



Ph.D. Scholars

Current

Highway design and traffic safety

Scholar: Afzal Hingora
Supervisors: D. Mohan and G. Tiwari

Study of the effect of thigh and leg muscle activation on the response of human knee to impact loading

Scholar: Anurag Soni
Supervisors: A. Chawla and S. Mukherjee

Tool for positioning human body FE model

Scholar: Dhaval Jani
Supervisors: A. Chawla and S. Mukherjee

In-vivo measurement of constitutive properties

Scholar: Hemant N Warhatkar
Supervisors: A. Chawla and S. Mukherjee

Demand models for bicycle traffic integrating landuse parameters

Scholar: Himani Jain
Supervisor: G. Tiwari

Pedestrian behaviour modeling

Scholar: Mariya Khatoon
Supervisors: N Chatterjee and G. Tiwari

Study of bone fracture characteristics

Scholar: Mike W J Arun
Supervisors: A. Chawla and S. Mukherjee

Demand model for public transport trips: case study Delhi

Scholar: Mukti Advani
Supervisor: G. Tiwari

Institutional and regulatory structure for providing urban public transport

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

To study the suitability of airbags for motorcyclists

Scholar: Prashant Vidhyadhar Bhosle
Supervisors: A. Chawla and S. Mukherjee

Estimation of externalities in public transport system

Scholar: Pradeep Singh Kharola
Supervisors: G. Tiwari and A. Kanda

Service level benchmarks for urban transport systems

Scholar: S K Lohia
Supervisors: V. Upadhyay and G. Tiwari

Impact of informal landuse on travel demand

Scholar: S S L N Sarma
Supervisor: G. Tiwari

Ph.D. Scholars

Completed

Characterization of the compressive impact response of muscles

Scholar: B. Karthikeyan
Supervisors: S. Mukherjee and A. Chawla

Dynamic studies on shell materials and ventilation in motorcycle helmets

Scholar: Praveen Kumar Pinnoji
Supervisor: P. Mahajan

M.Tech. Projects

Completed

SHPB for bones

Student: Kranthi Teja
Supervisors: A Chawla and S Mukherjee

Pedestrian crash reconstruction and head injury correlation

Student: Ganesh R
Supervisors: A. Chawla S. Mukherjee

Delta configuration based micro manipulation system

Student: Hemant Arora
Supervisors: A. Chawla S. Mukherjee

Estimating factors influencing bicycle choice in urban areas- A case of Pune, India

Student: Shruti Lomte
Supervisor: G. Tiwari and R R Kalaga

Network assignment model for bicycles based on bicycle compatibility index

Student: Jyothi Chava
Supervisor: G. Tiwari

Analysis of traffic safety on selected highway segments

Student: Rishi Gupta
Supervisors: G. Tiwari and Dinesh Mohan

Estimation of environment pollution caused by urban transport system

Student: Harsha Chatterjee
Supervisors: G. Tiwari and S.K. Deb

Evaluation of bus rapid transit corridor Delhi

Student: Satendra Singh
Supervisors: G. Tiwari and S.K. Deb

Dynamic studies on shell materials and ventilation in motorcycle helmets

Student: Zafar Haider
Supervisor: P. Mahajan

B.Tech. Projects

Completed

Rollover stabilization in electric vehicles

Student: Richa Bansal and Tushar Sharma
Supervisor: S. Mukherjee

Manufacturing of an artificial cartilage testing rig providing optimal flexion extension motion under constant loading

Student: Nitish Sabharwal and Shubham Rao
Supervisors: S. Mukherjee and R. Ribberro

Investigation of the speed, flow, density relationship at intersections

Student: Nihit Jain
Supervisor: G. Tiwari

Investigation of the speed, flow, density relationship at urban and mid-block street

Student: Parv Dhiman
Supervisor: G. Tiwari

Analysis of pedestrian risk near bus stops

Student: Palvinder Singh
Supervisors: G. Tiwari and N. Chatterjee

Assessment of pedestrian risk in car accidents in Delhi

Student: Akhilesh Kumar
Supervisor: G. Tiwari

Application of intelligent transport system on Delhi BRT corridor

Student: Abhinav Bhardwaj
Supervisor: G. Tiwari

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.





S.N. Srivastava

After completing his B.Tech. from IIT, Kharagpur, Shrivastava joined the Indian Police Service. Today, he is the Joint Commissioner of Police (Traffic) for Delhi. He is keen on introducing modern technology in traffic management to increase its efficiency.

As the person in charge of road traffic in Delhi, your responsibilities are immense. What, in your opinion, are some of your most pressing challenges?

From the point of view of traffic management, safety is one of our primary concerns but the challenges are many. Twenty one per cent of the total land area of Delhi is occupied by road use. That is a large area of land but even then, road space is limited in view of the fact that more and more vehicles keep appearing on the road. Road design has to be improved; this will include factors like lighting, signages, road engineering with comfortable footpaths and walkways. This will make it user-friendly for vehicles and all other road users alike. Roads should be engineered for smooth flow of vehicular and other traffic. As things exist we find that our roads in Delhi are not pedestrian-friendly. There are no clear markings and crossover facilities; the pavements are not continuous and are often encroached upon. Even the lighting at night on the roads should be such that it keeps the drivers alert and makes for safety. Road adequacy depends on the vehicle-to-road space ratio. And as we have just seen, the road space remains much the same (as in the case of Lutyens Delhi) while the number of road users and vehicles keep steadily increasing. This is bound to make for increasing congestion, which in turn leads to an increase in unsafety. To give you some idea of the scale and enormity of the problem, let me tell you that we have over sixty five lakh registered vehicles in Delhi with an inflow of five to ten lakh vehicles from the neighbouring states. About 900 new cars come on to the Delhi roads each day as per our registration records. And in addition to all this we have on our roads, eight to ten lakh non-motorised vehicles (cycles, auto rickshaws, thelas, animal drawn carts, etc). There are over seven lakh auto-rickshaws on the Delhi roads.

In the present day context, what do you see as some of the major impediments or obstacles that you have to face?

Take for instance, the people behind the wheels of motorized vehicles – the drivers: A very large number of them do not know even the basic road rules; they are incapable of reading many of the common road signs that are put up to guide them. In addition to this we have to cope with what I can only describe as contempt for traffic discipline. Now to come closer home: the traffic police – there is just not enough of us. We are spread too thinly on the ground. The motivation in the force is poor because of several factors: long hours of work in adverse conditions like sun, rain and cold (and, this could well be in the daytime or the night time without adequate protection from the elements). And now we have to prepare for the coming Commonwealth Games. In this respect, a lot of road restructuring work is going on which is necessary and good, but we must face the fact that this puts all kinds of obstructions on the road, which reduce road space today in preparation for a better tomorrow; in all this, we have to forge ahead with little or no cooperation from the road users.

Can you tell us what your plans are for the future?

A great number of changes are underway – in the pipeline, so to speak. This is largely because of the approaching international event of the magnitude of the Commonwealth Games which I have mentioned earlier. We have a meticulously detailed traffic circulation plan and a transportation plan, both of which would be implemented before the games. We plan to introduce new technologies at various levels which will hasten operations and processes while eliminating shortages and errors in manual work. There will be a largescale improvement because of this new technological upgradation. I.T.S.: All information from all intersections (about vehicles, timings, signal phasings,

Delhi Traffic: Today and Tomorrow

speed, etc.) will be gathered by vehicle detectors and passed on for processing to the central control room. There will be no dead time and the operation as a whole will become extremely smooth. If there is a developing congestion situation at some point due to a vehicular breakdown or some other reason, this information can be relayed to all road users via VMS (Variable Messaging System) to divert their routes. It will also help us fire fighters or ambulances to reach the spot immediately to assist in solving the problem. The idle run of vehicles can be avoided when this new technology helps us in parking management. (CCTVs) can record violations by camera automatically. Instead of the old fashioned challans, the new PDA type equipment will allow police personnel to enforce the law electronically. This will also give us a database where we will be able to detect habitual offenders and bring them to book. We are increasing the quality, size and number of cranes at our disposal, which will help with the speedy clearing of truck breakdowns; Many of the new cranes are forklift cranes which can handle large vehicles breakdowns; we have also increased the number of our motorcycle-borne personnel; our vehicles will now be fitted with GPS systems to help us track vehicles. Infra-red cameras will now record even night time speed violations.

In your experience, what are the main causes of road crashes?

Our data analysis shows us that several of the reasons for road crashes like over speeding, lane changing, drunken driving and rash and negligent driving could be clubbed under the head of "Drivers fault". We have already touched upon other factors like road design, lighting, signages, etc, which I do not want to repeat. An example of poor road engineering is the Dwarka flyover which has already witnessed several crashes; poor alignment of certain intersections also create black spots. Sometimes, we find that crashes happen due to the victim's fault, and we have even recorded such a case. But I would like to close this topic by saying speed is the biggest culprit.

A newspaper recently quoted you as saying you were considering signaling some roundabouts in Lutyen's Delhi. Please comment.

As conceived and executed, Lutyen's roundabouts Delhi were built to take a five thousand passenger car limit. A truck, as I mentioned, takes up the road space of four cars. The indiscipline and increase in traffic have made these roundabouts difficult, if not impossible, to negotiate during the peak rush hours without large police intervention. Hence the need for a rethink on the subject. Instead of allowing traffic to move without interruption, the traffic signal will help allow traffic to move one vehicle at a time.

What is your take on parking, flyovers and road fines?

Parking is an issue of the utmost importance, as it is a space-related problem where city street space is limited. This is further compounded by the fact that residential areas are being turned into commercial hubs; and the number of cars and other vehicles keep steadily increasing. At present the parking fines (Rs. 100) are no deterrent. This must be raised to a level when it will pinch the offender so that he/she does not repeat his/her mistake. This is a complex problem whose every aspect will have to be addressed in detail. We need flyovers though they are not the solution to traffic congestion; we need grade separators; we need to look at this problem in a holistic way. It would be quite wrong to say, in this day and age, that we can do without flyovers. It would be equally erroneous to think, as we earlier did, that flyovers alone would solve the problem of vehicular congestion on our roads.

Towards Zero: Ambitious Road Safety Targets and the Safe System Approach

The International Transport Forum recently released its report Towards Zero: Ambitious Road Safety Targets and the Safe System Approach. The report is the result of a three-year co-operative effort by an international group of safety experts representing 21 countries, as well as the World Bank, the World Health Organisation and the FIA Foundation. Salient features from the report are excerpted below:

INSTITUTIONAL

All countries should commit to ensuring an effective road safety management system and in particular seek to achieve a strong results focus through their institutional management arrangements. This results focus requires clear identification of: a lead agency; the core group of government ministries and agencies to be involved; their roles and responsibilities; and the performance targets in terms of institutional outputs and intermediate and final outcomes to be achieved within a defined strategy.

KNOWLEDGE BASE

Our understanding of why and how crashes occur is based on very limited research. A more complete picture would provide the basis for more effective interventions. High-income countries will rely increasingly on innovation to work towards the ultimate goal of eliminating road deaths and serious injuries.

- In allocating resources to road safety, sufficient funds must be provided to ensure that evidencebased research is available to support the proposed countermeasures and their monitoring and evaluation.
- Creating road safety specialist positions at national and local levels will also help to attract high-quality personnel. This professionalism should start with the formal education in road safety disciplines offered at universities and colleges and extend to further on-the-job training.

PRINCIPLES

IRAP (International Road Assessment Program) began in 2000 with the European Road Assessment Programme (EuroRAP), which introduced international protocols to measure the safety of roads regardless of national engineering standards...iRAP is a major step away from the traditional 'fix the driver' approach. It recognises that most crashes result from normal people making often minor errors. Its central precept is to provide a road environment that makes human beings less likely to be involved in serious crashes and that provides protection when crashes do occur.

- Over reliance on behavioural strategies must, nevertheless, be avoided. Even well-educated and compliant road users will make mistakes, and an over-reliance on enforcement and compliance measures will not always counter these mistakes...Placing the onus of blame on the road traffic victim acted as a major impediment to the appropriate authorities fully embracing their responsibilities for a safer road traffic system.
- The Safe System task is to reverse the safety/mobility balance, to turn mobility into a function of safety, by bringing system designers to accept responsibility for the safety of users of the road transport system, and explain the safety constraints within which users need to operate...Just as public health authorities demand that economic development cannot be at the cost of environmental degradation, so too can safety managers require that economic development not come at the cost of death or serious injury.

BUILDING BLOCKS

Providing for safer speeds.

- Reducing drink-driving.
- Increasing safety belt use.
- Improving road and roadside infrastructure.
- Promoting safer vehicles.
- Providing for graduated licensing of novice drivers.
- Improving the safety of vulnerable road users such as pedestrians, cyclists

- and powered two-wheeled vehicles.
- Improving the medical management of people after crashes.

SPEED

Speed is at the core of the road safety problem...a 5% increase in mean speeds leads to approximately a 10% increase in all injury crashes and a 20% increase in fatal crashes. Similarly for a 5% decrease in mean speed, there are typically 10% fewer injury crashes and 20% fewer fatal crashes.

- An effective speed management programme should have the following elements:

- ▶ Targeted education and information to the public and policy makers.

- ▶ In urban areas the speed limit should not exceed 50km/h and 30km/h zones are recommended where vulnerable road users are at risk.

- ▶ Sufficient levels of traditional police enforcement and automatic speed control (electronic enforcement) and the development of section control

(control of average speeds over sections of a road using electronic means). More effective enforcement can be achieved through measures like minimum tolerances above speed limits and the use of mobile cameras.

- ▶ Development of vehicle engineering to include technologies such as collision avoidance systems. In countries where this is not immediately feasible, consideration should be given to mandatory speed limiters for trucks and coaches.

- An overarching priority will be to help create the understanding that reduced network speeds are not necessarily detrimental to the achievement of mobility goals, and that they can contribute to the achievement of sustainable development goals concerning climate change and energy security

Road use	Safe speed thresholds Km/h
Roads with possible conflicts between cars and unprotected	30
Intersections with possible side-on conflicts between cars	50
Roads with possible frontal conflicts between cars	70
Roads with no likelihood of frontal or side-on conflicts between road users	≥100

DRINKING AND DRIVING

The European Road Safety Observatory (ERSO, 2006-2) recommends that measures to reduce drink driving should include:

Random breath tests for all drivers and not only for "suspected drivers".

- ▶ Raising the chance of getting caught by carrying out more random roadside breath tests, especially at times and in locations where drink driving is suspected.
- ▶ Installation of alcohol interlocks in the vehicles of severe first time offenders and all repeat offenders, in combination with a driver improvement course and a health counselling programme if alcohol dependency is suspected.
- ▶ Improved public awareness and education campaigns for all age groups based on research.
- ▶ Reducing the availability of alcoholic beverages, especially for young novice drivers. Methods for achieving this can include raising the age limit for purchasing alcohol and banning alcohol sales in petrol stations and transport cafes.



ROADS

- While there are important short-term benefits to be gained from these measures pursued in isolation, it is likely that full protection of vulnerable road user groups will result only from a Safe System approach which enables pedestrians, cyclists to be either separated from vehicles or exposed only to vehicles travelling below 30 km/h.
- Many users drive through signalised intersections when they should not, whether knowingly or unknowingly, and significant numbers of fatalities and serious injuries consequently occur in urban centres. Crashes can still occur at roundabouts, but are likely to be much less severe...Roundabouts are a proven solution for intersection safety
- Infrastructure improvements aimed at achieving safe, "self explaining" roads, where the road design and appearance provide a constant visual guide to drivers in choosing the appropriate speed.

VEHICLES

- The responsibility for vehicle safety innovation should not lie entirely with consumers. Vehicle manufacturers can be encouraged to take greater responsibility for investing in safety research and development and for

subsequently installing new technologies.

- The actions of the automobile industry represent another example of commercial interests delaying or obstructing implementation of some safety measures. Legislation on safer car fronts for pedestrian protection has been slow in being introduced as a Directive in the European Union, despite technological feasibility and sound evidence on the benefits. Although pedestrian protection is incorporated into EuroNCAP tests and star ratings given for it, the full potential benefits are not being achieved.

REVENUES

Allocating revenues from enforcement fines may also gain public acceptance for greater investment in safer roads. At the same time, one needs to be careful to avoid the appearance that fine collection has the primary purpose to fund road safety programmes: curbing risky behaviours must be the predominate purpose...For example, the perception that speed enforcement is to raise revenue for government and is not based on a real assessment of risk can undermine public support. Any possibility of corrupt use of funds raised will also have a very adverse effect on public confidence in the integrity and justification of road safety measures.

News

10th World Conference on Injury Prevention & Safety Promotion

Safety 2010 is a major world conference bringing stakeholders in the prevention of unintentional injuries and violence from around the world to debate, discuss and exchange information and experiences. The conference will be co-sponsored by the World Health Organization.

The key theme of the conference is **Safe and Equitable Communities**. This theme has been chosen to reflect the disproportionate burden from almost all types of injuries that falls on poorer communities. Such differences are apparent both within countries, between countries and even between global regions. The conference programme will cover all aspects of injuries and safety.

Practitioners, researchers and policy makers from health, criminal justice, education, public administration and industry are invited to join an international and diverse audience at **Safety 2010**. <http://www.safety2010.org.uk/> info@safety2010.org.uk Tel: +44 (0) 151 231 8797

The Effects of Transport Accessibility and Jobs-Housing Balance on Commuting Time: Evidence from Beijing **Pengjun Zhao, Bin Lu, Gerard J. J. Linden (2009) International Planning Studies, 14:1, 65 - 83**

Increases in commuting time have caused serious social and environmental problems in a physically fragmentizing mega-city. Some policy-makers attempt to solve commuting-related problems through alternative land-use policies, in particular mixed land use and multi-functional structures, rather than mere transport programmes. This paper investigates the effects of the jobs-housing balance on commuting time at the community level in Beijing. The paper puts forward a new indicator of home-based job proximity to measure the jobs-housing balance. A 1500 household based travel data set was used to aggregate the average. In fact, the results of a two step regression analysis suggest that 68.6% of the changes in average commuting time are explained overwhelmingly by the home-based job proximity variable. However, there are no significant associations between average commuting time and the variables of local public transport accessibility and private vehicle transport accessibility. Obviously, current urban policy, which relies predominantly on ambitious and expensive programmes of transport infrastructure provision must be rethought in Beijing. Improving the jobs-housing balance through the implementation of compact land development may be an alternative to reducing overall commuting duration.

Big Organizations and Climate Change: The Rubber Hits The Road And The Smell Is Awful. Social Science Seminar, CISAC, Stanford University, Stanford, CA 94305, April 16, 2009; Charles Perrow

We possess the knowledge and technology to stabilize our emissions of greenhouse gases within a few years, though it is possible that we have already passed the "tipping point." We would need iron clad regulations in the nations that make up roughly 80% of the worlds population. These regulations would substantially lower the standard of living in the industrialized nations for at least several decades. They would also probably slow the improvements in standards of living, or perhaps even reverse them, for the poorer nations. The so-called "political will" of the populations in these nations would have to be mobilized to force their governments to invest in policies that will favor future generations at the expense of the present one. These governments then would have to drastically change the goals of private corporations where they exist in the democratic industrialized nations, as well as the nation's own goals. It may be too late. Most estimates of the accumulation of greenhouse gases have been too low, new data indicates. And there are examples of unexpected interactions that have grave implications. I will conclude with just one: Canada's giant boreal forests used to suck up an estimated 55 million or more tons of CO2 annually. But the exploding beetle population, caused by global warming, is killing the trees, and their death releases up to 245 million tons of CO2 each year. Russia's massive boreal forest expanse is also hard hit by global warming, and wildfires have risen dramatically.

Establishment funds have been received from
Ministry of Industry, Government of India
Asian Institute of Transport Development
Tata Motors
Volvo Research and Education Foundations

Endowments for perpetual Chairs
Volvo Chair for Urban Transport
CONFER, India: TRIPP Chair for Transportation Planning

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