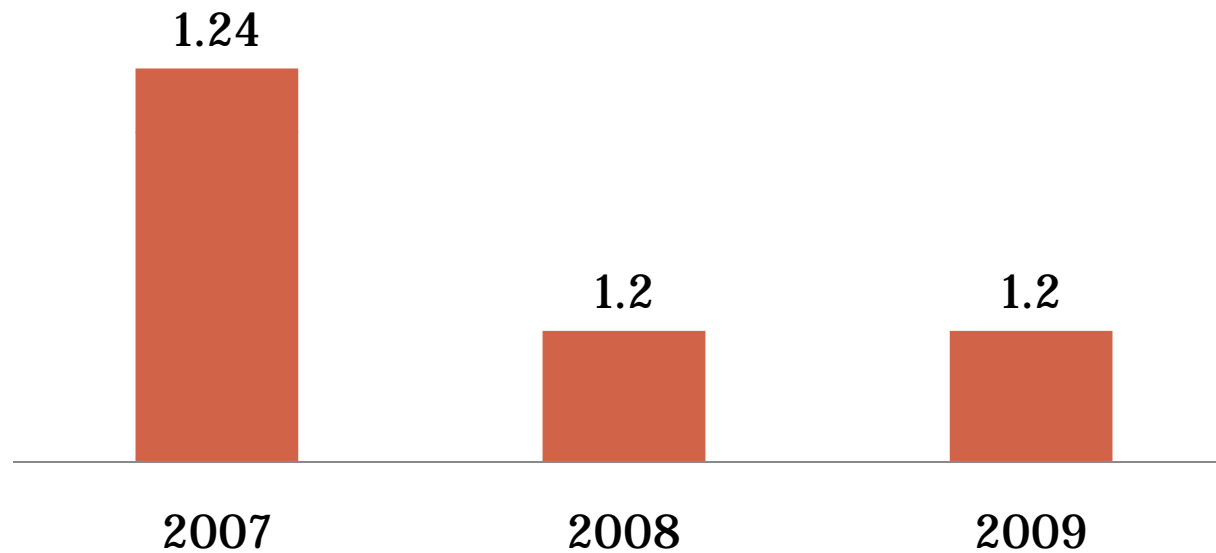
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Travel Time Index

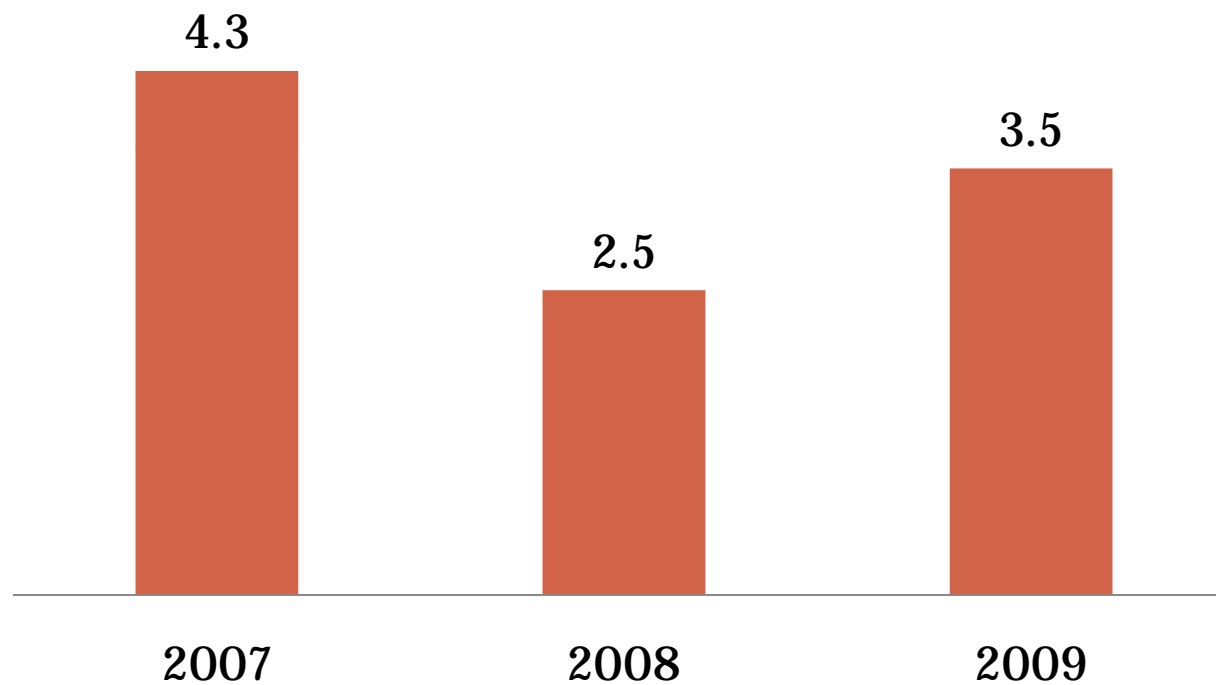


$$\text{Travel Time Index} = \frac{\text{Travel time during peak period}}{\text{Travel time at free-flow speed}}$$

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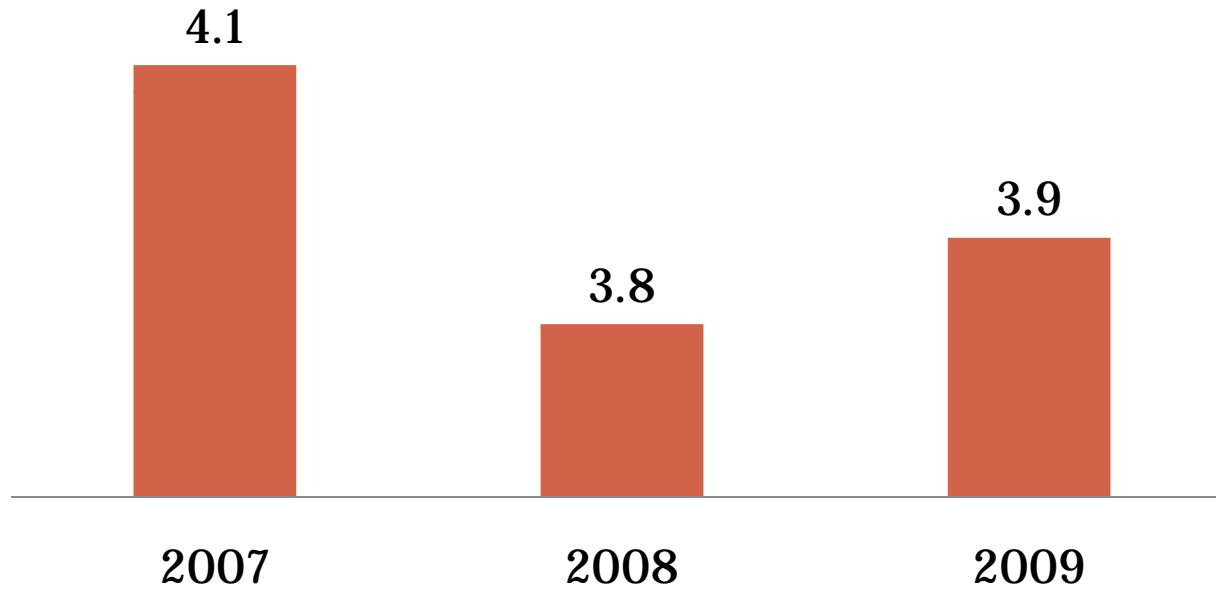
Travel Delay (Billion hours)



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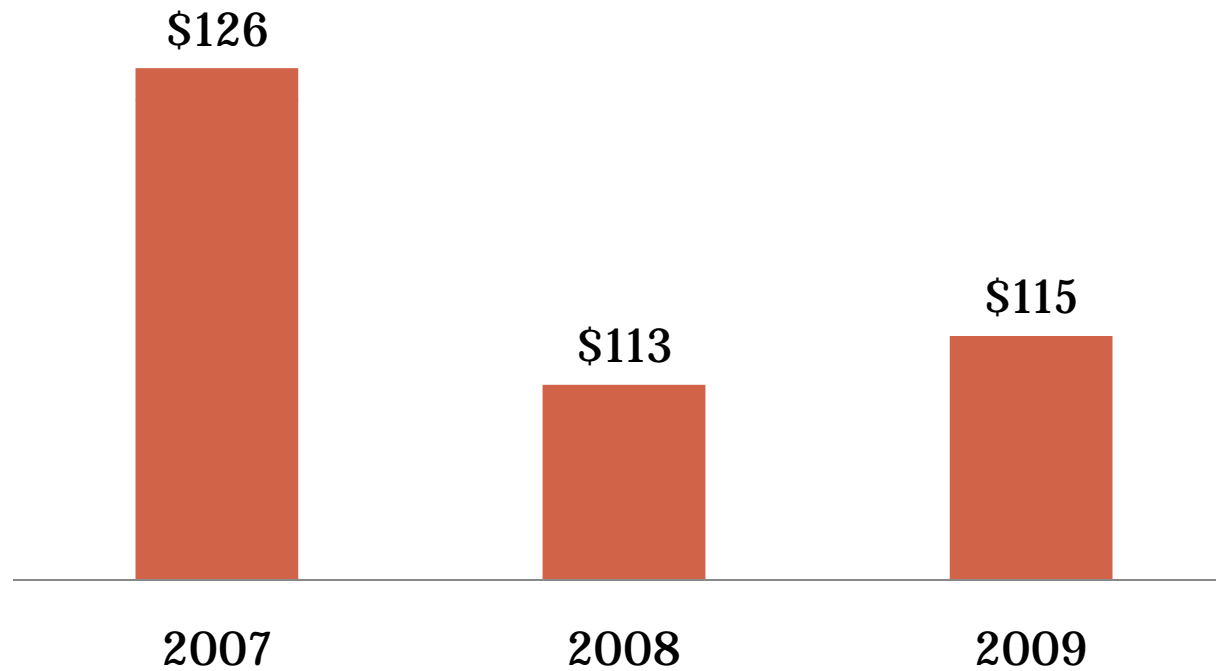
Wasted Fuel (Billion gallons)



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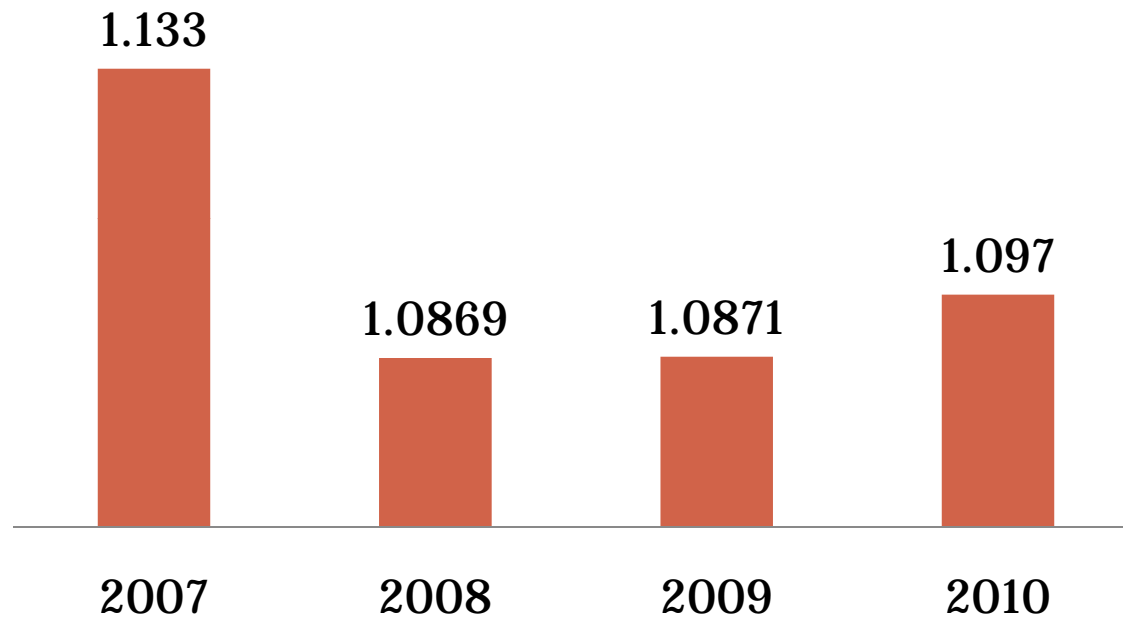
Cost (\$B-2009)



2010 National Traffic Scorecard Annual Report, INRIX Corporation

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Travel Time Index



From 2007 to 2008,
4% reduction in total traffic volume \Rightarrow 30% decrease in congestion

Strategies for Congestion Mitigation

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“Congestion Reduction Strategies: Identifying and Evaluating Strategies to Reduce Traffic Congestion,”
TDM Encyclopedia,
Victoria Transport Policy Institute.

Demand Management Strategies

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- **Congestion pricing**
 - Market-based approach, first proposed by Pigou (1920)
 - Many forms, e.g., area and cordon based
 - Successful implementations
 - ✦ **London:**
 - The number of vehicle trips has fallen by 17%
 - Congestion has fallen by 26%
 - ✦ **Stockholm**
 - Ave. reduction across control points reduced by 22%
 - Public acceptance is still a major obstacle
 - Presentations
 - ✦ **Session 2: Mahut, Yin**
 - ✦ **Session 4: Marcotte, Yao, Lindberg, Hau, Garcia**
 - ✦ **Session 5: Ben-Akiva, Lo, Wong, Voss**
 - ✦ **Session 6: Bell**
 - ✦ **Session 9: Holguin-Veras**

Demand Management Strategies

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- **Commute trip reduction programs**
 - Encourage commuters to use alternative modes for trips to work and school
 - Particularly effective when there are suitable financial incentives such as transit benefits or parking pricing
- **Parking Management and Pricing**
 - Driving and parking are virtually perfect complements
 - On-street parking and road congestion
- **Transit improvements and rideshare programs**
 - Particularly effective when implemented with other incentives such as HOV priority and congestion pricing

Demand Management Strategies

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- **Successful programs**
 - Bellevue, WA: The drive alone commute rate fell by 30% from 1990 to 2000.
 - Boulder, CO: Since 1995, the drive-alone rate from downtown employees has fallen nearly 36%.
 - Portland, OR: Limits of downtown parking increase transit ridership from 20% to 48%.

Demand Management Strategies

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- **HOV Priority**
 - Favor bus, vanpool and carpool travel
 - Common features
 - ✦ Dedicated traffic lanes
 - ✦ Queue-jumping lanes
 - ✦ Access to, e.g., favorable parking locations
 - HOT Lanes
 - **Session 2: Bar-Gera**

Demand Management Strategies

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- **Distance Based Fees**

- Converting vehicle insurance and registration fees into distance-based charges provides a significant financial incentive to reduce driving.
- Unlike congestion pricing, distance-based fees affect all travel

- **Fuel Pricing**

- In 2008, a 28% increase in fuel price contributed to a 3% reduction in the Travel Time Index.

Demand Management Strategies

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- **Freight Transport Management**
 - Freight trucks make a relatively large contribution to congestions
 - Reduce total freight traffic and/or shift it to less congested routes.
- **Pilot program sponsored by NYC DOT**
 - Have trucks make off-hour deliveries (7 PM – 6 AM)
 - Travel speed improved by up to 75%
 - Delivery time decreased from 100 to 30 minutes
 - Sharp reduction in parking tickets and fine
- **Session 6: Yao/Friesz**

Demand Management Strategies

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- Other strategies
 - Credit based
 - ✦ Allocate road-usage credits to individuals
 - ✦ Pay road tolls with these credits
 - ✦ **Session 9: Yang**
 - Road space rationing
 - ✦ Limit the number of vehicles that use the roadway each day.
 - Traffic control measures
 - ✦ Signal timing (**Session 6: Osorio**)
 - ✦ Speed Reductions
 - Reducing traffic speeds to 55 mph or less can increase traffic flow
 - ✦ Ramp metering
 - Flexible work hours (Flextime)

Supply management and other strategies

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- **Road Capacity Expansion**
 - Public-private partnership
- **One-way streets**
- **Road closures, e.g., Braess' paradox**
- **Reversible lanes**
- **Intelligent transportation systems**
 - Traffic information
 - Electronic tolling
- **Incident detection and management**
- **Urban planning, e.g., Smart Growth**

Thank you
and
Have a productive workshop

