

# ITS in INDIA: challenges and future prospects

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Gitakrishnan Ramadurai

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Standardisation for Select Technologies

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# Our Perspective

- We don't do research on automotive technology!
- We don't do research on communication technologies!!!
- We do research on how the transport system is impacted by above technologies
  - Includes driver behavior and resulting traffic flow patterns
  - Includes traveler decision making process and its impact on transport system
- Not understanding behavioral implications of technological changes may lead to 'wasted' inventions!



# Our Perspective

- Driver Behavior / Traffic Flow
  - Traffic flow models
  - Traffic Simulation
  - Capacity and level of service analysis
  - Safety
  - Environmental Impact
- Traveler Decision Making
  - Whether, when, how, where, what route to travel
  - Selfish behavior versus system optimal
  - Decision making under information

How does the transport system respond? Supply-Demand interaction – Model, Estimate, Predict, Impact



# Challenges for ITS in India

- Indian Traffic Conditions
  - Heterogeneity in vehicle types
  - Lack of lane discipline
- Institutional and Social Challenges
  - No single organization is in-charge of transport infrastructure in cities or rural areas
  - Vehicle ownership is low but growing dramatically
  - Public transit is lacking or over-stressed; at the same time new public transit projects are underway in most major cities
  - Smartphone penetration and usage still low
  - No standards, body, governmental organization – few are beginning to come up

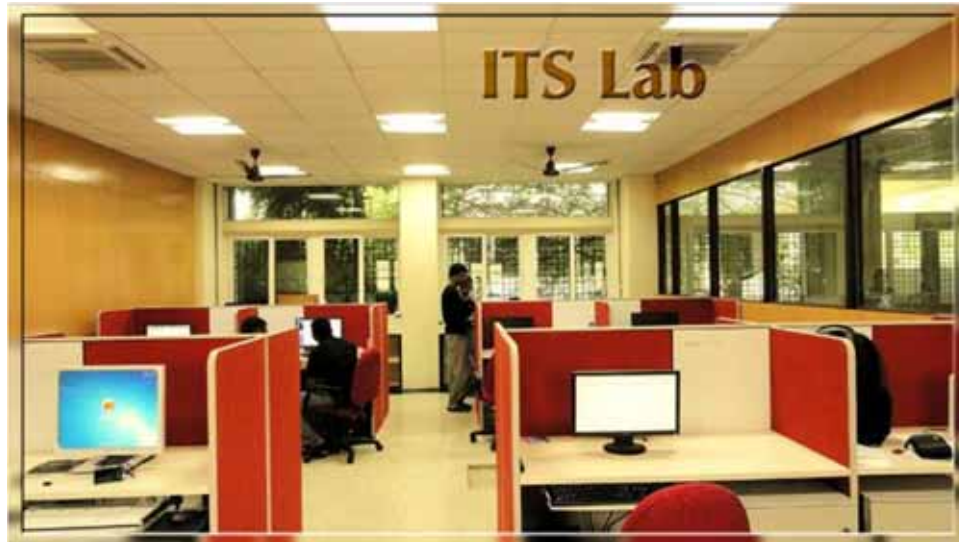


# Current ITS Implementations in India - Limitations

- Inadequate real-time data; data from multiple sources needed for large scale implementations
- Not supported by dynamic traffic prediction models
- Network capacity not effectively utilized
- Information strategies ad hoc
- Piecemeal implementation – technology demonstration
- Not customised to user needs and requirements



# ITS Developments at IIT Madras



State-of-the-art ITS laboratory –  
first in the country in academic setting

A real-world ITS test bed – 16 km long

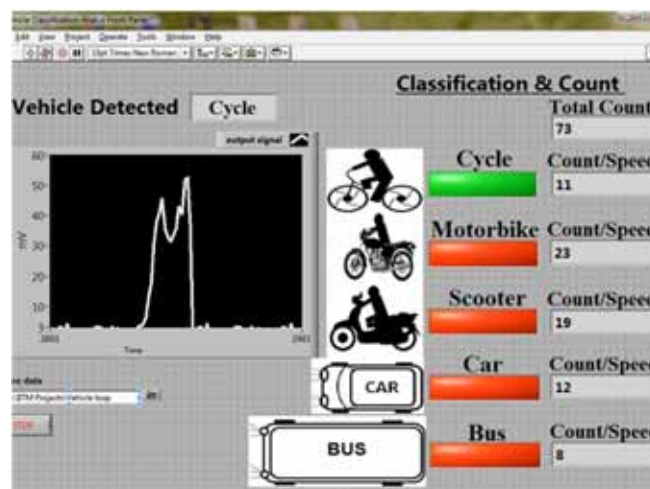


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# ITS Developments at IIT Madras

## Advanced Public Transportation Systems – APTS

Route Number	Expected Time of Arrival	Time Now
5C	Within 15 mins	04:42 PM



Inductive Loop Detector for Indian Traffic Conditions



# ITS Developments at IIT Madras



- Complete Setup
- Raspberry Pi
- Car Charger with socket
- Bluetooth Adapter
- 3G Dongle



Sample Output

Bluetooth Sensor

A	B	C
[10/28/13 16:50:23]	50:01:BB:59:E8:D3	Cell Phone
[10/28/13 16:50:23]	00:19:C1:A0:F1:7B	Handsfree A/V
[10/28/13 16:50:23]	74:E5:43:45:08:1F	Laptop Computer
[10/28/13 16:50:27]	00:19:C1:A0:F1:7B	Handsfree A/V
[10/28/13 16:50:27]	50:01:BB:59:E8:D3	Smart Phone
[10/28/13 16:50:31]	2D:8F:84:69:66:11	Cell Phone



Vehicle Approaching

Green boxes indicate vehicle presence

Width of vehicles used to classify and count vehicles in mixed (heterogeneous) traffic conditions

GRIPTraffic:  
Grid-based real-time Image Processing for Traffic Counting

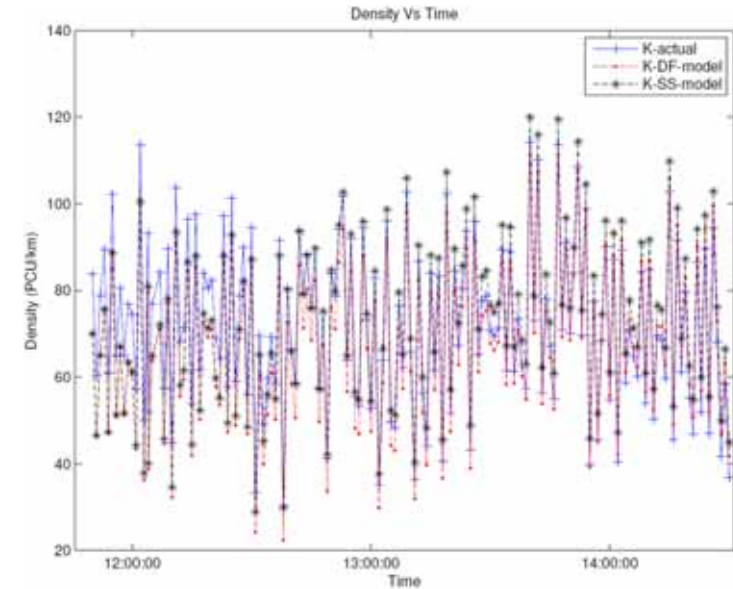
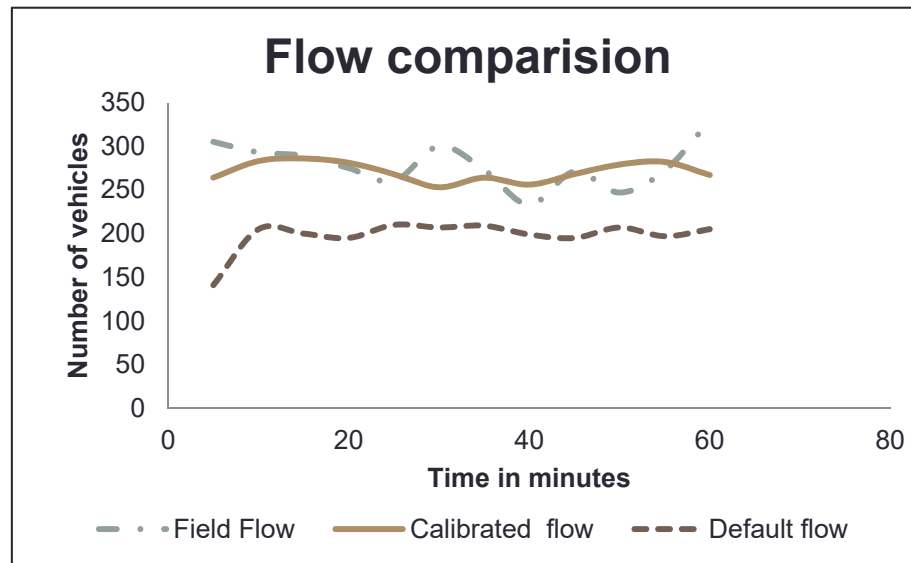


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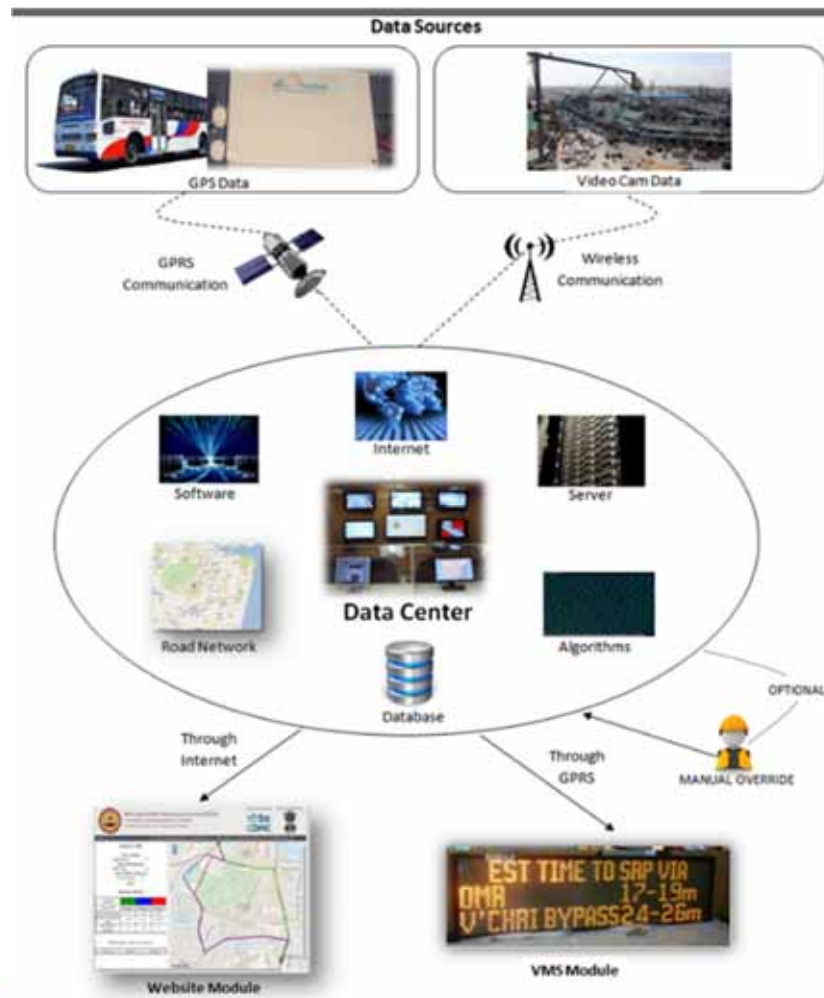


# ITS Developments at IIT Madras

## Modelling and Simulation



# ITS Developments at IIT Madras



## ATIS for Indian Cities: System Overview

Multiple types of information based on user needs analysis:

- Alternate Routes and Travel Times – Routing, Diversion, Driving Directions
- VMS Information
- Speed and Congestion Map
- Delay Map
- Traffic Incidents and Alerts
- Live traffic images

Customized traveller information:

- Specific to mode (tw, car, bus)
- Specific to various departure times
- User selected Origin-Destination pair

Accurate dynamic and predicted information strategy based on historical, real-time and forecasted information





Information via VMS on roads and through website

Personal Traveler Information System  
Department of Civil Engineering, IIT Madras

5:24:33 PM

Select Origin: Madhya Kailash  
Select Destination: Vijayanagar

Available Paths

Route ID	Route 1	Route 2	Route 3
Time (min)	23	23	27
Distance (approx. Km)	6.8	7.8	7.28
Speed (Kmph)	19	18	28

Directions

Route 1

Route 2



## Specific Actions towards improving ITS in India

- Evolving a national ITS standard for different ITS applications and their components
- Setting up a national ITS clearinghouse
- Setting up fully functional Traffic Management Centres for coordinating the urban and regional ITS activities,
- Developing and implementing automated traffic data collection methodologies,
- Developing a national ITS data archive,
- Developing models and algorithms suitable for ITS implementations
- Fostering more interaction between academia, industries and governmental agencies

INTELLIGENT TRANSPORTATION SYSTEMS - Synthesis Report on ITS  
Including Issues and Challenges in India, Lelitha Devi, Gitakrishnan  
Ramadurai, Asha Anand. Center of Excellence in Urban Transport, IIT Madras



# Future Prospects

- Possibilities of the use of data sources such as
  - Video, GPS data from taxi, auto and private vehicles, Bluetooth, Smart phones/crowd sourcing, Cell phone, Location based such as ILD
- ATIS
  - Anticipative route guidance
  - Dissemination through smart phones, SMS, in-vehicle systems
- APTS
  - Transit Operations – Dynamic scheduling
  - Address bus bunching
  - Big data analysis – ticket information
  - Operators modules – crew scheduling, vehicle scheduling
- ATMS - Network wide control that is
  - Predictive and anticipative
  - Aware of heterogeneous mix of traffic and Indian traffic behaviour
  - Integrates with signal pre-emption (bus and emergency vehicle priority), actuated signals, metering
  - Simultaneously optimized along with ATIS, APTS etc.
  - Incorporates sustainable objectives – emissions/air quality, safety



# Thank you

Visit for more details: <http://coeut.iitm.ac.in>

<http://rtis.iitm.ac.in>

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