

SYMPOSIUM

USING TECHNOLOGY TO REDUCE WILDLIFE-VEHICLE COLLISIONS:

Identifying future directions and opportunities for research trials.

TUESDAY 21 MAY 2024

Aerial UTS Function Centre,
Bldg 10/Level 7, 235 Jones St, Ultimo, NSW
and Online via Zoom



Nicola Jackson

POSTER

The application of airborne eDNA to minimise wildlife-road kills

Linear transport infrastructure (e.g., roads, railways) stands as one of the main culprits of anthropogenically caused biodiversity decline. Because it fragments landscapes, linear transport infrastructure ultimately results in a myriad of direct and indirect ecological consequences for wildlife, including, but not limited to, increased mortality and injury through road kill. Measures to reduce roadkill are often expensive, ineffectual (e.g. wildlife fences and wildlife over/underpasses) and fencing entire road networks is simply not realistic, potentially causing more harm than good. So how do we identify potential roadkill hotspots for the prioritisation of fencing and location of wildlife crossings in a cost-efficient manner? Here, I will show how the analysis of animals' DNA present in the air through shedding (airborne eDNA) can identify their close interactions with major road infrastructure allowing for a cost-effective and adaptive management approach.

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**Associate Professor
Julie Old**

POSTER

Wombat Roadkill Reported to WOMSAT

Roads directly impact wildlife through vehicle collisions. We analysed wombat roadkill reported into WomSAT (Wombat Survey and Analysis Tool), a website and application where citizen scientists can upload sightings of wombats, to map wombat roadkill across their distribution. We used Maxent software to identify the main factors influencing wombat roadkill hotspots. A total of 2,391 wombat deaths on roads were reported by 567 citizen scientists from 2015 to 2019. More wombat roadkill deaths occurred in winter, with most unaffected by sarcoptic mange. The most roadkills reported per kilometre occurred on Old Bega Road and Steeple Flat Road, in the New South Wales southern tablelands. Reduced reporting corresponded with a reduced number of citizen scientists continuing to report sightings over time, reflecting the limitations of the data collected by citizen scientists. However, data should continue to be collected by citizen scientists as it is an easy and low-cost method of collecting data over large areas and can provide information to managers to support conservation efforts directed at reducing roadkill. Our study emphasises the need to continue to engage and reward citizen scientists for their efforts.

BIOGRAPHY

Associate Professor Julie Old joined Western Sydney University in 2006. She has expertise in comparative and developmental immunology, native mammal biology, wildlife management, conservation and citizen science. She completed her PhD in 2002 in marsupial immunology and worked as a postdoctoral research fellow at Macquarie University prior to commencing her position at WSU. Julie's research combines immunology, developmental biology, molecular biology, anatomy, microscopy, ecological techniques and citizen science to solve important issues in wildlife health and disease, especially marsupials. She established the School of Science and Health Small Native Mammal Teaching and Research Facility in 2009 and continued to manage it for teaching and research until 2018, and is the Chief Investigator of the Citizen Science project, WomSAT. Since 1998, her research has resulted in over 110 research publications in high impact journals including PLoS One and DCI, and a regular reviewer of national and international journals and research grant applications. Julie is a Director on The Wombat Foundation Board, and a member of the NSW National Parks and Wildlife Service Advisory Council, Audit and Compliance Committee, and Metro Regional Advisory Committee, and Environmental Trust Invasive Species Technical Review Committee. Julie has been recognised internationally as a Senior Fellow by the Higher Education Academy for her excellence in teaching undergraduate and postgraduate students, and support of those new to teaching in Higher Education.

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Li Kunming



Ioni Lewis



Sebastien Glaser

POSTER

Enhancing Road Safety and Wildlife Conservation in Regional Australia: The Development of a Novel Large Animal Activated Roadside Monitoring and Alert System

Wildlife-vehicle collisions (WVCs) present a significant threat to wildlife conservation and human safety, particularly in wildlife-rich areas like regional Australia. Conventional mitigation measures, such as wildlife crossings and fencing, are often limited by geographical and financial constraints. Innovative machine-learning-based approaches have emerged as promising solutions for animal detection; however, these approaches face challenges in detecting species where there is insufficient existing data for model training. This collaborative study, conducted by the University of Sydney, Queensland University of Technology, and Queensland Department of Transport and Main Roads, develops a novel large animal activated roadside monitoring and alert (LAARMA) system. The system monitors roadside animals via cost-effective perception sensor suite and alerts motorists to the safety hazard in real time via purpose-designed messaging displayed on roadside variable message signs (VMSs). An innovative feature of the animal detection is its self-supervised learning pipeline, which enables the system to automatically label real-world animal data collected during field operations, continually improving its accuracy and reliability without extensive human supervision. Prior to their use in the on-road trial of the technology, a series of messaging concepts were developed, concept-tested via qualitative focus groups and evaluated via a large-scale online survey of drivers' responses to messaging. Such aspects were underpinned by robust conceptual and methodological approaches to message design and evaluation; namely, the Step approach to Message Design and Testing (SatMDT). Two selected messages were evaluated on 50 participants in a 40-minute drive in a driving simulator study to evaluate the fine response to the developed messaging strategy. The overall system's performance and road safety outcomes are evaluated using field data from the real-world system deployment at a site in Far North Queensland.

BIOGRAPHY

Dr Kunming Li is a Research Associate specializing in robotics at the Australian Centre for Robotics (ACFR), the University of Sydney. He obtained his PhD from the same institution, focusing on interaction between autonomous vehicles and pedestrians. Prior to his current role at the ACFR, Kunming completed his bachelor's degree at the Australian National University. His research interests are centered on enhancing the capabilities and safety of intelligent transportation systems and autonomous driving technologies. Dr Mao Shan is a Research Fellow at the ACFR, the University of Sydney. He received his Ph.D. degree from The University of Sydney in 2014. His research areas include connected and automated vehicles, object detection and tracking, multi-modal sensor fusion, and V2X-based cooperative perception. Prof Sebastien Glaser is a Professor at CARRS-Q (since 2018) and Centre Director for the ARC Training Centre on Automated Vehicles in Rural and Remote Regions, having previously contributed to and led research projects & teams in Europe. He has significant experience working with the automotive industry. His research focuses on the safe interaction between automated vehicles and other road users. Professor Ioni Lewis has over 20 years' experience in traffic psychology. Currently, she is a Principal Research Fellow at CARRS-Q, QUT. Her expertise relates to the design and evaluation of behaviour change strategies including public education and advertising campaigns. Dr Stewart Worrall leads the intelligent transport systems (ITS) group at the ACFR, the University of Sydney. His research is focused on enabling vehicle automation by understanding the complex interactions that occur in an urban road environment. This includes exploring challenges in perception, localisation, obstacle detection/avoidance and path planning and prediction.

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Rob Appleby

POSTER

How species-specific roadside repellents might help reduce wildlife-vehicle collisions

Given the enormous toll wildlife-vehicle collisions (WVCs) have around the world and in Australia each year, there is an urgent need for innovative new approaches to WVC mitigation. One area that currently has limited options available in terms of mitigation is roadside, wildlife repellents. Aversive conditioning theory, combined with state-of-the-art technology offers new avenues for exploring and advancing the efficacy of repellents. I will demonstrate two key elements of a proof-of-concept repellent that promises to be a cost-effective and highly adaptable solution for WVC applications and beyond. Element 1 consists of a wirelessly activated sound and light system that can be easily adapted or modified by users to suit different species, either singularly, or in combination (e.g. in areas where multiple species might be involved in WVCs). In addition, there is scope to add a variety of other stimuli that might enhance aversion and reduce the prospect of habituation. Element 2 consists of a thermal imaging camera (swappable with an RGB camera) and machine learning edge module, capable of running streamlined animal detection/classification algorithms and then activating element 1 accordingly. Further development is required to create robust and reliable detection algorithms specifically for species such as koalas and wallabies, as well as improving energy efficiency. Research is also required to establish consistently reliable aversive stimuli for these and other Australian species often involved in road strikes. Once fully-developed, it is envisioned that this system will be one of the most flexible and effective options available as a roadside repellent.

BIOGRAPHY

Dr. Rob Appleby is a wildlife ecologist and behaviourist specialising in human-wildlife conflict. In 2010 he co-formed a wildlife and conservation technology company (Wild Spy Pty Ltd) that develops state-of-the-art wildlife monitoring and management devices. Wild Spy has worked extensively with government agencies including DTMR, numerous Universities both in Australia and overseas, as well as the BBC Natural History Unit and NHK (Japan), on a wide variety of technologically challenging projects. Rob splits his time between Wild Spy and research at Griffith University, where he is currently examining the utility of smart signage in reducing koala strikes in Redland Bay, ways to improve wildlife warning systems for drivers and developing roadside repellents to discourage wildlife from entering roads at the wrong time.

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Steve Béga

POSTER

Identifying the most appropriate technology for detecting wildlife on roads and how this could help you.

As part of the ongoing effort to reduce wildlife-vehicle collisions and improve habitat connectivity in the United States, transport authorities have been considering implementing new wildlife detection and driver warning systems. Using case studies from the USA and Europe we will describe how we have been designing systems in contrasting environments and provide you with key factors you should consider when looking to propose and design a system. Within this presentation we will walk through the steps that the transport agencies and their collaborators have taken to identify the need and interest in designing and implementing systems. We will also share how the design team has analyzed each location and describe the design process. As part of this we will talk through the technologies that were considered and highlight the reasons certain technology has been proposed over others. Some aspects that will be described will be based on terrain, target species, existing infrastructure, budget and other factors. - Technologies that have been considered and will be described include: - Passive Infrared - Active Infrared - Radar - Lidar - Thermal

BIOGRAPHY

Steve Béga, has been leading research and development for Animex International for the last 10 years. He has collaborated with a range of government agencies and NGOs across the world to identify and design effective fencing solutions for reducing wildlife vehicle collisions and improve habitat connectivity.