



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

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

Scholar: Anvita Anand

Supervisor: Geetam Tiwari

**Urban bus route optimization**

Scholar: Mukti Advani

Supervisor: Geetam Tiwari

**Methodologies for rural road planning: evaluation of selection criteria and investment decisions**

Scholar: B.K. Durai

Supervisors: Geetam Tiwari and V. Upadhyay

**Institutional and regulatory structure for providing urban public transport**

Scholar: O.P. Agarwal

Supervisors: Geetam Tiwari and V. Upadhyay

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

Scholar: B. Karthikeyan

Supervisors: Sudipto Mukherjee and Anoop Chawla

**To study the suitability of airbags for motorcyclists**

Scholar: Prashant Vidhyadhar Bhosle

Supervisors: Anoop Chawla and Sudipto Mukherjee

**Stability of three wheeled vehicles**

Scholar: Tushar Rajaram Gawade

Supervisors: Sudipto Mukherjee and Dinesh Mohan

## ▶ Awards for B.Tech. Projects

**The Suresh Chandra Memorial Trust Award** for the Best Software Project in Mechanical Engineering to R. Nikhil and D. Trivedi for "Randomized kinetodynamic planning for traffic simulation."

**The Tata Consultancy Services Award** for the Best Software Project in Mechanical Engineering to A. Sudarshan and A. Bahri for "An orthopaedic model of the human index finger."

## ▶ M.Tech. Projects

### Completed

**Crash simulation of RTV, Indian truck and buses using MADYMO**

Student: Ashish Nayak

Supervisors: *Sudipto Mukherjee and Anoop Chawla*

**Modeling of rupture of material under impact loading**

Student: Walesh Kumar

Supervisors: *Sudipto Mukherjee and Anoop Chawla*

**Road accident reconstruction**

Student: Lala Ram Patel

Supervisors: *Sudipto Mukherjee and Anoop Chawla*

**Validation of human body FE models (human knee)**

Student: Abhijeet Singh Parihar

Supervisors: *Anoop Chawla and Sudipto Mukherjee*

**FE modeling from MRI raw data and kinematical analysis of human knee joint**

Student: Girish Sharma

Supervisors: *Anoop Chawla and Sudipto Mukherjee*

**Validation of human body finite element models for different impact conditions (human neck)**

Student: Siddharth Jain

Supervisors: *Anoop Chawla and Sudipto Mukherjee*

## ▶ Visiting Faculty

**Dr. Joseph Fazio**, Adjunct Professor, Illinois Institute of Technology, Chicago, spent four months (May to August 2004) 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.

## B.Tech. Projects

### Completed

**An orthopaedic model of the human index finger**

Students: Amitayush Bahri and Anant Sudarshan

Supervisors: *Sudipto Mukherjee and Anoop Chawla*

**Bicycle crash modeling**

Students: Saurav Raaj and Sunil Kaler

Supervisors: *Sudipto Mukherjee and Anoop Chawla*

**Randomized kinetodynamic planning for traffic simulation**

Students: R. Nikhil and Deepak Trivedi

Supervisors: *Sudipto Mukherjee and Anoop Chawla*

**Design and control of biped walking mechanism**

Students: Vivek Sangwan and Anuj Taneja

Supervisors: *Sudipto Mukherjee and Anoop Chawla*

**Risk factor analysis of road traffic crashes**

Student: Ashutosh Saxena

Supervisors: *Dinesh Mohan and K.C. Iyer*

**Design of passenger facilities along HCBS corridor**

Student: Nikhil Marwaha

Supervisors: *Geetam Tiwari and K.C. Iyer*

**Design of modern roundabouts in urban arterials : case study Delhi**

Student: Albinder Singh Dhindsa

Supervisors: *Geetam Tiwari and Supratic Gupta*

**Estimation of traffic pollution along selected arterial roads of Delhi**

Student: Prerana Goyal

Supervisors: *Geetam Tiwari and Sanjeev Sanghi*

**Planning and management of effective urban transportation systems**

Student: Abhishek Shukla

Supervisors: *Geetam Tiwari and Dinesh Mohan*

**Design of HCBS corridor**

Student: Abhishek Dabas

Supervisors: *Geetam Tiwari and Supratic Gupta*

**Multicity analysis of road traffic crash indices**

Student: Purnish Dave

Supervisors: *Dinesh Mohan and S.K. Deb*

**Estimation of performance measures on HCBS corridors under different operating strategies**

Student: Himanshu Saran

Supervisors: *Geetam Tiwari and R.R. Kalaga*





## ► World Health Day 2004: Road Safety

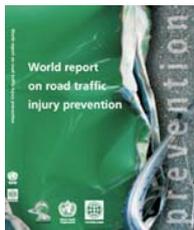
On 7 April 2004 around the globe, hundreds of organizations hosted events to help raise awareness about road traffic injuries, their grave consequences and enormous costs to society. They also contributed to spreading the word that such injuries can be prevented.

For the first time in the history of the World Health Organization, World Health Day was devoted to road safety. The slogan for the day was "Road Safety is No Accident." The global event was celebrated on 7 April 2004 in Paris, France. The event was hosted by President Jacques Chirac of France.

Dr. J.W. Lee, Director-General of the World Health Organization, officially launched the *World report on road traffic injury prevention* and handed a copy of the report to President Chirac. This report emphasizes the role of public health in the prevention of road traffic injuries. It offers countries six recommendations for action on road safety at a national level.

Dr. Lee called for a concerted effort in road safety, particularly among the public health community, saying that "we must now use every day to act on road safety, and implement effective sustainable action to prevent injury and death on the world's roads".

The Secretary-General of the United Nations, Mr Kofi Annan, pledged his support to World Health Day and called on all countries to take heed of the growing toll of road traffic collisions and begin implementing preventive action.



The *World report on road traffic injury prevention* is the first major report jointly issued by the World Health Organization (WHO) and the World Bank on this subject. It underscores their concern that unsafe road traffic systems are seriously harming global public health and development. It contends that the level of road traffic injury is unacceptable and that it is largely avoidable.

Available at

[http://www.who.int/world-health-day/2004/infomaterials/world\\_report/en/](http://www.who.int/world-health-day/2004/infomaterials/world_report/en/)



Dinesh Mohan. *The Road Ahead: Traffic Injuries and Fatalities in India*, Transportation Research and Injury Prevention Programme, Indian Institute of Technology Delhi, 2004.

Available at

[http://www.iitd.ac.in/tripp/publications/paper/safety/road\\_ahead.pdf](http://www.iitd.ac.in/tripp/publications/paper/safety/road_ahead.pdf)

## ► Delhi Workshop

A National Workshop on Road Safety was organised in Delhi on 14 April 2004 by the Transportation Research and Injury Prevention Programme, Indian Institute of Technology Delhi (WHO Collaborating Centre). The Workshop held in recognition of the World Health Day 2004 involved the various stakeholders to adopt a document indicating future policy directions for road traffic safety in India. There were sessions on: (1) Current activities (2) Research in India (3) Future directions. Over a hundred professionals participated with speakers including representatives from the Ministry of Road Transport and Highways, the Ministry of Health, the Ministry of Heavy Industry, the National Highway Authority of India, Delhi Police, SEARO WHO, Society of Indian Automotile Manufacturers, NIMHANS Bangalore, Administrative Staff College (Hyderabad), St. Stephens Hospital (Delhi), and the Indian Institute of Technology Delhi. The concluding session was chaired by Prof. M.G.K. Menon, Chairman, Board of Governors, IIT Delhi. The participants adopted a Declaration on Road Safety.





## World Health Day 2004 National Workshop on Road Safety Wednesday 14<sup>th</sup> April 2004 Delhi Declaration on Road Safety

Having considered the various aspects of the road traffic safety situation in India the participants of the workshop adopt the following declaration:

- Welcoming the recognition of road traffic injuries and deaths by the World Health Organization and the World Bank as a major public health problem in all countries and designating the World Health Day 2004 as dedicated to road safety;
  - Noting the release of the *World Report on Road Traffic Injury Prevention* on 7<sup>th</sup> April 2004 by the World Health Organization;
  - Recognising that road traffic injuries in India constitute a major public health and economic burden resulting in an estimated 100,000 deaths and possibly 2,000,000 injuries needing medical attention per year with an economic loss of 1%-2% of the national GDP;
  - Aware that trends in motorization indicate that by 2020, road traffic injuries could rank third in order of the burden of disease, ahead of other health problems such as malaria, tuberculosis, and HIV/AIDS, according to projections made by the World Health Organization;
  - Guided by the recommendations contained in the *World Report on Road Traffic Injury Prevention* which are based on evidence of successful and unsuccessful road safety interventions around the world;
  - Guided further by the presentations and discussion at the National Workshop on Road Safety held in Delhi on 14<sup>th</sup> April 2004;
  - Concerned that the existing data collection and analysis systems, institutional framework for managing road safety, institutions for road safety research and training, and medical care systems in India are inadequate for the problem facing the country;
  - Deeply concerned that the trend in the rate of road traffic deaths and injuries in India is not showing any improvement and that this situation is not acceptable;
  - Noting that urgent action is needed to prevent future degradation of human life as caused by road traffic injuries and fatalities;
1. AFFIRM that all the concerned sectors health, transport, education, law enforcement, vehicle manufacturers and civil society should jointly participate in programmes to reduce the burden of road traffic morbidity and mortality on an urgent basis by improving methods of data collection and analysis, initiating research on risk factors associated with road traffic injuries, implementing and evaluating known road safety interventions, undertaking research to develop road safety measures uniquely suited to India, and improving prehospital and trauma care systems in the country;
  2. RECOMMEND that:
    - (1) The Government of India establish a national lead agency for road safety, independent of the road building agency and also of the traffic policing system, with the authority and responsibility to make decisions, control resources, establish safety standards, and coordinate efforts by all sectors of government including those of health, transport, education and the police, with adequate finances to use for road safety, and should be publicly accountable for its actions;
    - (2) Road traffic crash and injury surveillance systems must be established both in the police and health sectors immediately for scientific analysis and dissemination;
    - (3) Funding mechanisms be established to ensure financing of road safety interventions and associated research through appropriate budget allocation and the cess levied on road building projects, vehicle sales and fuel;
    - (4) Interdisciplinary research centres in medical and technical institutions be established and funded on a long term basis for focussed work on road safety;
    - (5) Road safety policies and interventions must focus on the safety of vulnerable road users pedestrians, bicyclists, motorised two-wheeler riders, three-wheeler occupants and users of public transport who constitute the vast majority of road traffic crash victims in India;
    - (6) The Government implement proven safety measures immediately: speed control by road design and enforcement, provision of safe facilities for pedestrians and bicyclists through traffic calming and segregation of traffic, notification and enforcement of compulsory helmet laws in all states, mandatory use of daytime headlight use by two-wheeler riders, compulsory use of seat belts by motor vehicle occupants, increase in conspicuity of bicycles, rickshas, thelas, etc., with reflectors and lights, control of vehicles with hazardous loads, and control of driving under the influence of alcohol;
    - (7) All new road projects be subjected to a road safety audit, and plans be drawn up for phased audit of existing roads;
    - (8) Standards for vehicle crashworthiness be made compatible for Indian requirements with special attention to vulnerable road users especially the provision of safer vehicle fronts for impacts with pedestrians and bicycles and standards for India specific vehicles;
    - (9) All links in the chain of help for road crash victims be strengthened, from the crash scene to the health facility with special training for professionals in trauma care;
    - (10) Awareness creation programmes with implementation of road and vehicle safety measures and enforcement policies be coordinated;
    - (11) Special programmes be initiated for developing national capacity of professionals dealing with traffic safety in all disciplines;
    - (12) Professional training for heavy vehicle drivers be promoted.



## News

### Sustainable Road Safety

Initial road safety policy was strongly directed at the protection of vulnerable road users (also logical because cycling is a major mode of transport in the Netherlands), predominant accident types and hazardous locations. Consequently policy was focussed on the following central themes (or spear points) the elderly, cyclists and moped riders; driving under the influence of alcohol; safety devices (mainly seatbelts, motorcycle helmets and child restraint systems); speeding; heavy goods vehicles and lastly hazardous locations (blackspots). Towards the end of the 1980's it became apparent that the spear point policy, although initially successful, could by itself not meet the targets set for the long term. A new impulse was needed if the downward trend in road accident fatalities was to continue. The Institute for Road Safety Research (SWOV) had for a number of years been analysing the road safety situation in the Netherlands and, on the basis of a subsequent in-depth analyses the concept of sustainable safety was launched (SWOV, 1990). Although favourably received on all fronts, the actual implementation of the programme would not commence until 1998.

The principles outlined by the sustainable safety approach have since become the basis for the design and layout of Dutch road infrastructure. However, Sustainable Safety embraces more than purely road infrastructure. It is an integrated approach and therefore includes aspects related to the human, the vehicle, land use planning and mobility. Unfortunately the approach does have a drawback in that infrastructure measures are often costly and cannot always be implemented due to space constraints. Phased implementation and a degree of creativity are therefore essential.

In contrast to the spearhead policy the sustainable safety strategy is characterised by a proactive and preventive approach. The spear point-policy was a reactive (and curative) approach aimed at addressing problems when they occurred. Sustainable safety has "prevention is better than cure" as its motto.

Furthermore, humans do not readily change or adapt and many attempts at influencing road user behaviour have either had merely short-term effects or failed. The limitations of the human remain evident. Motivation, attention, emotion, observation, prediction, knowledge and skills are all aspects that influence human behaviour and that prevent humans from being the ideal traffic participant.

In a sustainable safe traffic system the human takes the central role. Humans are (largely) unpredictable and influencing their behaviour cannot be sustained over the long term. They are therefore incorporated in sustainable safety as a reference against which other system elements are gauged. Sustainable Safety is based on a systems approach where all elements of the traffic safety and transport system are geared to one another. At the highest level it is the interaction between man, vehicle, infrastructure and legislation. At the next level it is the relation between function, form, and usage. Function relates to the use of the infrastructure as intended by the road authority. Form relates to the physical design and layout properties of the infrastructure. Legislation relates to regulatory requirements for the use of the infrastructure. Usage relates to the actual use of the infrastructure and the behaviour of the road user within the system.

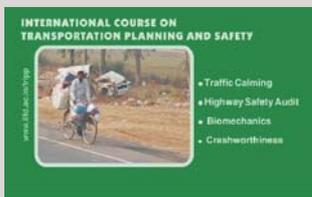
Source: 'Safer Roads by Applying the Concept of Sustainable Safety', by P. van Vliet and G. Schermers, in *The Asian Journal : Journal of Transport and Infrastructure*, Vol. II, No. 1 July 2004

### What Works and What Doesn't to Reduce Pedestrian Crashes

- One of the simplest and least costly methods is to change signal light timing to give pedestrians exclusive access to intersections. A study has found that this reduces crashes by about half.
- Another effective approach is to separate vehicles and pedestrians by space -- for example, by adding refuge islands, which are raised medians between lanes of opposing traffic. They effectively reduce crashes at wide intersections or where elderly pedestrians cross frequently. A study found that adding such islands reduces pedestrian crash rates by about half at both marked and unmarked crossings. Another study found conflicts reduced by two-thirds. Roundabouts have been shown to reduce vehicle-to-vehicle crashes when they replace traffic signals and stop signs. Two studies also have reported reductions in pedestrian crashes of about 75 percent after conversion to roundabouts.
- Enhancing roadway lighting is an obvious way to improve pedestrian visibility after dark. This is important because more than half of fatal pedestrian crashes occur at night. At crosswalks where the lighting intensity has been increased, two studies found that crashes decreased by more than half.

Source: *Status Report, Insurance Institute for Highway Safety*, Vol 39, No. 6, July 3, 2004

## Future Events



The Transportation Research and Injury Prevention Programme (TRIPP) at the Indian Institute of Technology, Delhi, the French National Institute for Transport and Safety Research (INRETS) France, and the International Research Council on the Biomechanics of Impacts (IRCOBI) are organizing a seven day "International Course on Transportation Planning and Safety". The Course will be held in New Delhi, India, from 09-15 December 2004, and TRIPP will be the host institution. The course will have a common component for the first three days, followed by two parallel modules on Traffic Safety and Biomechanics and Crashworthiness. The course application form can be downloaded from - [www.iitd.ac.in/tripp](http://www.iitd.ac.in/tripp)



BAQ 2004 will take place in Agra, India from the 6th to the 8th of December 2004. The event will be jointly hosted by the Ministry of Environment and Forests (MOEF) and the Clean Air Initiative for Asian Cities (CAI-Asia). Abstracts on all themes related to ambient and indoor air quality management in Asia are welcome.

<http://www.cleanairnet.org/baq2004/1527/channel.html>

Establishment funds have been received from  
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Endowments for perpetual Chairs  
**Ford Motor Company, USA: Henry Ford Chair for Biomechanics and Transportation Safety**  
**CONFER, India: TRIPP Chair for Transportation Planning**

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