



Dr Matthew Cuthbertson

CEO's Message

Welcome to the latest edition of AutoCRC Updates.

AutoCRC is committed to becoming a CRC success story and we are pleased to report that as we head into 2008 we have an active and robust project portfolio and we are well on track to deliver target outcomes from the Commonwealth Agreement.

There are now 28 AutoCRC projects underway at 11 research locations in 5 states, with more than 200 researchers and students involved.

AutoCRC has also achieved one of the most important objectives contained in its Strategic Plan, to engage a larger number of automotive industry firms in relevant research projects and to extend the beneficial impact of AutoCRC's research activities to a wider cross-section of automotive SME's.

AutoCRC's engagement with the Australian Telematics Cluster brought six new companies into the AutoCRC research program through projects on LPG Conversion for Heavy Trucks, Traffic Probes and a Standardised Approach to Energy Management/Driver Interfaces for Emergency Vehicles.

Three new Projects in the Materials and Sustainable Manufacturing Theme are:

- **Advanced Riveting System** – to demonstrate further the effective, efficient application of GM patented rivet technology for new alloys.
- **Advanced Weld Modeling** – looks at modeling welding processes to optimise manufacturing processes used in joining new materials.

- **Tool Wear Prediction** – to develop an instrument to predict the likelihood of tool wear problems for new tool design and facilitate solutions for the use of advanced high strength steels in stamping.

Two new Projects in the Safety & Intelligent Vehicles Theme are:

- **Traffic Probe** – to determine the minimal percentage penetration required of probe vehicles in order to offer service improvement, while optimising the flow of transmitted data between probe vehicles and infrastructure.
- **Wireless Communication Standards Framework** – This project addresses the fragmentation within the communication industry as it affects automotive wireless application and will aim to follow world's best practice by creating a cluster of manufacturers to develop standards.

I am pleased to report the successful ongoing progress of the Automotive Supplier Excellence Australia (ASEA) project. ASEA is an unprecedented whole-of-sector program to enhance the sustainability of Australia's \$10b automotive component supply base (www.asea.net.au) facilitated and managed by AutoCRC.

ASEA involves all four local motor vehicle producers, State and Commonwealth Governments and the Federation of Automotive Products Manufacturers.

ASEA Stage 1 (completed in June 2007, with survey/workshop inputs from over 100 companies) has provided a definitive competency framework for a competitive, world-class supplier. ASEA Stage 2 due for completion in April will complete a comprehensive benchmarking program (against the metrics identified in Stage 1) for 62 component suppliers in Victoria and South Australia.

Education and the provision of a new generation of engineers and designers for the Australian Automotive Industry is an important element of the work of AutoCRC.

During 2007, 47 industry-based undergraduate student projects were completed involving 70 final-year engineering, industrial design and computer science students across 7 universities. Fifty new student projects have already been allocated to universities for 2008 (see Education Report story).

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CEO's Message *continued*

A comprehensive risk management framework has been established that will be the subject of continuous reporting by Management and monitoring by the Board through the Audit and Financial Risk Committee. A new IP & Commercialisation Committee was constituted in November to review AutoCRC IP audits.

I would like to welcome three new directors who have recently joined the AutoCRC Board: Mr. Graeme Lane, whose career spans an impressive 30 years with GM Holden Ltd; Mr Anthony Wilkinson, Head of Commercial Operations at GKN Aerospace and Professor Caroline McMillen Pro-Vice Chancellor Research & Innovation, University of South Australia.

Dr Matthew Cuthbertson
CEO AutoCRC

AutoCRC Project will Study Older Drivers

An AutoCRC funded project will see Monash University accident researchers use one of the world's most advanced portable driving simulators (the first of its kind in Australia) to test older drivers.

With the number of drivers aged 65 and over set to more than double on Australian roads in the next 30 years understanding the behaviour of older drivers is crucial for determining how roads, cars, training programs, in-car technologies and government policies can make Australian roads as safe as possible for all road users.

The Minister for Innovation, Industry, Science and Research, Senator Kim Carr, launched (29 Jan 08) the new driving simulator, the EF-X, recently acquired by the Monash University Accident Research Centre (MUARC).

Professor Brian Fildes, MUARC Chair of Road Safety, said state-of-the-art 3D visuals created an exceptionally detailed driving simulation which replicated the full range of driving conditions including night, rain, fog and bright sunlight.

"The EF-X strengthens our researchers' ability to go into the community and collect large amounts of detailed, reliable data on the behaviour of Australian drivers. Its arrival represents an important new era in safety research."

Older drivers will undergo an eight-minute simulated drive testing their skills in a range of situations known to challenge some older drivers, including merging, major intersections, right turns and avoiding sudden obstacles. Younger drivers will also be invited to complete the simulated drive so the performance of different age groups can be compared.

MUARC Senior Research Fellow, Dr Judith Charlton, said understanding the behaviour of older drivers was crucial for determining how roads, cars, training programs, in-car technologies and government policies could make Australian roads as safe as possible for all road users.



An older driver in the simulator

Below: Dr Judith Charlton



The older-driver study is being funded by the AutoCRC (Auto Cooperative Research Centre) in association with Monash University and GM Holden. The simulator will be rotated between two major Melbourne dealerships – Barloworld Holden in Glen Waverley and John Collins Holden in Mornington – throughout 2008. Any licensed drivers can take part in the study.

Richard Marshall, GM Holden's Director of Innovation, said he was excited to be working with MUARC on such a valuable study. "Australia has an ageing population and it's essential to invest in understanding how older drivers perceive and respond to potential hazards," Mr Marshall said.

"There's no doubt our focus at GM Holden has expanded to include accident avoidance as well as continuing to improve passenger safety if an accident occurs. With powerful research tools such as this EF-X simulator, we're confident this will assist us to develop potentially life-saving technologies, features and vehicle design solutions. This project reinforces GM Holden's and MUARC's commitment to real world safety."



AutoCRC Project Wins National Award

AutoCRC postgraduate student Faisal Mufti was awarded 'Australian Pattern Recognition Society (APRS) Best Student Paper Prize' by DICTA 2007 Committee and the APRS for his paper 'Super-Resolution of Speed Signs in Video Sequences'.

He has worked in collaboration with Seeing Machines on speed signs detection and recognition as part of the AutoCRC project, 'Vision based collision avoidance'.

Faisal has implemented a technique called 'Super-resolution' using a number of low quality and scale varying images from a video stream recorded from an on board camera in a vehicle.



Faisal Mufti

The main idea was to develop a stochastic and iterative filtering framework for the motion model of the vehicle for a small interval of time to improve the quality of a final super resolved image.

The final images are of better quality than any of the individual images or images obtained through other classical super resolution algorithms and can be better used in classification and recognition purposes.

Annual Report 2007 In Brief

Achievements

Significant milestones have been reached in projects across all four AutoCRC research themes, e.g:

- Low-cost, environmentally friendly material, as potential substitute for polyurethane foam
- Novel designs for automotive seat adjuster mechanisms
- Design guidelines for next generation vehicle ventilation system fans and ducting
- Concept study for Australian lightweight/high fuel efficiency vehicle – as basis for focussed industry workshops
- New recommendations for design of child seats and vehicle-side attachment systems
- New algorithms for fast-moving object recognition and voice recognition in noisy environments
- Concept demonstrator for virtual training system for automotive production line operators
- Standardised approach for emergency vehicles with improved power-supply management for multiple-in-vehicle technologies.

Significant achievements were also made in management systems and projects eg:

- A unique web-enabled project management portal has been developed and implemented for inception, budgeting and tracking of AutoCRC projects. The web portal is already become an essential management tool and has wide potential applicability across the CRC program.
- A high performance computing and visualisation facility has been established at Port Melbourne headquarters, accessible to AutoCRC researchers across Australia. (This was made possible by a \$1m grant under Victorian Government's Science Technology and Innovation program.)
- A new centre has been created at UniSA for motion capture and vehicle ingress-egress studies.





Focus on Projects

In this edition of AutoCRC Updates we look at the AutoCRC Automotive Wireless Communication Project

The new age of in-vehicle user information from tolls payment as you go to finding an empty car parking spot and automated home services (turn the dinner on as you drive home) can come sooner-or-later to Australia.

AutoCRC's latest project is designed to make it sooner by developing standards for automotive wireless communication. The name of the technology is Dedicated Short Range Communications (DSRC) which has been developed in Europe, US and Japan but will need to be adapted for Australian conditions (we have much larger rural areas).



Driverless cars may be possible in the far future. Cars in front of you can warn you of road conditions they encounter before you see it ahead. Roadside infrastructure can also wirelessly warn of conditions (like road works, parades, etc).

Another aspect of this technology is the reduction of traffic. Roads can communicate to cars reporting how congested they are and suggest alternative routes. This will allow for quicker journeys and less time waiting in traffic. As well as being convenient, the amount of emissions produced by cars in traffic will be reduced.



A solution to traffic gridlock through more efficient use of existing infrastructure may be one early spin-off from advanced wireless transport communications along with (eventually) the driverless (smart car).

Project leader, Mark Looi of QUT says, "The technology has the potential to provide a vast array of safety and driver assistance including enhanced navigation, traffic management (fastest routes taking into account traffic flows and road works etc) and vehicle safety.

Some examples are to assist drivers to avoid collisions by giving verbal or visual warnings of potential collisions or even to control braking and acceleration of the car to stop it from colliding. This is useful also for merging traffic. The advantage of this technology is that warnings can be sent directly to the car's drive system to react fast enough to prevent accidents.

Of course this is only road safety, but there are lots of commercial applications too. Finding empty car parks, playing computer games with passengers in other cars and receiving tourist information, are just some examples.

The aim is to enable wireless communication technology to reach the market at a lower cost, and avoid the chance of wireless communication hardware manufacturers developing conflicting protocols. A unified standard will prevent conflicting communications protocols.

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Focus on Projects

Automotive Wireless Communication Project *continued*


The Project aims to develop a cluster of government, industry and automotive organizations focused on developing and establishing automotive wireless communication standards for the DSRC technology in Australia.

The initial objective of this Cluster is the allocation of spectrum for ITS (Intelligent Transport Systems) in Australia.

Mark Looi says, "The major task is the development of and the adoption of a single national standard supported by the Australian wireless communication and transport industries. Reserving channels in the radio frequency spectrum is important because we don't want other signals interfering with DSRC communications. We don't want mobile phone calls, wireless LANs or other signals causing car accidents".

The first steps in the project involve benchmarking world's best practice, researching existing standards, (national & international), via a number of research institution/s and reporting the findings.

The standards framework being developed is primarily for wireless communication concerning passenger and light commercial vehicles and heavy vehicles such as trucks and buses. It could be introduced to other ground based transport systems such as rail and tram systems. This technology could help prevent many road and rail accidents.



The three stage project is planned to culminate in a series of trials and demonstrations of IVC (the broad application of inter-vehicle to inter-infrastructure communications) products or prototype products including some specific road safety applications, specific mobile applications, precise navigation applications and other non-ITS applications.

Some features involve accident avoidance. If there is an accident ahead, cars will be able to communicate to cars behind them warning them to take a different route. Police, Fire and Ambulance vehicles will be able to warn drivers to move away or take alternate routes. You know yourself when an ambulance is coming for the first little while you don't know exactly which lane the ambulance will take. This technology will alert drivers to change lanes even before they see the ambulance. Thus emergency vehicles will not have to slow down to avoid traffic. Emergency vehicles will be able to communicate with traffic lights to ensure that they change so they can pass through, thus avoiding accidents with emergency vehicles.

Participants in the project are AutoCRC, GM Holden Ltd and QUT. Road safety is the key development offered by this project. We believe the project can assist in greatly reducing the road toll and by making cars intelligent we hope to reduce traffic and vehicle emissions, offering a cleaner environment.



The automotive wireless project will improve road safety and assist emergency vehicle access to accidents



AutoCRC Awards \$1.8m in Postgraduate Scholarships

The AutoCRC Education and Training Committee evaluated 40 proposals for postgraduate student research projects and awarded scholarships totalling \$1.8 m for 18 three-year research projects to be started by August 2008.

A full list of the projects which have won AutoCRC funding is below.

Research Topic	Research Supervisor	University
Stamp Forming Analysis of Lightweight, Recyclable Composite Materials	Ass Prof Shankar Kalyanasundaram	ANU
Leveraging Eye-Gaze and Operator Observation to Improve Safety	Prof Tom Gedeon	ANU
Development of Novel Crash Structures	Prof Peter Hodgson	Deakin University
Metal Foam Core Sandwich/Tubular Structures for Automotive Applications	Dr Cui'e Wen	Deakin University
Smart Seat for Monitoring Driver's Attentive State and Detecting Early Sign of Fatigue	Dr Mary F. She Ass Prof Lingxue Kong	Deakin University
The Fatigue Behaviour of Cost Effective Magnesium and Titanium Alloys	Dr Aiden Beer Dr Matthew Barnett	Deakin University
An Experimental Study of Combined Cold Expansion and Localized Severe Plastic Deformation on Improving Fatigue Performance of Fastener Holes	Dr Shahin Khoddam	Monash University
Porous Media Homogenous Charge Compression Ignition	Dr Jamil Ghojel	Monash University
Automatic Audio Visual Speech Recognition in Vehicles	Prof Sridha Sridharan	QUT
Building a Real Time Augmented Map for Road Risk Assessment	Ass Prof Andry Rakotonirainy	QUT

Research Topic	Research Supervisor	University
Developing a Smart Explanatory and Advisory Functionality in Knowledge-based Engineering Systems for Manufacturing Design	Prof Xinghuo Yu	RMIT
Nanostructured Pigments for Automotive Industry	Prof Sati Bhattacharya	RMIT
Developing Numerical Model for Flow-Induced Vibration Excitation Mechanisms towards Virtual Laboratory Simulation	Dr Jiyuan Tu	RMIT
Safe and Reliable Integration and Deployment Architectures for Automotive Software Systems	Prof Jun Han	Swinburne University
Developing Lightweight Vehicle Structures (2)	Prof Guoxing Lu	Swinburne University
Development of Gradient Index Optical Coatings for Polycarbonate by Plasma Polymerisation	Prof Hans Griesser	UniSA
The Development of Advanced Adhesives based upon Nano-additives	Dr Jun Ma	UniSA
Using Augmented Reality to Support Human Manufacturing Personnel	Prof Bruce H. Thomas	UniSA



Undergraduate Project - New design Features for a Safer Seat

One of the AutoCRC Undergraduate Project students for 2007, Chris Simmons of Monash University, was asked to develop a seating concept that could cater for the needs of the elderly by the year 2015 and beyond.

Chris's unique design has taken into consideration many key elements of AutoCRC participants, Futuris Automotive Interiors' innovation strategy and includes:

- A unique overhead mounting system that offers inverted crash dynamics intended to eliminate upper body and whiplash injury
- Easy entry/exit features that assist an occupant with limited mobility, including accommodating a wheelchair
- Modular systems capable of being stowed in the headliner and able to be reconfigured to free up vehicle cargo space
- Use of lightweight renewable composite materials.

Chris's project has been presented in a series of forums including his final assessment at the Monash University, AutoCRC final student forum 2007, to Futuris and at a Society of Automotive Engineers' meeting. It has generated much discussion around its unique solutions to vehicle seating for an aging population.



Chris Simmons demonstrating his new seat concept



Welcome to AutoCRC

We are pleased to welcome a new member of staff to AutoCRC.

Ms Anjana Panditaratne has been appointed to the role of Projects Coordinator.

Anjana began full time work with AutoCRC on 7 January 2008. Before this she was contracted on temporary assignment with AutoCRC to assist with various administrative support tasks.

Anjana has extensive experience with university/research activities and is currently completing a Bachelor of Electrical and Electronics Engineering degree at RMIT.



Anjana Panditaratne

Postgraduate Success

Congratulations to Khandoker Neamul Ahsan Noman from RMIT whose Masters thesis has been accepted without correction. Noman's work has been instrumental to the C1-03, Alternative Seat Adjuster Mechanism project. His thesis was titled *Development of Spot Weld Models for Crash Simulation*.



The Role of the AutoCRC Education & Training Committee

AutoCRC has committed to an investment in postgraduate education in excess of \$6 million.

A key role in administering this program will be played by the newly constituted Education and Training (E&T) Committee which has a charter to develop AutoCRC's education and training programs through:



Kate Neely

- Ensuring that policies, procedures and agreements are developed and implemented for all AutoCRC education programs.
- Maintaining an overview of AutoCRC's postgraduate research program and to make recommendations regarding its implementation and funding.
- Selecting postgraduate research proposals for AutoCRC support.
- Maintaining an overview of AutoCRC's undergraduate education program.
- Facilitating AutoCRC involvement in coursework development and faculty advisory committees with our participant universities.
- Instigating and reviewing evaluation of AutoCRC education programs.
- Maintaining an overview of AutoCRC's professional development program.
- Developing and implementing effective strategies for knowledge transfer between industry and universities.

The Chair of the committee is AutoCRC Director of Education – Prof Aleksandar Subic of RMIT.

For further information about the committee please contact Kate Neely, AutoCRC Education Coordinator, phone (03) 9647 2990.

AutoCRC Industry Based Final Year Undergraduate Projects

The 2007 program is now completed and a number of reports will be made available via our website in the near future. The 2008 program is just getting underway with a few enthusiastic students working over the university break to get a solid start on their projects.

We are expecting to have close to 100 students working on 50 projects with our industry participants over the year. All of our participants and colleagues are welcome to attend the student forums during the year and have a look at how well the projects are progressing and how well graduates from our universities handle the pressure of giving technical presentations to a professional audience.

The program for the 2008 will be:

Forum 1 - Poster Session

3 April 08, 6.00 pm - 8.00 pm,
Deakin University

Forum 2 - 5 minute reviews

14 August 08, 6.00 pm - 8.30 pm,
La Trobe University, Bundoora

Forum 3 - 15 minute final reports

16 October 08, Monash University, Caulfield

Events to watch out for in 2008

Check our website for regular updates

- AutoCRC IP Workshop – 30 April
a must to attend for all project leaders and champions
- AutoCRC AGM – 20 November