



IIT faculty members associated with TRIPP supervise research projects at undergraduate and postgraduate levels. The ongoing and recently completed projects are listed below:

▶ Ph.D. Scholars

Current

Congestion pricing in Delhi

Scholar: Akshay Sen
Supervisors: Geetam Tiwari and V. Upadhyay

Transportation projects and their effects on the poor: integrating a social impact assessment methodology

Scholar: Anvita Anand
Supervisor: Geetam Tiwari

Constitutive models of soft tissue for human body-vehicle impact analysis

Scholar: B. Karthikeyan
Supervisors: Sudipto Mukherjee and Anoop Chawla

Urban bus route optimization

Scholar: Mukti Advani
Supervisor: Geetam Tiwari

Institutional and regulatory structure for providing urban public transport

Scholar: O.P. Agarwal
Supervisors: Geetam Tiwari and V. Upadhyay

To study the suitability of airbags for motorcyclists

Scholar: Prashant Vidhyadhar Bhosle
Supervisors: Anoop Chawla and Sudipto Mukherjee

B.Tech. Projects

Completed

Analysis of car bicycle crashes

Students: Suman Chandrawat and Varun Agarwal
Supervisors: *Sudipto Mukherjee and Anoop Chawla*

CFD analysis of airflow inside the helmet

Students: Shubham Jain and Pradeep Yadav
Supervisors: Puneet Mahajan and Sanjeev Sanghi

Influence of national highway design features on road accident risk

Student: Anuj Kumar Kedia
Supervisors: Geetam Tiwari and Dinesh Mohan

Estimation of optimal route and assignment for a city bus system

Student: Tushar Jain
Supervisors: Geetam Tiwari and K.C. Iyer

Impact of alternate transport policies on traffic safety and air pollution

Student: Sindhu Sameer
Supervisors: Geetam Tiwari and Dinesh Mohan

Evaluation of urban roundabouts - case study New Delhi

Student: Aarti Kapur
Supervisors: *Geetam Tiwari and A.K. Jain*

Traffic circulation at Indian airports

Student: Abhishek kumar
Supervisors: *Geetam Tiwari and K.C. Iyer*

Modeling of traffic pollution at selected locations in Delhi

Student: Rahul Gupta
Supervisors: *Geetam Tiwari and Sanjeev Sanghi*

▶ Ph.D.

Completed

Methodologies for planning and evaluation of rural road network: an integrated functional accessibility approach

Scholar: B. Karagadurai
Supervisors: Geetam Tiwari and V. Upadhyay

Rollover stability and safety analysis of three wheeled vehicles

Scholar: Tushar Rajaram Gawade
Supervisors: Sudipto Mukherjee and Dinesh Mohan

M.Tech. Projects

Completed

Material characterization of soft tissues under tension

Student: Satyanarayana Gondu
Supervisors: *Sudipto Mukherjee and Anoop Chawla*

Material characterization of soft tissues in compression and impact

Student: Marathe Ratnakar Shrikrishna
Supervisors: *Sudipto Mukherjee and Anoop Chawla*

Evaluation of effectiveness of leg guard bars in an Indian motorcycle using computer simulation

Student: Biradar Ashok Rudragoud
Supervisors: *Sudipto Mukherjee and Anoop Chawla*

▶ Visiting Faculty

Dr. Joseph Fazio, Adjunct Professor, Illinois Institute of Technology, Chicago, will be spending four months (May to September 2005) in TRIPP, IIT Delhi, working on the "Signal Configuration for the High Capacity Bus System in Delhi."

▶ The **Transportation Research and Injury Prevention Programme (TRIPP)** at the Indian Institute of Technology Delhi, is an interdisciplinary programme focussing on the reduction of adverse health effects of road transport. TRIPP attempts to integrate all issues concerned with transportation in order to promote safety, cleaner air, and energy conservation. Faculty members are involved in planning safer urban and inter-city transportation systems, and developing designs for vehicles, safety equipment and infrastructure for the future. Activities include applied research projects, special courses and workshops, and supervision of student projects at postgraduate and undergraduate levels. Projects are done in collaboration with associated departments and centres at IIT Delhi, government departments, industry and international agencies.

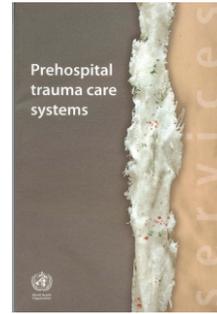




Dr. Mathew Varghese

Prehospital care

***Prehospital trauma care systems** released globally by the World Health Organisation in June 2005 focusses on the most promising interventions and components of prehospital care. Dr. Mathew Varghese, co-author of the book is the Director, St. Stephens' Hospital.*



What was the need for yet another text on pre-hospital care of injured patients?

Injury is today a major cause of pre-mature death and disability. There is an urgent need to do whatever is possible to reduce the occurrence of injuries as well as the consequence of injuries. First aid and emergency care is a part of this response. A wide range of pre-hospital care interventions are done in the hope of saving as many lives as possible and mitigating the severity of the injuries. However, there is little scientific consensus on what works and what does not work. In such a situation, it is necessary that what works best in actual practice is studied and systematically documented. Such a document was needed to assist policy makers in taking steps to provide effective pre-hospital care.

How is this guide different from others in suggesting guidelines for emergency care?

This document is in effect a consensus of opinion of a wide range of injury and public health experts. Because there are few clear-cut answers about which strategies are best, the recommendations contained in this document are sufficiently flexible to allow planners to modify them to suit local social, economic and political considerations. This book therefore, can be suitably used irrespective of the economic or the development status of the community.

As a co-author can you tell us the main new messages from this book?

As I see it the most important statement that has long term implications on the whole subject of pre-hospital care is the admission by all concerned experts that "there is a striking lack of evidence from studies, making it difficult to judge the value of pre-hospital interventions." Medical practitioners and experts are of the view that it is extremely difficult to unanimously agree on what constitutes the best practice in some aspects of pre-hospital care due to a lack of scientific evidence about specific procedures. Use of cervical collars in the pre-hospital setting is one such procedure. The second important message is that "while advanced systems are impressive and undoubtedly benefit some patients there is little evidence that they are inherently superior to systems that offer basic pre-hospital care."

The book also emphasizes the notion that laypersons can be trained to provide simple first aid to the injured and thus complement the existing healthcare infrastructure to provide basic pre-hospital care. This is a clear indication that there is room here for para-medical inputs that have clearly been shown to have worked in the past. This conclusion will go quite a long way towards strengthening the case of the available medical infrastructure in meeting the trauma needs of pre-hospital care.

If you had to advise policy makers on how to provide effective first aid and ambulance services what would be the main messages you would give?

First, assess what is being done in the region for pre-hospital care of the injured. Who does it and how is it done? The important thing is to make the existing system safer for the injured. For example: if a majority of patients are being transported by taxis then it is unrealistic to plan that all patients should be transferred by ambulances. It is not ambulances that save a patient but safe transportation to an efficient hospital that saves a patient. The people who are currently transporting patients in the area could be selected for training in simple first aid techniques. The key issues in this include; maintenance of a clear airway, control of bleeding, splinting of injured limbs and shifting of patients safely in a comfortable vehicle where the patient can lie down and be monitored by an attendant till he reaches the hospital. In urban areas where transportation can be less than an hour "scoop and run" seems the best policy. Basic life support and safe transportation to a hospital that can provide effective trauma care can save the injured. I would not recommend sophisticated equipments or technology or high-speed ambulances or other interventions until good evidence for their effectiveness is available.

"Despite the high costs of advanced life support interventions, there is little evidence that advanced prehospital interventions benefit more than a small subset of the most critically ill or injured victims. If adopted without regard for cost, advanced life support programme techniques can inadvertently harm prehospital systems by diverting precious resources from less glamorous but clearly effective interventions that benefit far more people. For this reason, we urge planners to use caution when considering whether to adopt advanced life support options and to base their decisions on a clear understanding of the costs of implementation versus the anticipated benefits."

Prehospital Trauma Care Systems, WHO



Prof. Subhashis Banerjee

Imaging traffic

Professor Subhashis Banerjee is Head of the Department of Computer Science & Engineering at the Indian Institute of Technology Delhi. His current research interests include computer vision, robotics, real-time systems, image processing and pattern recognition



1. Tell us something about your work as it relates to traffic monitoring and management systems.

The Department of Computer Science and Engineering at IIT Delhi in collaboration with Kritikal Solutions Pvt. Ltd., a Technology Business Incubation Unit of IIT Delhi, is engaged in developing a multiple camera based traffic monitoring and analysis system which can be deployed in the dense traffic conditions of Indian roads. Determining the accurate counts of the number and types of vehicles plying on the road can be made available online at various locations and can be used for better planning of roads and highways. Once these data have been fed into the traffic controller they can dynamically change the pattern of the signal lights as per the actual traffic flow, which saves a lot of time and is cost-effective.

2. Why have you taken up this imaging project when so many other softwares are available in the market?

Most existing techniques for vehicle counting and classifications are based on technologies such as embedded induction loops. Infrared and laser based solutions are sometimes used in tightly controlled environments, for example near toll booths. A passive camera based system, if it can be made to work reliably, can be deployed and maintained more easily. The few attempts at developing computer vision based technologies for this problem have assumed favourable conditions like sparse traffic and strict lane discipline. It is indeed a challenge to develop a system with an acceptably small error rate for Indian conditions.

3. How would you relate traffic signal operations with congestion management?

Most of the traffic signals in India are based on fixed time controllers i.e. the timing of the red and green light is fixed (and not a function of the traffic pattern). With time, traffic patterns change which are not accounted for in the fixed controller systems. The second generation of controller systems do congestion management by changing the timing of traffic lights (red and green) based on the traffic flow pattern on a real time basis. This system is further enhanced by real time synchronization of the traffic signals over an entire corridor in the city because the congestion management is based on the enumeration and classification of vehicles.

4. What are the counting and classifying techniques used?

The two systems are the loop detector (LD) based systems and camera based (CB) systems. The LD system has an inductive loop system, which is dug inside the road (1-2 inches) between 10 to 100 meters of a red-light. It ascertains the queue length of vehicles at any given time and also calculates the average flow rate of the traffic at any intersection. It is a widely used system in the world for vehicle detection, counting and flow rate measurements.

Loop detector based systems

Advantages: (a) The material cost can be cheaper as compared to a camera-based system (If one is doing only congestion management). (b) It is widely used and has a proven track record.

Disadvantages: (a) It involves a lot of civil engineering works, digging or cutting of roads (during both, installation and maintenance procedures). (b) Wear and tear of loop happens after some time. The loops come out of the road surface after some time. (c) Any road digging activity (fairly common in India) destroys the loops. (d) There are also question marks on the accuracy of the loop based system, in terms of the counting of vehicles. (e) Only useful for counting of vehicles and hence for traffic management.

By putting two loops in a row the length of the vehicle can be calculated and this can be used as the basis for certain kinds of classification. The only drawback or limitation is that for this system to work well in dynamic situations like road traffic, requires a sense of lane discipline that is missing in our cities.

Camera based detection and counting systems

Camera based systems serve the dual purpose of offense detection and congestion management. For congestion management, the camera based system will detect the vehicle, count and classify the vehicles and give this feed to the controller which will synchronize the timing of the traffic signals. Gradually, camera based systems are picking up as compared to loop based systems.

Advantages: (a) The same camera can be used for other activities. (Offence detection, surveillance). (b) More accurate than a loop based system, doesn't require lane discipline. (c) Low level of civil engineering works both in installation and maintenance.

Disadvantages: (a) More expensive than the loop based system, if only used for congestion management. (b) Chances of theft are higher. (c) Inoperable or unsatisfactory in foggy conditions of poor visibility.

5. What is technically/scientifically new in what you are doing?

The following aspects are new:

(a) A vision based system that can potentially work reliably in extremely dense traffic situations. (b) Detection and tracking of vehicles under severe occlusion, without using predictive models like, straight line trajectory, etc. (c) Dealing with a large number of vehicle types, in all shapes and sizes, including buses, trucks, cars, tempos, three wheelers, two wheelers and bicycles; and also pedestrians. (d) Automatically generating models for patterns of usual events in various deployments in Indian road conditions (which may all be different) and reliable detection of unusual events (from lane violations to accidents) under such situations and generating alerts.

6. Why is the above challenging to you as a faculty member in Computer Science & Engineering?

The main challenge is to extend the techniques of academic research to be able to deal with a difficult practical problem which may have a high social impact. Also, solving the problem in totality will necessarily involve an inter disciplinary approach not limited to computer vision. It will provide a new context and an opportunity for faculty members across Computer Science and Engineering and also other departments to find new problems which may even be of an academic nature.



News

Evaluation of Roundabout Performance Using SIDRA

This paper compares the performance of roundabouts with four leg intersections under yield control, two-way and four-way stop control, and signal control for various traffic conditions using the SIDRA package. Such conditions include variations in volume levels, turning volume splits, number of approach lanes, and lane widths. The results from the analysis indicate that roundabouts are the best alternative designs for intersections with two-lane approaches that carry heavy through and/or left traffic turning volumes. The performance of roundabouts compares well to the performance of signalized intersections with one-lane approaches and heavy traffic volumes. Roundabout capacities are found higher than capacities of signal controlled intersections with two- and three-lane approaches for any proportion of left-turning traffic volume. This study provides recommendations to traffic engineers on the conditions under which roundabouts perform better than controlled intersections and, thus, should be considered as design alternatives.

Source: Virginia P. Sisiopiku and Heung-Un Oh (2001), *Evaluation of roundabout performance using SIDRA*. *Journal of Transportation Engineering*. March/April, 143-150.

Post-Licence Driver Education for the Prevention of Road Traffic Crashes...

The effectiveness of post-licence driver education for preventing road traffic crashes was quantified using a systematic review and meta-analyses of randomised controlled trials. Searches of appropriate electronic databases, the Internet and reference lists of relevant papers were conducted. The searches were not restricted by language or publication status. Data were pooled from 21 randomised controlled trials, including over 300,000 full licence-holding drivers of all ages. Nineteen trials reported subsequent traffic offences, with a pooled relative risk of 0.96 (95% confidence interval 0.94, 0.98). Fifteen trials reported traffic crashes with a pooled relative risk of 0.98 (0.96, 1.01). Four trials reported injury crashes with a pooled relative risk of 1.12 (0.88, 1.41). The results provide no evidence that post-licence driver education is effective in preventing road injuries or crashes. Although the results are compatible with a small reduction in the occurrence of traffic crashes, this may be due to selection biases or bias in the included trials.

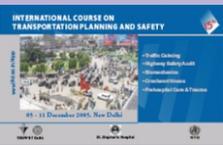
Source: Katharine Ker et al. (2005). *Post-licence driver education for the prevention of road traffic crashes: a systematic review of randomised controlled trials*. *Accident Analysis & Prevention*, 37(2), pp. 305-313.

Land-use Patterns of Urban Development...

As land-use patterns of urban development came increasingly to accommodate the automobile, people without access to a car became more seriously disadvantaged in their mobility—to jobs, commerce, schools and recreation. Should transit get drivers out of their cars, or should transit serve people who have few transportation alternatives? But if local agencies shift transit service to suburban constituencies at the expense of local bus service at the urban core, accessibility from high-poverty neighbourhoods will likely worsen... Planners and policy makers may be losing sight of transit's longstanding social purpose of providing mobility for people who cannot drive a car. Attracting "discretionary" suburban commuters to switch to transit is strongly supported by federal provisions that favour capital-intensive projects... Local transit officials must juggle competing goals, and are likely to increasingly face the difficult tradeoff between serving people who have few transportation options and following their ridership further into the suburbs. Planners and policy makers may be losing sight of transit's longstanding social purpose of providing mobility for people who cannot drive a car. Providing good service to both groups of riders is possible but unlikely in the current political climate.

Source: Grengs, J. (2004) *The abandoned social goals of public transit in the neoliberal city of the USA*, *City*, 9(1), 51-66

Future Events



The Transportation Research and Injury Prevention Programme (TRIPP) at the Indian Institute of Technology, Delhi, and St. Stephens' Hospital, Delhi are organizing a seven day "International Course on Transportation Planning and Safety". The Course will be held in New Delhi, India, from 05-11 December 2005. TRIPP, IIT Delhi will be the host institution. The course will have a common component for the first three days, followed by three parallel modules on Traffic Safety, Biomechanics and Crashworthiness and Pre-hospital Care. The course application form can be downloaded from : www.iitd.ac.in/tripp



The 8th World Conference on Injury Prevention and Safety Promotion will be held in Durban, South Africa from the 2nd to 5th April 2006. Data To Action: The implementation, installation and maintenance of systemic mechanisms for the collection of accurate, timely and comprehensive injury and safety information are imperatives for the prevention of injury and the promotion of safety. However, the utility of these systems may only be measured by the extent to which the information generated is effectively translated into injury prevention and safety promotion action. While acknowledging the groundbreaking information collection milestones and achievements of the global injury prevention and safety promotion sector, the Data to Action theme challenges injury and safety researchers, practitioners and decision-makers to discuss ways through and by which such information can, and indeed must, be translated into the creation of concrete injury prevention policies and practices in action. 31 August 2005: Abstract submission deadline Information : <http://www.safety2006.info/>



The 3rd Conference on Future Urban Transport "Dynamics of Urban Transport Development - What is Generic and What is Specific?" April 2-5, 2006, Goteborg, Sweden. International conference for politicians, city planners, engineers, physicians and scientists to discuss and understand how we have learnt to cope with complexity as it is today, and what we can learn from this for the future development of urban transport. The conference is being organised by the Volvo Research and Educational Foundations. www.volvo-researchfoundations.com



The 2005 International IRCOBI Conference on the Biomechanics of Impact will be held in Prague, Czech Republic 21- 23, September 2005 <http://www.ircobi.org/interface.html>



3rd Asian Regional Conference on Safe Communities. Conference Venue: Taipei International Convention Centre, Taipei, Taiwan. Conference Date: 19th - 22th October 2005. www.safe2005.com.tw

Establishment funds have been received from
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Endowments for perpetual Chair
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