

# RAC Intellibus<sup>®</sup>

## Australia's first and longest-running public driverless vehicle trial

South Perth, Busselton & Geraldton  
2016 - 2023



**For the better**



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# Key achievements



Theme	Year(s)	Key Achievement
<b>Launch &amp; National Leadership</b>	2016	Launched the RAC Intellibus®, which has become the longest-running AV public road trial in the country (31 August 2016).
<b>Awards &amp; Recognition</b>	2016–2018	Recognised with multiple national innovation, safety and transport awards, including: <ul style="list-style-type: none"> <li>&gt; Australian Driverless Vehicle Initiative – <i>Innovation Award</i> (Automated Vehicle Trial).</li> <li>&gt; AIM West Business Pinnacle Awards – <i>Innovation Award</i>.</li> <li>&gt; ITS Australia – <i>Automated Vehicle Award</i>.</li> <li>&gt; Australian College of Road Safety – <i>Diamond Road Safety Award</i>.</li> <li>&gt; Australian Institute of Traffic Planning &amp; Management – <i>Excellence Awards (Best Project)</i>.</li> <li>&gt; International Transport Forum – <i>Transport Achievement Award (Special Mention)</i>.</li> </ul>
<b>Technical Capability &amp; Operations</b>	2016–2023	Delivered in-house management of vehicle software and hardware upgrades, commissioning, testing and validation across the trial lifecycle. <ul style="list-style-type: none"> <li>Conducted new vehicle and technology testing, producing comprehensive technical reports and stakeholder demonstrations.</li> <li>Led commissioning for other AV trialling organisations across Australia, helping build national trial capability.</li> </ul>
<b>Stakeholder &amp; Community Engagement</b>	2016–2023	Delivered multiple VIP stakeholder rides and presentations with state, national and international guests to demonstrate AV capability and readiness.
<b>Policy &amp; Regulatory Leadership</b>	2016–2021	Prepared comprehensive submissions and evidence-based responses to National Transport Commission consultations, including: <ul style="list-style-type: none"> <li>&gt; Guidelines for Automated Vehicle Trials.</li> <li>&gt; Changing Driving Laws to Support Automated Vehicles.</li> <li>&gt; Review of Guidelines for Trials of Automated Vehicles.</li> <li>&gt; Safety Assurance for Automated Driving Systems.</li> <li>&gt; Government access to AV and C-ITS data.</li> </ul> Submitted evidence to the Standing Committee on Industry, Innovation, Science and Resources inquiry into social issues relating to land-based driverless vehicles in Australia.
<b>Regional Demonstration – Busselton</b>	2019	Launched Western Australia's first regional AV demonstration in Busselton, introducing increased route complexity including autonomous roundabout navigation. <ul style="list-style-type: none"> <li>&gt; 1,596 participants experienced the trial.</li> </ul>
<b>Education &amp; Engagement</b>	2019	Launched the RAC Imagine Program™, supported by the City of South Perth, introducing thousands of school students to autonomous and electric vehicle technology.
<b>Resilience &amp; Continuity</b>	2020	Successfully managed project continuity during the global COVID-19 pandemic, maintaining safe operations and community engagement.
<b>Regional Demonstration – Geraldton</b>	2020	Delivered a second regional demonstration in Geraldton, managing significantly increased complexity: <ul style="list-style-type: none"> <li>&gt; 7,500+ roundabouts navigated.</li> <li>&gt; 2,070 participants, 629 trips, 1,761 km travelled.</li> </ul>
<b>Innovation in Road Management</b>	2020	Trialled Australia-first AV-specific traffic management signage during the Geraldton deployment.
<b>Regional Education</b>	2020	Delivered a tailored regional RAC Imagine Program™ in partnership with the Museum of Geraldton: <ul style="list-style-type: none"> <li>&gt; 448 students across 19 sessions.</li> </ul>
<b>Public Legacy &amp; Recognition</b>	2020	Featured the RAC Intellibus® in the Innovations Gallery at Boorla Bardip (WA Museum), recognising its role in transport innovation in Western Australia.
<b>Trial Evolution</b>	2021	Adapted the South Perth trial to demonstrate a first- and last-mile transport solution, allowing passengers to hop on and off at the Old Mill in line with opening times.
<b>Permanent Regulatory Impact</b>	2021	Main Roads WA formally approved AV-related traffic management signage and made it publicly available following the success of the Geraldton trial.
<b>Enduring Public Art Legacy</b>	2021	Jointly commissioned R/evolve, a three-metre public artwork on the South Perth foreshore celebrating RAC's driverless journey and the evolving nature of transport.
<b>Historical Recognition</b>	2022	The RAC Intellibus® i1 model entered the Motor Museum of Western Australia, cementing its place in Australian motoring history.
<b>Education, Skills &amp; Workforce Legacy</b>	2024	Donated the RAC Intellibus® i3 model to South Metropolitan TAFE, repurposing the driverless vehicle as an educational asset to provide apprentices and students with hands-on experience in electric and autonomous vehicle technologies, supporting the next generation of automotive workers.

# Executive summary

The RAC Intellibus® was Australia's first and longest running trial of an autonomous vehicle (AV) technology on public roads, operating for nearly seven years from its launch in August 2016 until completion on 30 June 2023.

The trial positioned Western Australia at the forefront of autonomous transport innovation, while providing RAC members, policymakers and the broader community with first-hand experience of driverless technology in real-world traffic conditions.

Launched on the South Perth foreshore, the fully electric, driverless RAC Intellibus® carried more than 24,000 passengers along a 3.5-kilometre public road route, achieving consistently high community approval. Across the trial, 98 per cent of passengers rated their experience as positive and 98 per cent believed autonomous vehicles could operate in Western Australia in the near future. The trial also reinforced RAC's trusted advocacy role, with most participants strongly supporting RAC's involvement in preparing WA for the introduction of driverless vehicles.

Building on the success of the metropolitan trial, RAC expanded the program into regional Western Australia. In 2019, the RAC Intellibus® became the first driverless vehicle to operate on public roads in regional Australia, delivering public demonstrations in Busselton and later Geraldton. These demonstrations showcased increasingly complex driving environments, including roundabouts and higher traffic interactions. In Geraldton alone, the RAC Intellibus® autonomously navigated more than 7,500 roundabouts across 1,761 driverless kilometres through the trial period. Passenger satisfaction remained consistently high, exceeding 97 per cent positive ratings at all regional locations.

Complementing the trial, RAC delivered the RAC Imagine Program™ to support education and community engagement. Launched in 2019, this program reached more than 4,600 primary school students across metropolitan and regional WA, helping young people explore past and future transport technologies, road safety and the changing nature of mobility. Schools reported overwhelmingly positive outcomes, with strong support for RAC's role in contributing to community education.

Beyond community engagement, the trial delivered significant policy, technical and industry outcomes. RAC managed software and hardware upgrades in-house, conducted extensive testing and commissioning activities, and supported other organisations trialling autonomous vehicles across Australia. Crucially, RAC translated real-world trial learnings into evidence-based submissions to government and regulators, contributing to national discussions on autonomous vehicle trials, safety assurance, data management, social impacts and regulatory reform. These efforts helped inform policy frameworks, improve safety guidance and build readiness for autonomous vehicles at both state and national levels.

The trial earned multiple national awards and industry recognition, and its broader legacy includes approved AV-specific traffic management signage, first- and last-mile transport demonstrations, and the permanent placement of the RAC Intellibus® in Western Australia's transport and cultural landscape. This includes the R/evolve public artwork on the South Perth foreshore and the RAC Intellibus® being displayed at the Motor Museum of Western Australia.

Together with government, industry and community partners, RAC's autonomous vehicle program helped develop a practical roadmap for how autonomous vehicle technology can contribute to a safer, more sustainable and better-connected transport future. The completion of the trial marked not an end, but a strong foundation for the next stage of Australia's transition to autonomous and electric mobility.

## Trial aims

- » Increase understanding about the potential impacts and opportunities from the advent of AV technology.
- » Provide Australians the chance to see AV technology and eventually use and experience it.
- » Further help WA prepare a roadmap for changes to support and safely transition to AV technology.

**38,566**km  
travelled in autonomous mode

**28,744**  
passengers experienced  
the Intellibus®

**7 years**  
operating on public roads



**98%**  
of passengers said AVs  
could operate in WA

**3**  
deployment locations

**4,621**  
students in RAC  
Imagine Program™

^  
The project launch was celebrated with a ribbon cutting event featuring The Honourable Bill Marmion, Former City of South Perth Mayor, Sue Doherty and Former RAC Group CEO, Terry Agnew.

# The Vehicle: Navya Autonom Shuttle

## A fully electric, level 4 autonomous vehicle

The RAC Intellibus® was a 100% electric Navya ARMA Level 4 (High Automation) vehicle meaning all aspects of the driving task are autonomous in defined environments. The shuttle used multiple sensors and telecommunications systems to localise itself and detect obstacles, enabling real-time reaction within a dynamic road environment.

For localisation, the vehicle used a combination of three main technologies. The RAC Intellibus® had 3D Light and Detection and Ranging or LiDAR sensors. LiDARs used laser beams to create a 3D map then uses the map to track its location. Second, an Inertial Measurement Unit, or motion sensor, used odometry to know how far it had travelled and in which direction. Lastly, it featured a Global Positioning System (GPS), which communicated with a number of satellites to know its exact location. Specifically, the

RAC Intellibus® used Real-Time Kinetic (RTK) GPS technology, or differential GPS, to know where it was in relation to its base, or zero point. It communicated with up to 18 satellites to pinpoint its exact location to within one centimetre accuracy.

The vehicle featured a 80 volt lithium iron phosphate (LiFePO4) battery. The battery capacity was 216Ah and took about three to five hours to charge using a 32 amp charger. On a full battery, the shuttle could run anywhere between six to eight hours.

## Technical specifications

<b>Max Speed</b>	18 km/h (road approved)
<b>Capacity</b>	11 seated passengers
<b>Battery</b>	80V LiFePO4 - 33 kWh
<b>Charge Time</b>	~5.5 hrs (32A)
<b>Steering</b>	2x2 bidirectional

NAVYA Intellibus technical specifications. ▼

### 3D LIDAR

Used laser beams to create a 3D map of the surrounding environment and to detect and track obstacles.

### Cameras

Recorded everything happening around the vehicle and analyses road infrastructure.

### 2D LIDAR

Used for detecting and avoiding objects.

### RTK GNSS

Used to pinpoint the vehicle's exact location with centimetre accuracy in relation to a nearby fixed base.

### Bi-directional

The RAC Intellibus® is symmetrical and can drive forward in both directions.

### Odometry

Used motion sensors to estimate its position relative to its starting location.

### Autonomous emergency braking

Automatically applied the brakes if it senses a collision is coming.



# Key Stakeholder Engagement

The RAC Intellibus® trial was made possible through an extensive network of government, industry and community partners. Each organisation played a distinct and essential role in bringing Australia's first public autonomous vehicle trial to life.



^ AV Reference group stakeholders attended a private facility to observe progress of vehicle to infrastructure trialling.

<b>Navya (France)</b>	Vehicle Manufacturer	Supplied the AUTONOM ARMA Level 4 vehicle and delivered ongoing technical support, software upgrades and diagnostic reporting across all deployments for the duration of the 5-year partnership.
<b>City of South Perth</b>	Local Government	Provided the trial location, RAC Intellibus® Hub, land use permissions, monthly permits, on-site ranger support, power supply and parking management across the 3.5km South Perth foreshore route.
<b>Dept. of Transport WA (DoT)</b>	State Government	Issued the Special Permit allowing the RAC Intellibus® to operate on public roads, the first of its kind in WA. DoT also contributed to site criteria development and transport planning integration.
<b>Main Roads WA</b>	State Government	Provided in-kind support and ensured the RAC Intellibus® could integrate safely onto public roads alongside existing infrastructure. Assisted with traffic management approvals and road safety assessments.
<b>Public Transport Authority</b>	State Government	Collaborated to ensure the trial aligned with WA's public transport network priorities, providing strategic input on how AVs could integrate with rail, bus and ferry infrastructure.
<b>Australian Federal Government</b>	Federal Government	Provided funding through the Smart Cities and Suburbs Program to support the application of innovative technology-based solutions to urban transport challenges.
<b>City of Busselton</b>	Regional Local Government	Hosted WA's first regional autonomous vehicle demonstration, supporting permits, route approvals and community engagement across the 8-week Busselton foreshore deployment in 2019.
<b>City of Greater Geraldton</b>	Regional Local Government	Partnered on the 12-week Geraldton demonstration, providing community engagement, route approval, support for the Museum of Geraldton school program and extended operating days due to public demand.



# Commissioning Process & Trial Stages

The trial was delivered through a structured commissioning and staged rollout approach designed to progressively test and validate autonomous vehicle technology in increasingly complex environments, culminating in sustained public operation.

## Commissioning Process

Before operating on any new route, the RAC Intellibus® underwent a comprehensive commissioning process. At the beginning of the trial, this process included the following steps:

1. Installation and configuration of a Navya Real-Time Kinematic (RTK) Global Navigation Satellite System (GNSS) base to enable centimetre level vehicle localisation.
2. Completion of multiple low speed mapping loops using the driverless shuttle along the proposed route.
3. Generation of a Light Detection and Ranging (LiDAR) map and deployment of the map to the vehicle.
4. Testing and validation of multiple autonomous loops under strict supervision, including road closures and traffic management.
5. Commencement of public operations only after all commissioning and performance criteria were successfully met.

Over the life of the trial, RAC and Navya significantly refined and improved this approach to increase efficiency, safety and scalability. Key improvements included:

- » Migrating from locally installed Navya RTK GNSS base stations to a commercial RTK GNSS network provider, removing the need to install and configure route side base stations while improving reliability and reducing deployment time and complexity.
- » Transitioning from low-speed manual RAC Intellibus® mapping drives to a Mobile Mapping System (MMS) that could be mounted on any vehicle and operated at normal traffic speeds without requiring special permits or traffic management.
- » Upgrading route mapping from 2D to 3D LiDAR, enabling perception of full spatial geometry including height and object shape, while significantly enhancing localisation accuracy through increased LiDAR feature density. This results in improved obstacle detection and classification, more robust vehicle positioning, and greater autonomy continuity with fewer disengagements in complex real world environments.

Commissioning process in Busselton. ▼



### Stage 1: Private (Closed) Testing

Stage 1 involved initial vehicle commissioning and testing on a private track in April 2016. With no pre-existing guidelines, an extensive test program was developed to observe and document autonomous behaviour. A purpose built course incorporating merge lanes, a roundabout, obstacles, give way scenarios and controlled stops enabled testing across varied conditions and simulated scenarios.

### Stage 2: Closed Testing on Public Roads

Stage 2 extended commissioning activities to public roads under controlled conditions to verify the operating route. This stage involved obtaining regulatory approvals, completing risk assessments and road safety audits, establishing traffic management arrangements, conducting in operation reviews and delivering a supporting community communications program.

### Stage 3: Public Operation

Public operation commenced in South Perth on 1 September 2016. The route was initially planned to be delivered in phases with progressively increasing traffic complexity, including greater interaction with different road users, traffic signs and signals, right-turn manoeuvres and varying traffic flows. Members of the public were invited to visit the RAC Intellibus® Hub and experience a 30-minute ride along the South Perth foreshore. However, not all planned phases ultimately progressed. Learnings from the initial phase, combined with technical limitations of the shuttle, informed decisions to limit further increases in operational complexity to ensure safety and reliability while continuing to deliver meaningful trial outcomes.

### Stage 4: End of Trial

The RAC Intellibus® trial concluded on 30 June 2023 after seven years of operation on public roads across South Perth, Busselton and Geraldton. The RAC Intellibus® travelled more than 38,000 kilometres and carried over 28,000 passengers, delivering valuable insights into the strengths, limitations and practical integration of Level 4 autonomous vehicle technology within existing road and city infrastructure.

“Having the various aspects of autonomous driving explained to me in terms I could understand made me realise how much safer the Intellibus, as a driver, is safer than me.” **Passenger**

“It is a wonderful use of modern technology and also very informative, it has even made me think more about my own driving habits” **Geraldton passenger**





**RAC In**  
Auto

City of  
South Perth



# Licensing, Approvals & Safety

Bringing Australia's first autonomous vehicle to public roads required navigating an entirely new regulatory and safety landscape. With no pre-existing framework in place, RAC developed comprehensive permit applications, safety plans and insurance solutions that would go on to set the national standard for AV trials. A 2016 review identified more than 700 legislative barriers to AV deployment across state, territory and Commonwealth law.

## Licensing & Approvals

### Vehicle Import Approval Secured February 2016

The RAC Intellibus® did not comply with Australian Design Rules (no steering wheel, no driver's seat, no brake pedals). RAC secured federal approval - Australia's first AV import approval - supported by technical specifications and multi-agency letters.

### WA Special Permit Approved August 2016

As an unlicensed vehicle, the RAC Intellibus® operated under a 'Special Exceeding 48 Hours' permit from WA Department of Transport. The RAC application framework was subsequently adopted by TMR Queensland as the guiding template for future AV permits nationally.

### Insurance Framework Multi-layer coverage

RAC obtained comprehensive, compulsory third party (CTP), public liability and voluntary workers insurance. When the Insurance Commission of WA (ICWA) withdrew CTP support after year one, RAC sourced private insurance - setting a market precedent for AV insurance in Australia.

## Safety Requirements

All stages of the trial were underpinned by rigorous independent safety audits, risk assessments, road safety audits and traffic management planning, developed in close collaboration with government agencies and specialist external consultants.

### Road Safety Audit

Consultants conducted independent Road Safety Audits (RSA) in line with Austroads guidelines, identifying potential hazards and recommending mitigation measures prior to each stage of the trial.

### Traffic Management Plan

Traffic Management Plans were prepared for each deployment, outlining procedures to protect all road users and minimise disruption throughout operations.

### Emergency Procedures

An Emergency Procedures Manual was stored onboard and at the RAC Intellibus® Hub, covering incident response procedures, Navya's Crisis Management Plan, RAC's Crisis Communication Plan and an Incident Report Framework.

### Driverless Vehicle Chaperones

A permit condition required a trained chaperone onboard at all times. Chaperones reported disengagements, managed passenger experience and could take manual control immediately when required.

### In-Operation Safety Review

Once operational, consultants undertook ongoing in-operation safety reviews. Following observations at Mill Point Road where vehicles were found to exceed the 50 km/h limit and overtake the RAC Intellibus®, the speed limit was reduced to 40 km/h and additional signage was installed on all approaches. Traffic management arrangements were iteratively updated throughout the trial as conditions and community familiarity with the RAC Intellibus® evolved.

Across 38,566 km of autonomous operation and 28,744 passengers carried, the trial completed its full operational life without any serious incidents or injuries - a testament to the rigour of the safety framework put in place from day one.

◀ Passengers receiving a pre-ride briefing from a chaperone.

# Technical Performance & Disengagements

Understanding how the RAC Intellibus® handled real-world conditions was central to the trial's research objectives. With support from an in-house technical team, chaperones recorded every journey in detail; logging the location, direction and time of each disengagement, allowing RAC and Navya to understand and progressively improve the vehicle's autonomous operating system.

A disengagement occurs when the vehicle exits autonomous mode, either automatically (triggered by the system) or manually (initiated by the chaperone). Data reporting of all disengagements was collected and classified into four categories including external factors, AV components, EV components and other.

RAC Intellibus® at the testing facility. >



External Factor

**67%**

Most common. Poorly parked vehicles, tree branches, bushes detected on virtual path. External factor to normal shuttle function

AV Component

**21.5%**

Hardware/software issues: RTK GNSS, LiDAR, sensor fusion errors. Any error specific to autonomous vehicle

EV Component

**9.5%**

Mechanical issues: doors, propulsion, suspension, battery. Standard electric vehicle maintenance challenges

Other

**2%**

Undiagnosed causes, or minor chaperone errors during operations



^ Vehicle to Infrastructure (V2I) road trials at test facility.



^ Roundabout trial at the test facility.

### Key Technical Challenge: Limited Perception for Obstacle Avoidance

A significant contributor to external disengagements was RAC Intellibus® limited sensor capability at the time, which did not provide sufficient forward and rearward visibility to safely assess and execute manoeuvres around obstacles in typical public road conditions and traffic speeds.

Had this perception constraint been resolved, these disengagement rates would have been expected to reduce substantially.

### Progressive Improvement Across Deployments

The average manual disengagement per loop was the lowest in Geraldton (the final deployment location) compared to South Perth and Busselton. Technical issues causing the shuttle to stop were also significantly lower, attributable to Navya software upgrades, full RAC Auto Services servicing of AV and EV components prior to deployment, and the suitability of the Geraldton route for first/last mile AV operations.

### Technical enhancements and operational outcomes

The RAC Intellibus® trial delivered a range of targeted technical upgrades to improve vehicle capability, safety and operational performance. The table below summarises how these initiatives, including both implemented enhancements and evaluated solutions, translated into tangible outcomes.

In addition to these enhancements, the RAC technical team supported Navya deployments across multiple Australian sites (Curtin University in Western Australia, Olympic Park in New South Wales, La Trobe University in Victoria and Flinders University in South Australia), leveraging expertise developed through the RAC Intellibus® trial and reinforcing RAC's leadership in autonomous vehicle operations and deployment.

Technical Enhancements and Evaluations	Operational outcomes achieved
<b>Upgrade from 2D to 3D LiDAR mapping</b>	Improved vehicle positioning reliability and reduced localisation errors.
<b>Deployment of Mobile Mapping System (MMS)</b>	Reduced AV commissioning time and removed permitting constraints.
<b>Navya software upgrade increasing shuttle speed from 14.5 km/h to 18 km/h</b>	Improved integration with live traffic conditions.
<b>New obstacle trajectory algorithm</b>	Significantly reduced harsh braking and improved passenger comfort and safety perception.
<b>Additional LiDAR units installed to address blind spots</b>	Enhanced situational awareness and safer interaction with surrounding vehicles.
<b>Roundabout navigation capability developed and validated</b>	Demonstrated ability to operate in complex road environments (e.g. Busselton and Geraldton routes).
<b>In-house Vehicle to Infrastructure (V2I) testing with WA traffic signals</b>	Identified current system limitations and informed future deployment strategy.
<b>RTK GNSS battery backup system</b>	Enabled up to 12 hours of operation during power outages, improving service reliability.
<b>Passenger experience upgrades (openable windows, upgraded air conditioning and onboard information screens)</b>	Improved passenger comfort, particularly during high-temperature conditions, and enhanced the overall onboard experience.
<b>New chaperone user interface</b>	Improved operational efficiency and safety.
<b>Operator box separation</b>	Increased system safety through isolation of critical components.
<b>External communication screens (front and rear)</b>	Improved communication with road users and increased predictability of AV behaviour.
<b>Brake light and indicator repeaters</b>	Enhanced vehicle visibility and interaction with traffic.
<b>Induction charging pad testing</b>	Demonstrated the potential for autonomous charging, supporting future improvements in uptime and operational efficiency.

# Deployment Locations

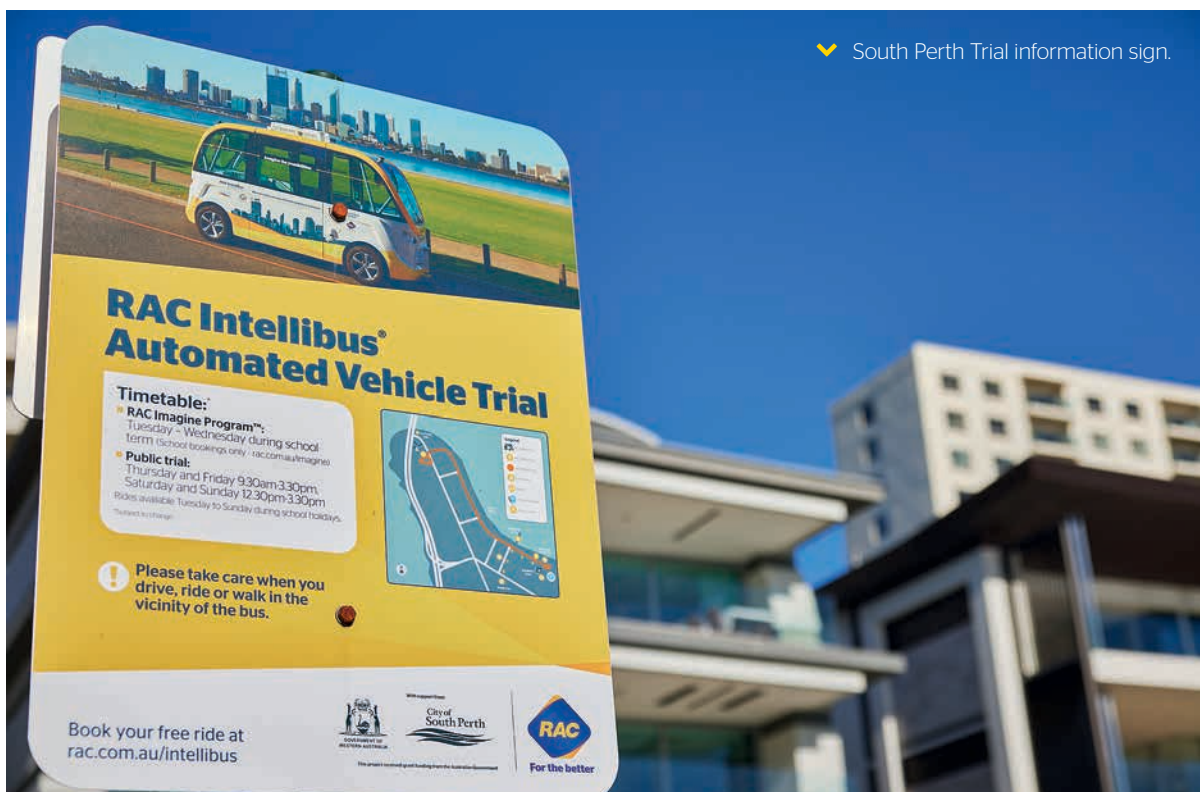
## South Perth Flagship Trial Location (2016-2023)

The 3.5-kilometre route along the South Perth Esplanade was selected following a detailed assessment of 18 candidate sites, evaluated against a range of safety, operational and strategic criteria. Key considerations included traffic volumes, road geometry, pedestrian and cyclist activity, public accessibility, trial visibility, and alignment with broader objectives for understanding autonomous vehicle integration within an urban environment.

The South Perth foreshore provided a uniquely valuable setting, offering a diverse range of operating conditions within a highly visible and well-used public space. The route was deliberately designed to support a phased increase in complexity across four planned stages. Initial phases focused on lower-traffic sections with simpler road layouts, while later phases introduced progressively more challenging elements such as right-hand turns across oncoming traffic, signalised intersections, pedestrian crossings, shared-path interactions and high-density foreshore activity, particularly during peak recreational periods.

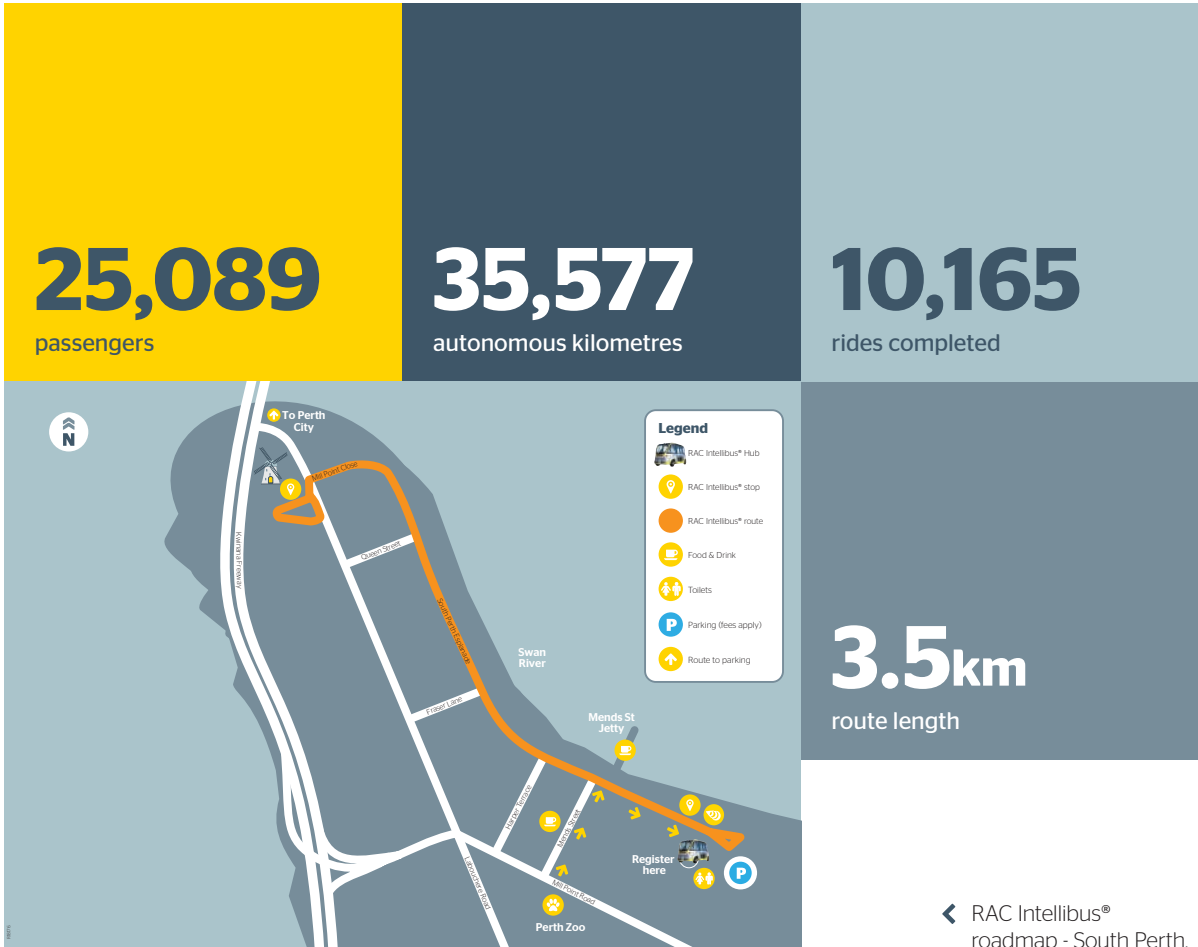
The location also provided a strong opportunity to demonstrate the practical application of autonomous vehicles as a first- and last-mile transport solution. The route connected the South Perth Ferry Terminal with destinations along the foreshore, including the historic Old Mill grounds, illustrating how autonomous shuttles could complement existing public transport services and improve access between key activity nodes.

While this phased approach was intended to incrementally test the shuttle's technical capabilities and its interaction with real-world road users, learnings from the initial phase of public operation, combined with technical limitations of the shuttle platform, informed decisions not to progress all planned stages. These limitations highlighted challenges associated with operating safely and reliably in higher-complexity traffic environments. As a result, the route configuration and operational scope were adapted to prioritise safety, consistency and meaningful trial outcomes, while still delivering valuable insights into autonomous vehicle performance in a highly active, mixed-use public setting.





^ RAC Intellibus® at South Perth.



< RAC Intellibus® roadmap - South Perth.

## **Busselton First Regional Demonstration (May-June 2019)**

In 2019, the RAC Intellibus® became the first driverless and fully electric vehicle to operate on public roads in regional Western Australia, marking a significant milestone in the state's autonomous vehicle journey. The RAC Intellibus® was deployed in Busselton from 8 May to 30 June 2019 as an eight-week public demonstration, providing residents and visitors with first-hand exposure to autonomous vehicle technology and its potential benefits for regional transport. Operating along Geographe Bay Road from Foreshore Parade, the Busselton route introduced additional operational complexity compared with earlier trials. Notably, it included the first successful autonomous navigation of a roundabout during the

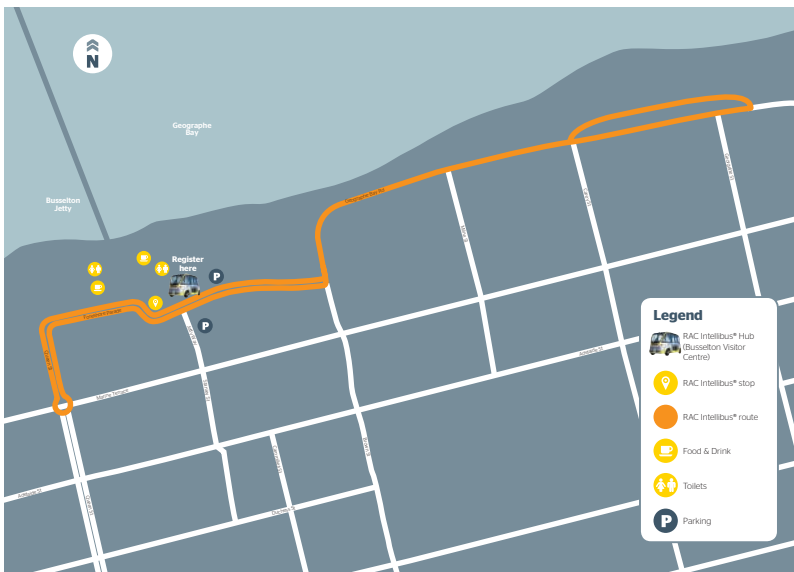
trial program, representing an important technical achievement and demonstrating the shuttle's capability to manage more complex road geometries and traffic scenarios in a regional setting.

Throughout the demonstration, 1,596 passengers experienced a ride on RAC Intellibus®, engaging directly with the technology and learning about its role in improving accessibility, sustainability and mobility in regional communities. Feedback was strongly positive, with 97 per cent of passengers rating their overall experience favourably.

The Busselton deployment provided valuable insights into the performance of autonomous vehicles outside metropolitan environments and highlighted the potential application of driverless, electric shuttles as a future transport option in regional towns, particularly in high-amenity, tourist-focused locations.

▼ RAC Intellibus® in Busselton.





- ↗ Passengers waiting at the bus stop.
- ↖ RAC Intellibus® roadmap - Busselton.

**1,596**  
passengers

**1,235**  
autonomous kilometres

**441**  
trips completed

**97%**  
rating overall  
experience favourable

## Geraldton Second Regional Demonstration (September - December 2020)

The RAC Intellibus® extended its regional operations to Western Australia's Midwest with a second regional public demonstration in Geraldton. Initially planned to launch in March 2020, the trial was delayed due to the global COVID-19 pandemic and subsequently commenced successfully in September 2020. The demonstration was originally designed to showcase how autonomous vehicle technology could support both local travel and visitor movements, particularly by providing a convenient first- and last-mile transport solution linking cruise ship arrivals and visitors to the Visitor Centre with the Museum of Geraldton and surrounding foreshore attractions.

The RAC Intellibus® operated along the foreshore between Marine Terrace and the Museum of Geraldton, highlighting the potential role of autonomous, electric vehicles in enhancing access to key cultural and tourism destinations. The demonstration ran for an initial 12-week period and was extended by a further five weeks in response to strong public demand, with rides consistently booked out weeks in advance.

The Geraldton route represented a significant increase in technical complexity compared with previous trial locations. Each 2.8-kilometre loop included 12 roundabouts, a substantial progression from the two-roundabout milestone achieved during the Busselton trial in 2019. Over the course of the demonstration, the RAC Intellibus® travelled 1,761 kilometres in autonomous mode and successfully navigated more than 7,500 roundabouts, achieving the lowest manual disengagement rate recorded across all three trial locations.

A total of 2,070 residents and visitors (including student numbers from RAC Imagine Program) participated in the Geraldton demonstration, gaining first-hand experience of autonomous vehicle technology and its potential benefits. Public response was overwhelmingly positive, with 98 per cent of passengers rating their overall experience favourably.

The Geraldton trial delivered valuable insights into the performance, reliability and scalability of autonomous vehicles in complex regional road environments. It also demonstrated strong community acceptance and reinforced the potential for driverless, electric shuttles to support regional mobility, tourism connectivity and future transport networks.

A chaperone conducting the pre-ride briefing at the RAC Intellibus® stop, fittingly located at the heritage listed historic railway building. ✓

The Geraldton deployment recorded the highest average passenger satisfaction score (9.3/10) of all three trial locations, and the lowest manual disengagement rate, demonstrating continuous improvement across the trial's operational life.





- ↗ RAC Intellibus® in Geraldton.
- ↖ RAC Intellibus® roadmap - Geraldton.

**98%**

rating overall  
experience favourable

**1,622**

passengers

**1,761**

autonomous kilometres

**7,500+**

roundabouts navigated

# Community Engagement & Survey Results

## Passenger Post-Ride Survey - South Perth

All participants were invited to complete pre- and post-ride surveys assessing their experience and attitudes towards driverless vehicle technology. Key findings from the South Perth trial:



Public interacting with the RAC Intellibus® in South Perth.

## Community Awareness Study (2016-2021)

RAC conducted five waves of community research across WA. Key trends:

- » Awareness of AVs increased from 64 per cent (2016) to 88 per cent (2021) without prompting.
- » Prompted awareness rose from 88 per cent to 95 per cent over the same period.
- » RAC Intellibus® trial awareness peaked at 61 per cent in 2017.
- » 45 per cent of WA residents would likely travel in a private AV when available (2021).

## Top Benefits

- » Freedom and independence for young, elderly and those with mobility difficulties.
- » Better use of travel time.
- » Potential to reduce crash severity and frequency.
- » Lower vehicle emissions and better fuel efficiency.

## Top Concerns

- » Unable to manually override if the system fails.
- » Cybersecurity and hacking risks.
- » Liability in the event of a crash.
- » How driverless vehicles interact with conventional vehicles.



"Safety is paramount and if we were to take humans out of the equation, I feel driverless vehicles would have lower accident statistics."

**South Perth passenger**

"Autonomous vehicles like this are absolutely the future and the next 10-20 years in this space will be world altering."

**South Perth passenger**

## Passenger Post-Ride Survey - Busselton

All passengers were invited to complete a post-ride survey assessing their experience and attitudes towards autonomous vehicle technology. Key findings from the Busselton deployment:

▼ Launch day in Busselton.



## Community Observations

The Busselton deployment attracted significant community interest, with bookings filling quickly and community members travelling specifically to experience the trial. Local media coverage contributed to strong awareness across the Geopraphe Bay region. The deployment also demonstrated the potential for AV technology to enhance tourism-related transport, with a notable proportion of passengers being visitors to the Busselton foreshore precinct.

Key community observations noted by the project team included:

- » High levels of curiosity from pedestrians and passing motorists, with many stopping to observe the vehicle in operation.
- » Positive interactions between the RAC Intellibus® and cyclists sharing the foreshore precinct.
- » Road users adapting their behaviour relatively quickly after initial exposure, with fewer unexpected stops as the deployment progressed.
- » Strong interest from local government and tourism stakeholders in potential future applications for the technology.

"Fantastic to have this technology trialed in our community. I think it shows great potential for areas like ours where public transport options are limited."

**Busselton passenger**

"I was nervous at first, but the ride was surprisingly smooth and safe. I came back and brought my whole family the following weekend."

**Busselton passenger**

- ▼ Official launch with Former City of Busselton Mayor, Grant Henley and Former RAC Group Executive Social & Community Impact, Patrick Walker.



## Passenger Post-Ride Survey - Geraldton

Geraldton recorded the highest passenger satisfaction scores across all three trial locations, reflecting both the confidence gained through the maturation of the trial and the strong community reception in the Midwest. Key findings from the Geraldton post-ride survey:

Students at the RAC Intellibus® deployment space at the Museum of Geraldton. ▼



**98%**

of passengers rated their overall experience as positive or extremely positive

**97%**

said they felt safe on board the RAC Intellibus® throughout the ride

**96%**

believed autonomous vehicles could provide a useful transport service in regional WA

**88%**

said they had not experienced autonomous vehicle technology prior to the trial

**91%**

would support the introduction of an AV shuttle service in Geraldton

**94%**

said the experience increased their confidence in autonomous vehicle technology

## Community Observations

The Geraldton deployment demonstrated some of the strongest community enthusiasm of the entire trial. Rides were consistently booked out weeks in advance, and the trial extension by five weeks was driven directly by community demand. The Museum of Geraldton served as an effective community hub for the deployment, attracting both regular museum visitors and community members who attended specifically to ride the RAC Intellibus®.

"Felt very safe in the Intellibus and I think such a transport mechanism would be extremely beneficial for Geraldton, where we don't have space for a traditional tram system." **Geraldton passenger**

Notable observations from the Geraldton deployment included:

- » The highest average passenger satisfaction score (9.3/10) across all three trial locations.
- » The lowest manual disengagement rate recorded across all deployments, attributable to Navya software upgrades, pre-deployment servicing by RAC Auto Services, and the suitability of the route.
- » Strong engagement from schools, with 448 students from 19 school groups participating in the regional RAC Imagine Program™.
- » Significant interest from regional tourism bodies and local government in future first/last mile AV applications for the Midwest region.
- » Media coverage through regional outlets that contributed to strong advance bookings throughout the extended deployment.
- » Successful trialling of non-standard AV traffic management signage, approved for the first time in Australia during this deployment.

▼ Official opening of Geraldton Demonstration, Former General Manager Social Impact, Anne Still.



# RAC Imagine Program™ South Perth

Launched on 3 September 2019 with support from the City of South Perth, the RAC Imagine Program™ brought Year 5 and 6 students face-to-face with autonomous vehicle technology through a hands-on day of exploration. The program addressed STEAM subjects (Science, Technology, Engineering, Art and Mathematics) and HASS topics, linking road safety and mobility to the Australian curriculum.

"In all the excursions I have ever done, this is probably the best one ever. Every activity had the right mix of theory and practical. We all loved it; it was amazing."  
**Teacher, RAC Imagine Program™**

## Program Activities

- » 3.5km journey on the RAC Intellibus® experiencing the technology firsthand.
- » Tour of South Perth's historic Old Mill connecting past innovation to the present.
- » RAC Rescue Experience via virtual reality.
- » Exploring AV technology's impact on road safety.
- » Coding with Edison robots - basic programming and automation.
- » Building futuristic transport sculptures from recycled materials.

<p><b>4,173</b> students participated</p>	<p><b>131</b> school bookings</p>	<p><b>98%</b> schools rated experience extremely positive</p>
		<p><b>98%</b> extremely important or very important for RAC to be involved</p>

◀ Students at the RAC Imagine Program™.



# Policy Contribution

## National Policy Submissions

RAC used its trial experience to inform national AV policy, making submissions and responses to the National Transport Commission (NTC) across multiple years, including:

### **NTC Guidelines for Automated Vehicle Trials (2017, 2020)**

RAC contributed to the development of national guidelines for automated vehicle trials by providing practical, experience-based input to the National Transport Commission. Drawing on real-world data, operational insights and public feedback from the RAC Intellibus® trial, RAC helped inform national policy, safety frameworks and community readiness, advocating for strong safety oversight, transparent reporting and community engagement to support the safe introduction of automated vehicles.

### **NTC Discussion Paper: Changing Driving Laws to Support Automated Vehicles**

RAC contributed to national automated vehicle reform by providing detailed policy guidance to the National Transport Commission on legal, safety and consumer impacts of automation. Through its submission, RAC advocated for strong safety assurance, clear accountability, and consumer protections, drawing on real-world trial experience to help shape practical and community-focused regulatory frameworks.

### **NTC Discussion Paper: Regulatory Options to Assure Automated Vehicles**

RAC emphasised the importance of having flexible and dynamic standards which encourage rapid technical change while lifting baseline safety standards. The submission also highlighted how community perceptions of safety are critical to facilitate trust in the technology, using insights from its trial.

### **NTC Consultation Regulation Impact Statement: Safety Assurance for Automated Driving Systems**

RAC supported the development of a strong safety assurance framework for automated vehicles by advocating for clear regulatory oversight, defined

responsibilities and rigorous evidence-based approval processes. Through its submission, RAC emphasised ongoing monitoring, transparency and continuous safety improvement to ensure automated vehicles are introduced safely and earn public confidence.

### **NTC Discussion Paper: Regulating Government Access to Co-operative Intelligent Transport Systems (C-ITS) and AV Data**

RAC contributed to national automated vehicle policy by advocating for the responsible collection, use and sharing of automated vehicle data. Through its submission, RAC emphasised the importance of data transparency, privacy protections and access to safety-critical information to support effective regulation, public trust and continuous safety improvement as automated vehicles are introduced.

### **NTC Discussion Paper: Government Access to Vehicle-Generated Data**

RAC noted the benefits of government access to vehicle-generated data and the improvement of road safety. However, it emphasised that striking the right balance between maximising these benefits and managing privacy risks is critical. Importantly, the community's interests must be prioritised irrespective of the chosen policy option, and this must be informed by an ongoing two-way dialogue with government/industry.

### **Standing Committee on Industry, Innovation, Science and Resources - Social Issues Relating to Land-based Driverless Vehicles in Australia**

RAC contributed to the national conversation on driverless vehicles by highlighting the social impacts of automation, including social acceptance, safety, accessibility, equity, and opportunities for public transport. The submission also notes the importance of considering interrelated issues such as congestion, road infrastructure, parking and urban sprawl. Throughout its submission, RAC advocated for people-centred policy settings that ensure automated vehicles deliver clear community benefits, support vulnerable road users, and are introduced in a way that builds public confidence and social acceptance.

# Awards & Recognition

2016	Australian Driverless Vehicle Initiative - Innovation Award: Automated Vehicle Trial, RAC Intellibus®.
2017	<ul style="list-style-type: none"> <li>&gt; AIM West Business Pinnacle Awards - Innovation Award.</li> <li>&gt; ITS Australia Automated Vehicle Award.</li> <li>&gt; Australian Driverless Vehicle Initiative - Innovation Award.</li> <li>&gt; Australian College of Road Safety - Diamond Road Safety Award.</li> </ul>
2018	<ul style="list-style-type: none"> <li>&gt; Australian Institute of Traffic Planning and Management - Excellence Awards: Best Project.</li> <li>&gt; International Transport Forum - Transport Achievement Award (Special Mention).</li> </ul>
2020	IPAA WA Awards - Best Practice in Collaboration Between Government and Non-Government Organisations (Finalist).
2021	<p>R/evolve Sculpture jointly commissioned between RAC and City of South Perth on the South Perth foreshore celebrating WA's and RAC's world-leading role in vehicle automation and road safety. Standing three metres tall, the sculpture embodies movement, innovation and the evolving nature of transport, while framing views of the Perth skyline.</p> <p>Designed by Tony Jones Art Projects, the work draws on futuristic and automotive influences and was created by Tony Jones, Ben Jones and Angela McHarrie, known for iconic Perth artworks.</p>

City of South Perth Mayor Greg Milner and RAC Group CEO Robert Slocombe unveiling the new sculpture on the South Perth foreshore. ▼



# Conclusion

The RAC Intellibus® trial represents a landmark chapter in Australia's journey toward autonomous and electric mobility. Over seven years of continuous operation on public roads, the trial moved beyond theoretical discussion and controlled testing to deliver real-world evidence on how autonomous vehicles interact with people, infrastructure and existing transport systems. In doing so, RAC helped place Western Australia, and Australia more broadly, at the forefront of autonomous vehicle readiness.

As Australia's first and longest-running public autonomous vehicle trial, the RAC Intellibus® provided more than 27,000 passengers with first-hand experience of driverless technology across metropolitan and regional environments. Consistently high levels of passenger confidence, safety perception and community support demonstrated that when autonomous vehicles are deployed transparently, conservatively and with strong human oversight, public acceptance can be achieved, even in mixed traffic and complex road settings.

Importantly, the trial delivered value well beyond passenger rides. RAC's work helped shape national and state policy, inform regulatory reform, and establish practical safety, insurance and permitting frameworks that did not previously exist. Learnings from real-world operation, were translated into

evidence-based submissions to government, contributing to the development of guidelines for automated vehicle trials, safety assurance and data governance across Australia. Many of these frameworks will continue to underpin future autonomous vehicle deployments nationwide.

From a technical perspective, the trial demonstrated both the promise and the limits of first-generation Level 4 autonomous shuttle technology. While the RAC Intellibus® successfully operated for thousands of autonomous kilometres without serious injury or incident, it also highlighted critical constraints around perception, decision-making, scalability and the requirement for onboard chaperones. These limitations ultimately capped further increases in operational complexity and underscored that meaningful progression toward widespread autonomous deployment will require more advanced sensing, software maturity and remote oversight models.

Equally enduring is the social and educational legacy of the program. Through the RAC Imagine Program™, thousands of students across metropolitan and regional Western Australia engaged with future transport technologies, road safety and STEM learning. For many, the RAC Intellibus® was their first exposure to autonomous and electric vehicles, helping build a generation

▼ RAC Intellibus® at the Motor Museum of Western Australia.



“This trial broke new ground in the automated vehicle space in Australia, putting WA at the forefront of this emerging and exciting technology. Through a public trial of a Level 4 automated vehicle, we learned about the strengths and limitations of automated vehicle technology, including how it integrates with existing roads and city infrastructure.” **RAC WA**

that is better informed, more confident and more curious about the future of mobility. The preservation of the RAC Intellibus® through museum display and educational donation ensures this legacy continues beyond the life of the trial.

The conclusion of the RAC Intellibus® trial does not mark an end point for RAC's involvement in autonomous mobility. Rather, it provides a strong, evidence-based foundation for the next phase. Future autonomous driving in Australia is likely to progress incrementally, through safer, more capable vehicles, clearer regulatory settings, targeted use cases such as first- and last-mile transport, and closer integration with electric and connected vehicle systems. RAC is well positioned to continue contributing where it adds the greatest value, advocating for safety-led adoption, supporting informed policy development, trialling next-generation technologies when appropriate, and ensuring that the introduction of automation delivers tangible benefits for members and the wider community.

The RAC Intellibus® trial demonstrated that progress in autonomous transport is not simply a matter of technology, but of trust, governance, education and purpose. By combining cautious innovation with strong public engagement and policy leadership, RAC has helped prepare Western Australia, and Australia, for what comes next.



▲ Donation event at South Metropolitan TAFE with RAC Group CEO, Robert Slocombe, Hon Hannah Beazley, SM Tafe Managing Director, Darshi Ganeson-Oats, Group Executive Social & Community Impact, Terry Durrant and RAC Councillor and Chair of the Western Australia State Training Board, Jim Walker.

The RAC Intellibus® provides TAFE students hands-on experience in automated vehicle technologies. ▼



# Glossary

<b>Autonomy Levels</b>	A classification defined by SAE International to describe the extent of vehicle automation - from level 0 (no automation) to level 5 (full automation).
<b>Co operative Intelligent Transport Systems (C ITS)</b>	A set of technologies that enable vehicles, infrastructure, and road users to communicate with each other in real time to improve road safety, traffic efficiency, and transport operations.
<b>Disengagement</b>	Occurs when the vehicle exits autonomous mode, either automatically (triggered by the system) or manually (initiated by a person).
<b>RTK GNSS</b>	Used to pinpoint the vehicle's exact location with centimetre accuracy in relation to a nearby fixed base.
<b>Light Detection and Ranging (LiDAR)</b>	Used laser beams to create a 3D map of the surrounding environment and to detect and track obstacles.
<b>Mobile Mapping System (MMS)</b>	A system that collects geospatial data while moving, using a combination of sensors, cameras, and inertial measurement units to accurately map roads, infrastructure, and the surrounding environment.
<b>Vehicle to infrastructure (V2I)</b>	A communication capability that allows vehicles to exchange information with infrastructure to improve safety and operational efficiency.





**RAC Intellibus™**

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