



**An Overview of
Current Research Projects
at the
Institute of Transport Studies
Dept. of Civil Engineering
Monash University**

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Abstract

This paper provides an overview of current research at ITS (Monash). The research activities at ITS (Monash) are focussed on four main program areas:

- ◆ Travel demand
- ◆ Transport operations
- ◆ Transport and traffic management
- ◆ Public transport planning and management

Individual projects within each research program area are described.



1. Introducing ITS (Monash)

The Commonwealth Government provided funding to Monash University, together with the University of Sydney, for the establishment of a Commonwealth Key Centre of Teaching and Research in Transport Management. The Centre, which commenced on 1 July 1995, is known as the Institute of Transport Studies (ITS) and has one node at Monash University and the other at the University of Sydney. The centre became self funding in 2001 and activities are focused through each of the two nodes (Sydney and Monash). The Director of ITS is Professor David Hensher, Professor of Management at the University of Sydney. A/Professor Geoff Rose is the Director of ITS (Monash).

The ITS (Monash) team includes:

- Professor William Young, Head of the Department of Civil Engineering
- Professor Graham Currie, Professor of Public Transport
- Professor Ken Ogden, Adjunct Professor
- Professor Rahmi Akcelik, Adjunct Professor
- Professor Tony Richardson, Adjunct Professor
- Associate Professor Geoff Rose, Director of ITS (Monash)
- Dr Majid Sarvi, Lecturer
- Mr John Clements, Senior Lecturer, Program Director, Transport Management course
- Ms Astrid de Alwis, Assistant Lecturer
- Ms Brenda O'Keefe, Administration Manager
- Ms Julia Arnold, Administration Officer (Finance)
- Ms Merle Chan, Research Student
- Mr Jim Youngman, Research Student
- Ms Rita Seethaler, Research Student
- Mr Tim Martin, Research Student
- Associate Professor Tan Wen Yeng, Research Student
- Ms Ruimin Li, Research Student
- Mr Richard Yeo, Research Student
- Mr Mark Karpovitch, Research Student
- Mr Dudung Purwadi, Research Student
- Mr Martin Abeling, Internship Student, University of Twente

This paper provides an overview of current research activities. The following section provides an overview of the research program and then individual projects are identified.

2. The ITS (Monash) Research Program

Transport research at ITS (Monash) is focused into four program streams with each covering a range of topics as listed below:

- ◆ Travel demand
 - Mobility management and travel behaviour change
 - Role of information (e.g. ATIS) in influencing travel behaviour
 - Transport and land use interaction
 - Disabled access
 - Demand response to innovative transport modes and technologies

- ◆ Transport operations
 - Road based public transport
 - Operations management
 - Environmental impacts
 - Intelligent Transport Systems
 - Non-motorised transport

- ◆ Transport and traffic management
 - Road space and traffic management
 - Investment appraisal and evaluation
 - Demand management
 - Policy

- ◆ Public transport planning and management
 - Service planning and development
 - Transport needs analysis
 - Demand assessment and forecasting
 - Rural and regional transport
 - Mass transit
 - Transport planning for special events

The following abstracts of current research projects have been classified under those research program streams. Funding source is noted where applicable.

3. Overview of Current Research Projects

3.1 Travel demand

- **Evaluation of the 2004 Monash University TravelSMART initiative (Rose).**

This report evaluates the TravelSMART initiative run at the Monash University Clayton Campus in 2004. Statistically significant changes in travel behaviour were measured between 2003 and 2004 with greater use of walking, cycling, public transport and carpooling. The survey revealed the components that students valued most (public transport tickets and information) and also provided insight into barriers which need to be overcome to increase the use of environmentally friendly modes of commuting to campus.

- **Enhancing South Dandenong employee access (Rose).**

Employers have noted concerns that some employees find it difficult to access workplaces in the South Dandenong area of outer South East Melbourne. The main concerns raised are poor public transport services, the widely dispersed nature of development and the lack of footpaths and bicycle facilities for access. ITS (Monash) is undertaking a feasibility assessment for development of an employee travel plan on this area. The feasibility assessment considers the range of suitable mobility options and the process through which a mobility plan could be developed for outer metropolitan employer(s).

- **Regulation of personal mobility devices (Rose).**

ITS (Monash) has continued a research interest in the regulation of motorised personal mobility devices such as scooters, power assisted bicycles and the Segway Human Transporter. A submission was made commenting on the Australian Transport Council's Working Group Report titled "Review of the Safety of, and associated rules for, scooters and other wheeled recreational devices" and an associated presentation made to the Victorian Bicycle Advisory Committee.

- **Impacts of in-vehicle navigation systems on travel behaviour (Chan/ Rose) –PhD project**

Merle completed her undergraduate degree in civil engineering at the University of Auckland prior to undertaking a research higher degree at Monash. Her study focuses on the mobility impacts of in-vehicle navigation systems but recognises that there are related safety impacts through changes to exposure. A field trial was used to explore the effects on travel behaviour of fitting an in-vehicle navigation system into the respondent's vehicles. Longer term impacts were examined using a stated preference questionnaire. Merle submitted her thesis in September 2004.

- **A study of parking in multi-use facilities (Tan Yan Weng/ Young) - PhD project**

Yan Weng is an Associate Professor in the School of Civil and Structural Engineering at Nanyang Technological University, Singapore. His current PhD research is in the area of parking systems design, with particular emphasis on developing an interactive stated preference approach to collect information on parking behaviour in multi-use facilities.



- **Travel behaviour change opportunities of major events (Rose)**

This study is exploring the potential of major events (specifically a “ride to work” day) to provide a basis for longer term travel behaviour change. The research is being conducted in conjunction with Bicycle Victoria and the Victorian Department of Infrastructure (DOI) and is funded by the Australian Greenhouse Office and DOI.

- **Impact of ticket parking on travel behaviour at Monash University – Clayton campus (Jenkinson/Rose) – undergraduate research project.**

This project undertakes a survey of the users of the day ticket facility in the new Engineering multi-level car park.

- **TravelSmart and car ownership decisions (Li/Rose) – undergraduate research project**

This study seeks to discover whether there is scope to develop an information and/or support program to influence a household’s car ownership decisions in a way which enables that household to continue to participate in activities while reducing motor vehicle use.

- **Parking behaviour (Zivanovic/Yeung/Young) – undergraduate research project**

The process of searching for a parking space is crucial in the design of parking facilities. It is necessary to understand how and why people search for particular spaces. This study investigates the search pattern for drivers in multistorey parking facilities.

3.2 Transport Operations

- **Predicting pavement performance at a road network and road project level (Martin/Young) – PhD project**

Tim is a principal research engineer with ARRB Transport Research Ltd, and commenced his PhD in April 2001. His project aims to develop improved network and project level roughness deterioration models. These will improve the reliability of the estimates of road wear and cost allocation, differences in road maintenance costs that are due to the various climatic regions in Australia and maintenance and rehabilitation scheduling along each road in the road network.

- **The modelling and intelligent optimisation of field service territories (Youngman/Rose) – PhD project**

Jim has many years of experience in operations research related to field service management through a long career with the RACV. Jim’s PhD research was focused on the strategic planning of field service operations, specifically the determination of optimal operating boundaries for field service teams. The aim of the project was to find a process for subdividing any region into territories that results in near minimal response times for service requests and sets an upper boundary on expected response times. Jim was awarded his PhD in July 2004.

- **Performance based standards for heavy vehicles (Young)**

This study has explored the role and potential for performance based standards in improving the economic, safety and environmental performance of the road system. This study is part of an Austroads project on Performance Based Standards for Heavy Vehicles.

- **Environmental impacts of transport (Young)**

This project explores the relationship between land use, transport and the environment. Long term changes in transport and their impact on land use and the environment are investigated.

- **Sustainability and urban transport (Young)**

This project explores the interaction between the transport system and sustainability of cities. The study proposes a number of projects and investigates their utilisation of framework acceptability.

- **Mobile phones as traffic probes (Rose/Sekercioglu/Ygnace)**

This study is exploring the scope for using mobile phones as traffic probes to collect traffic data. This technology has application to parts of the road transport network which is not instrumented with traditional data collection equipment. This is a collaborative project involving A/Prof Geoff Rose from ITS (Monash) along with Dr Ahmet Sekercioglu from Electrical and Computer Systems Engineering at Monash University and Dr Jean-Luc Ygnace from INRETS, France. The study is being supported by an Engineering Faculty Small Research Grant. .

- **Travel time prediction estimation (Ruimin Li/ Rose) - PhD project**

Ruimin has a Bachelor of Highway and Railway Engineering from the Inner Mongolia Polytechnic University and a Masters of Transportation Civil Engineering from the Southeast China University, and she has worked as a professional engineer in Beijing in highway and intersection design. Her current interests are in developing and improving various travel time prediction and estimation models. The models are being developed on the basis of the traffic data routinely collected by inductive loop detectors on motorways (speed, flow and occupancy) as well as probe vehicle data which can be provided by automatic vehicle identification systems.

- **The effects of emerging large road freight vehicles on the performance of Australian road pavements (Yeo, Young) - PhD project.**

- **Transferred technology based transport, infrastructure and engineering projects financed and undertaken in China and Asia (Karpovitch/ Young) - MEngSci project.**

High economic growth rates of the economies in Asia and China have meant increased transport and infrastructure construction project activity in the region. This programme of research aims to investigate and analyse the influence of systems of managing and financing large public transport and infrastructure projects on their outcome.

- **Vehicle drive cycles (de Marco/Warren/Young) – undergraduate research project.**

Data loggers are used to follow private and public transport vehicle movements through the road system. This data forms the basis of a study of vehicle drive cycles which will be used to help predict the levels of energy consumption and pollution created by vehicles.

- **Bicycle holding rails – help or hindrance? (Chau/Rose) – undergraduate research project.**

This study explores the application of bicycle holding rails and gauges user reactions in Melbourne. A survey of a number of sites provides a basis for correlating the different site characteristics with use and possible negative safety impacts. The project is being undertaken in conjunction with the City of Yarra.

- **Bicycle travel time and delay survey (Comport/Rose) – undergraduate research project.**

The study compares the speed data recorded by a portable GPS receiver with data logger and a wireless bicycle mounted computer/data recorder and then undertakes a field study to measure bicycle travel times and delays along some case study routes.

- **Alternative fuelled vehicles and transport policy (Fung/Rose) – undergraduate research project.**

3.3 Transport and Traffic Management

- **Accuracy and traffic simulation modelling (Young)**

This project looks at the reliability of traffic simulation models. In particular it investigates the assumptions made in the model and their impact on the output. Particular attention will be paid to assumptions about drivers risk taking.

- **Using stated preference method to examine travel preference in Indonesia (Dudung Purwadi/ Young) - MEngSci project**

A state preference approach will be used to investigate mode preference. Dudung hopes to transfer to the PhD program.

- **Modelling transport demand and parking management (Young)**

This project models urban travel on a city-wide scale using activity analysis.

- **Using the psychology of persuasion for effective implementation of transport policy (Seethaler/Rose/Allen) – PhD project**

Rita graduated with a Master of Economics and Political Science from the University of Berne, Switzerland, in 1994 and is presently a Director of the Urban Transport Institute, Victoria and an Associate of the Institute of Transport Studies (Monash University). She was awarded a PhD scholarship by the Victorian Minister for Transportation to develop evaluation approaches for “total transport” strategies. Rita is currently looking at this



concept from the perspective of developing and measuring the impact of psychological persuasion techniques on peoples' travel choices.

- **Road space allocation (Day/Young) – undergraduate research project**

The use of road space relates to the level of density of development and community needs and preferences. This project investigates the allocation of priority to vehicles on particular roads in terms of the road cross-section and the likely impact of change in allocation.

- **Road space allocation using a simulation program (Stebbing/Sarvi) – undergraduate research project**

This study investigates the impact of Green ratios on the performance of arterial roads.

- **Road space allocation using simulation program (freight) (Powell/Sarvi) – undergraduate research project**

This study investigates truck interaction with public transport in the same lane of traffic.

- **Road space allocation using simulation program (Bowden/Sarvi) – undergraduate research project**

This study investigates the impact of dwell time of buses on travel time and delay on a '2 by 2' arterial road.

- **Modelling of weaving phenomena observed during traffic congestion (Young/Sarvi)**

This work focuses on a little researched area of modelling vehicle acceleration-deceleration behaviour during weaving manoeuvres under congested traffic situations. Traffic congestion frequently occurs at weaving bottleneck sections and it is vital to investigate traffic behaviour and characteristics during traffic weaving processes under congested traffic flow in order to design safer and less congested weaving points.

- **Weaving section study (Sittiarjharn/Sarvi) – undergraduate research project**

This study focuses on the weaving manoeuvre in congested conditions in Melbourne. In this preliminary study, all suitable sites to conduct data collection are investigated.

- **Pedestrian and cyclist conflicts (Cuthbert-Sayers/Rose) – undergraduate research project.**

This project examines the conflicts between cyclists and pedestrians and explores the extent to which this is a behavioral problem or an infrastructure problem. A key part of this project explores Australian and overseas experience with conflicts on these facilities, and in particular identifies whether the introduction of more powerful electric power assisted bicycles overseas has increased these conflicts.

4. Public Transport Planning and Management

- **Improving methodologies to assess on road public transport priority (Currie/Sarvi/Young)**

This project examines previous approaches to allocating road space for all users and also reviews approaches to giving public transport priority in road space allocation. A new approach to determining 'optimum' road space allocation is developed using a Social Cost Benefit approach. Advanced micro-simulation approaches to model traffic impacts of alternative public transport priority designs is used to determine guidelines for 'optimal' road space allocation in relation to public transport. The project is being funded by Vic Roads.

- **Identification of spatial gaps in public transport provision in relation to transport needs in the community (Currie)**

A major requirement of public transport in median and smaller urban centres is that they are provided effectively in relation to social need for transport. However no techniques are available or used to assess the effectiveness of public transport in catering for needs particularly on a spatial basis. This project develops an innovative set of techniques in this area and has been applied in recent work in Tasmania.

- **The demand performance of Bus Rapid Transit (Currie)**

Compilation of valuations of passenger trip attributes which vary with transit mode to identify how bus rapid transit projects compare with heavy and light rail. Included an international review of available evidence. The results suggest demand performance should be similar however the research has identified weaknesses in the research approaches adopted and in the coverage of research in this area.

- **A review of Australian Bus Rapid Transit system developments (Currie)**

A review of current developments in the field of bus rapid transit in Australia with an emphasis on performance, lessons learned and future plans. The review is undertaken for the international session on BRT applications for the 2005 Institute of Transportation Engineers conference.

- **Innovative accessible tram stop design (Currie, Smith)**

A review of the performance of an innovative tram stop design using a speed hump as a means of providing at grade access to a centre road located tram service from a kerbside stop. To date speed reductions for through traffic have been documented and customer satisfaction is positive. The project is undertaken in collaboration with the City of Port Phillip.

- **Features of successful real time passenger information systems (Currie, Burke)**

A review of the successful features of systems providing real time passenger information systems for rail, tram and bus systems. The project is undertaken in collaboration with the Connexionz New Zealand.

- **A review of the performance of the Athens 2004 Olympic transport system (Currie)**

A review of the operations of the spectator and olympic family transportation system for the 2004 Olympic Games. Included a review of day to day performance, an assessment of reports from the various Olympic transport agencies and media monitoring throughout games time. The outcomes of the research were presented to the Bus Association Victoria as an input to transport plans for the 2006 Commonwealth Games in Melbourne.

- **A review of the performance of the Atlanta 1996 and Sydney 2000 transport system (Currie)**

A review of the operations of the spectator and olympic family transportation system for the 1996 and 2000 Olympic Games. The review was undertaken as part of the planning for the 2004 Athens Olympic games and was presented at the 8th International Conference on Applications of Advanced Technologies in Transportation Engineering ASCE in Beijing in May 2004.

- **Knowledge management in Australian public transport (Currie)**

A review of the way in which knowledge regarding urban public transport planning and management is managed in a range of international countries including a comparison with approaches in Australia. The study found significant gaps in Australian approaches with a lack of a coordinated national approach to knowledge development, retention and distribution. The findings were presented to the second Australian National Public Transport Summit.

- **Transport and social exclusion in metropolitan, rural and regional Australia (Currie)**

A review of international and Australian research concerning travel for the transport disadvantaged in rural and regional Australia. At this stage the project has focused on a literature review although some analysis of aggregate transportation statistics for rural and regional areas has been undertaken. Key preliminary findings were presented to the Victorian Planning and Environmental Law Association Annual Conference in 2004.

- **Planning for metropolitan rail rail interchange (Abeling, Currie)**

This project aims to identify types of rail-rail interchange in Melbourne and to assess the quality of planning and design to cater for transfers between trains. The project included an international literature review and the development of a typology of rail-rail interchange types for Metropolitan Melbourne. Field work has established that planning and design is focussed on only certain types of stations whilst important kinds of transfer behaviours are not being catered for. The research is part of an international student research project in cooperation with the University of Twente in the Netherlands.

- **Investigating tram pedestrian collisions (Logan/Currie) – undergraduate research project**

The project reviews tram pedestrian collision information through available research literature and performs an interrogation of the tram incident database provided by Yarra Trams. The research has identified significant reductions in accident rates as a result of the introduction of ‘super stops’.

- **Review of kerbside tram stop safety (Wright/Currie) – undergraduate research project**

Almost two thirds of tram stops in Melbourne are kerbside stops. This project includes a review of available tram safety literature, traffic regulations and an analysis of a tram company incident database, and looks for practical solutions to the problems raised.

- **Designing for pedestrians (Macdermott/Currie) – undergraduate research project**

This project considers design principals and practice to improve the travel environment for pedestrians. A review of relevant research and design literature is undertaken and techniques for the assessment of the ‘walkability’ of urban environments reviewed.

- **The design of public transport interchanges and terminals (Ross/Stewart/Currie) – undergraduate research project**

These two projects include a review of research literature regarding public transport stations, terminals, interchanges and bus and tram stops in order to understand the design requirements, techniques for evaluating interchanges and good practices and innovations in design.

- **Bus rail coordination (Firgaira/Lim/Currie) – undergraduate research project**

Two projects are being undertaken in this area. They include a review of relevant research literature, site surveys of coordination arrangements at Huntingdale Railway Station and surveys of scheduled and actual departure and arrival times of trains and buses.

- **Public transport stop analysis (Radion/Cheng/Sarvi) – undergraduate research project**

This study focuses on the functionality of different tram stops in terms of safety and interaction with general traffic.

4. Further Information

Further information about the activities of ITS (Monash) can be found on the web at:
<http://www-civil.eng.monash.edu.au/its>
or by contacting:

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