



Hello!

CAVForth:
The UK's first autonomous bus service

11/05/2023 – CAVForth media launch

Welcome

- What is project CAVForth
- The story so far
- Experience the AB1 Service
- Reflections



What is



A Proud Partnership between:



Innovate UK

The Trial Service

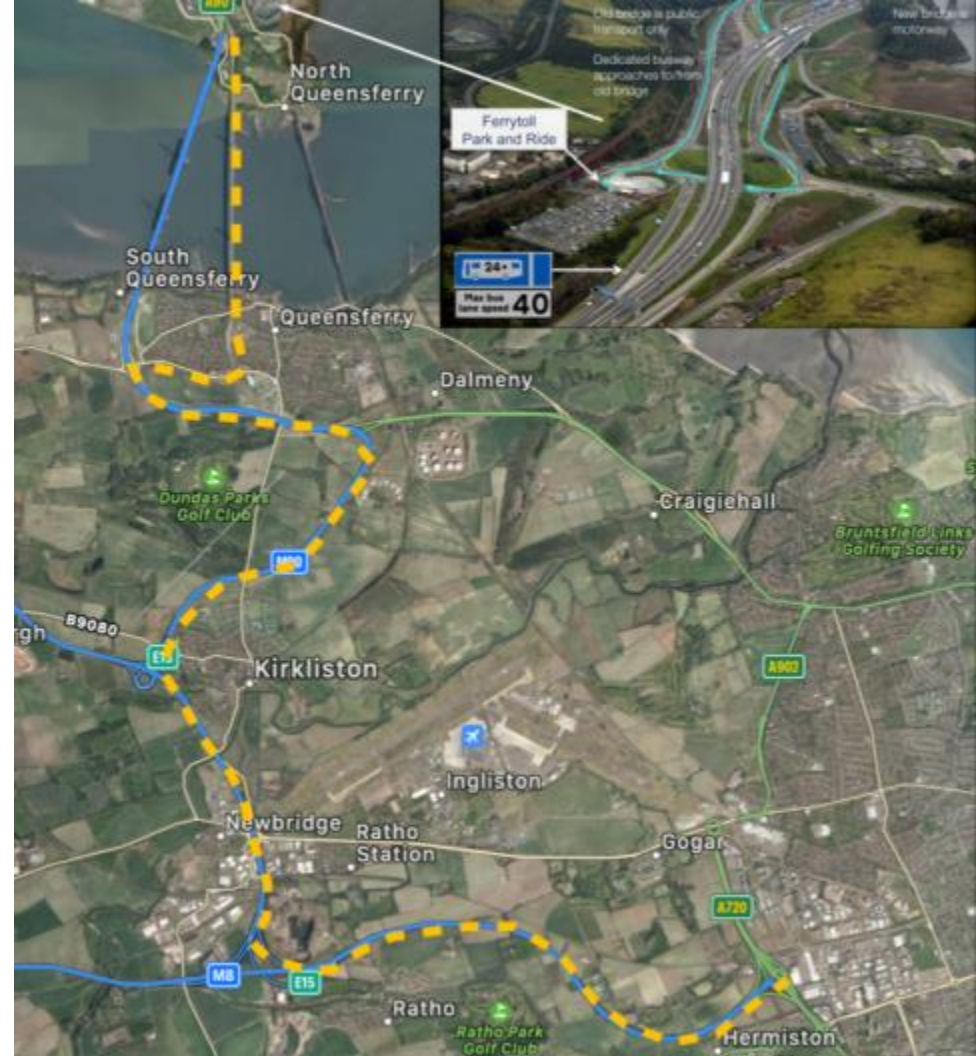
Launching in May 2023

3x Lv.4 vehicles in service, 1 as backup

36 passengers per vehicle

Potential for a bus every 30 minutes

Capacity to carry up to **10,000**
passengers per week



Existing Partnership



The story so far

BBC Sign in Home News Sport Weather Player

NEWS

Home | War in Ukraine | Coronavirus | Climate | UK | World | Business | Politics | Tech | Science | Health

Scotland | Scotland Politics | Scotland Business | Edinburgh, Fife & East | Glasgow & West | Highlands &

First full-size driverless bus trials to begin in Scotland



FUSION PROCESSING

It is intended the buses will carry up to 36 passengers, with capacity for over 10,000 a week.

The UK's first full-sized driverless buses will begin trials in Scotland this week with a view to having passengers on board later this summer.

The story so far

- Build Buses & Autonomies
- Upgrade the Route
- Simulation, Testing & Validation
- Research & Engagement
- Service Design
- Operations



Build the Buses & Autonomies

- Manufacture 5x Enviro200AV vehicles
- Develop CAVStar® for compatibility
- Fit Lv.4 Autonomous System
- Engineer full system redundancy



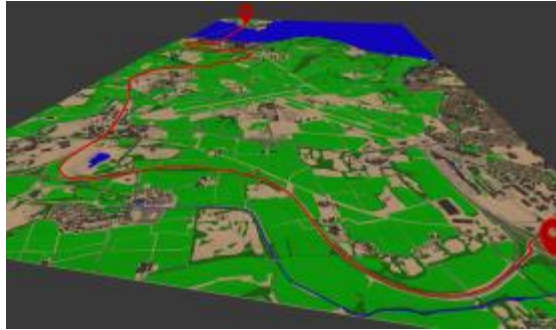
Upgrade the route

- Additional CCTV coverage
- Traffic light connectivity
- Refresh of white-lining
- Actively managed hard shoulder



Safety: Simulation, Testing & Validation

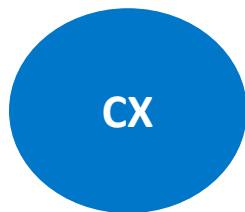
- Route risk assessment
- Digital twin: scenario simulation, hazard injection
- Physical track testing
- Route running in test van
- Safety Case development following industry standards & best practices
- Commissioned 3rd party audit



Research & Engagement

Around **500** people engaged in informed discussion and design activity so far.

Additional **~3000** participating in Napier's pre-trial acceptance study.





**Our computer
driven future
will still be
human**



Service Design

- The Captain
 - Role, Training & Equipment
- Livery
- ‘Plain English’ Information
- Brand Mark & ‘AB’ prefix
- Marketing Campaign



Prep for Operations



Our Autonomous Bus Professionals



Why we are doing this

Safety	90% reduction in avoidable accidents and associated savings: claims, repair, operational time, HR processes, PR & reputational risk.
Fuel Efficiency	Up to 20% reduction in fuel costs and supporting our green credentials
Reliability	Negligible improvement expected
Customer Experience	Improved customer satisfaction, increased ridership and savings on complaint handling.
Staffing	Reduced turnover, improved wellbeing and creates a culture of ownership.
Loading Times	10% improvement in running time and more consistent services



CAV Forth

Launching 15th May 2023.

Come see us in Fife, and try the UK's first autonomous bus service: AB1.



Thanks a bunch!

www.stagecoachbus.com/autonomousbus

Steven.Russell@StagecoachBus.com
[@SteveHasIdeas](https://twitter.com/SteveHasIdeas)



Fusion Processing Ltd

Our **CAVStar Automated Vehicle System** enables the Stagecoach buses to operate in Autonomous Mode



About Fusion Processing Ltd



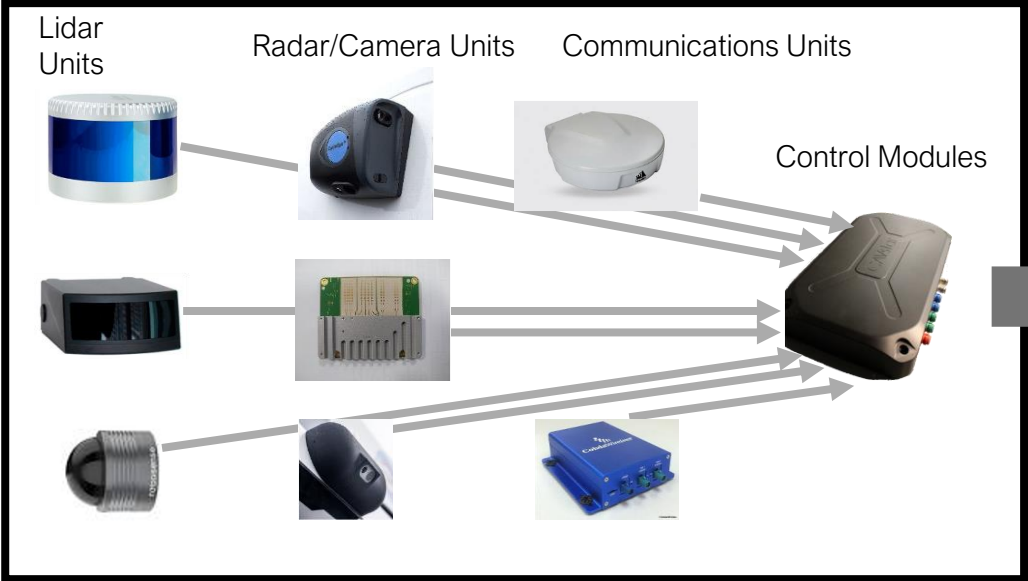
- UK tech company, founded 2012
- Based in Bristol, with growing presence in Scotland
- Expertise in
 - Vehicle automation
 - Sensors and sensor fusion
 - AI and high speed computing
 - Vehicle systems
 - Safety engineering
- Systems are designed in-house



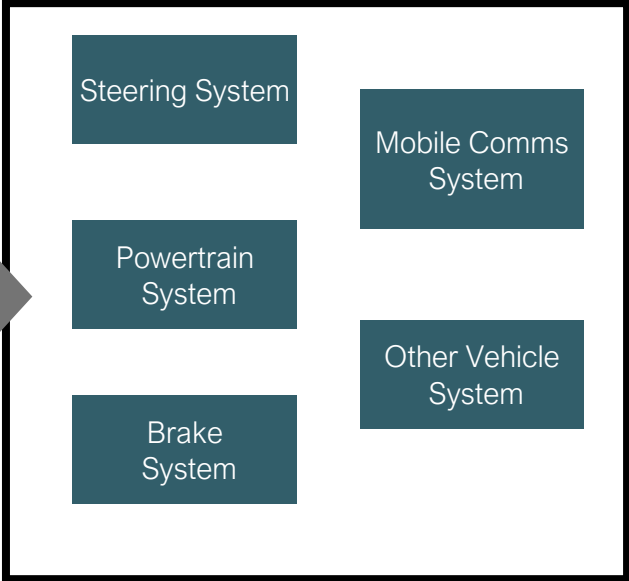
About Fusion Processing Ltd



Automated Vehicle System (Fusion Processing Ltd)

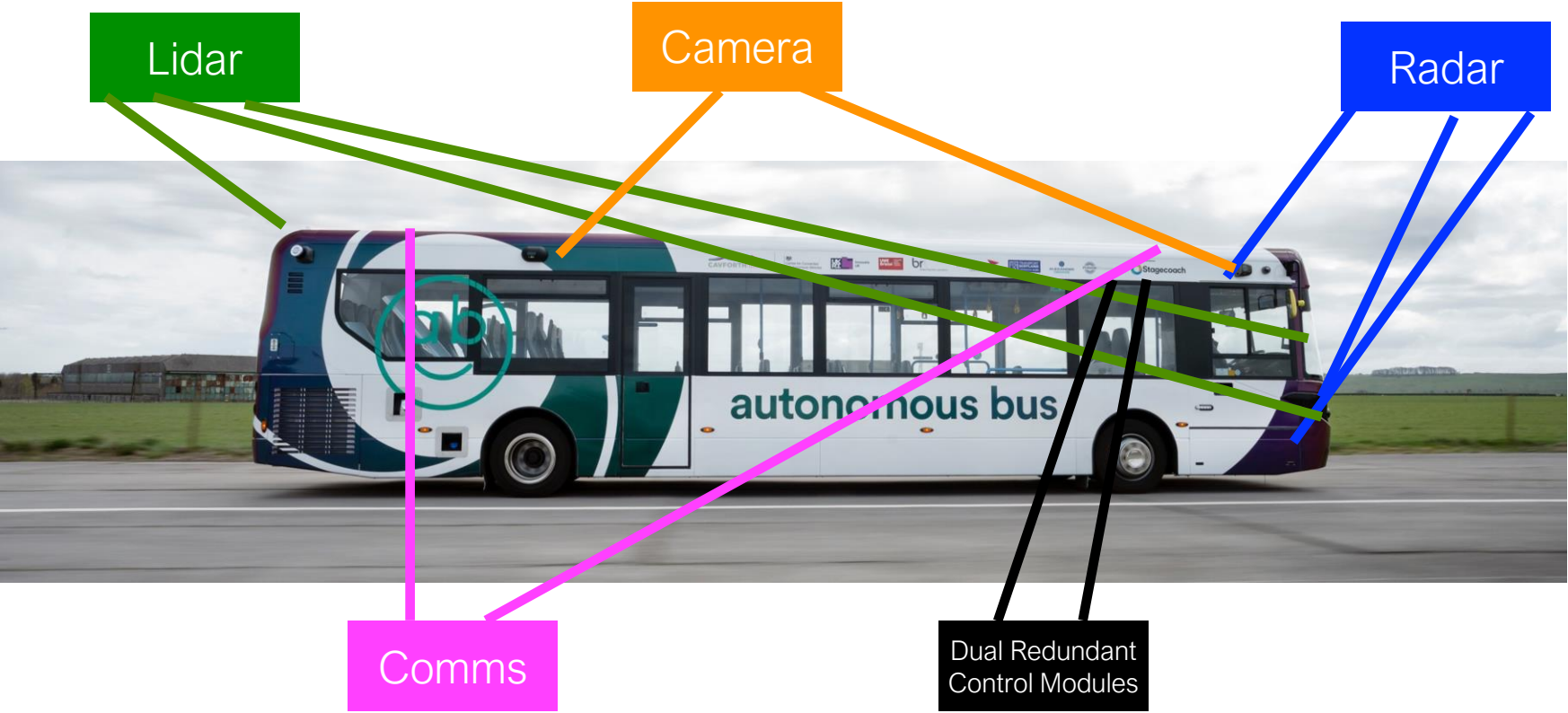


Vehicle Systems (Alexander Dennis Ltd)



CAVStar® Automated Drive System

An Autonomous Level 4 System



Benefits of CAVstar ADS



- Whilst we often hear about driverless cars, we believe the the most significant benefits for this technology will be in commercial vehicles: buses, trucks, tow tugs, etc
- We have industrial partners: vehicle manufacturers and vehicle fleet operators in each of these vehicle segments
- This CAVForth project is one example of how we are delivering that strategy
- Our autonomous driving system can provide:
 - Improved safety
 - Up to 25% saving on fuel, tyre and brake costs
 - Improved punctuality and operational efficiency





ALEXANDER
DENNIS

Vehicle technology

CAVForth media launch, 11th May 2023



Leading the **ZE**volution™



Who we are

The world's leading manufacturer of double deck buses, lightweight buses and accessible coaches.

Alexander Dennis facts and figures

Global leader

in double deck and
lightweight buses

2,000

zero emission buses
sold to date

15

facilities
in 9 countries

2,100

team members

Supporting a total network of

31,000

buses and coaches

Established

1895

Part of



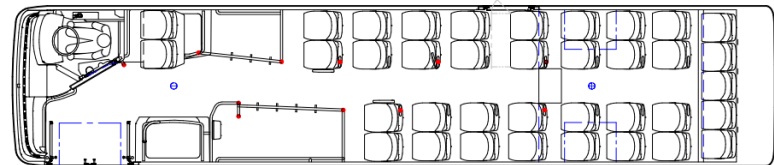
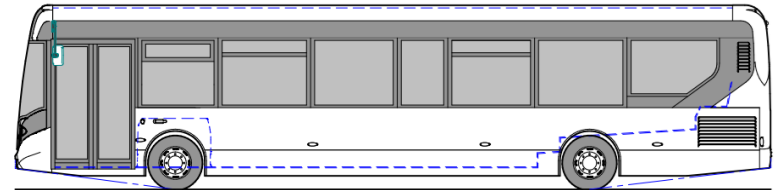
since 2019

Enviro200AV

- Based on the 11.8m Enviro200 single deck bus
- Low-emission driveline
- 37 seat belted seats and 1 drivers seat also belted



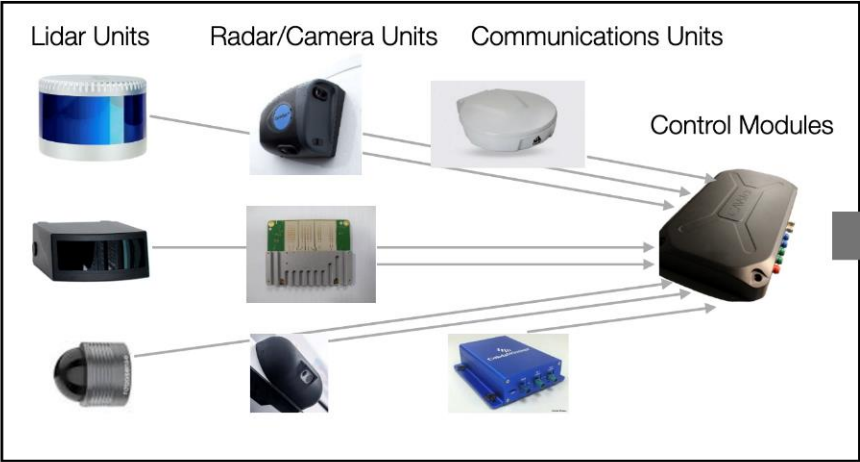
Length	11.8m
Width	2.47m
Height	2.9m
Wheelbase	6.5m
Wheel Size	19.5"
Seats	37 seatbelted
GVW	14,440kg



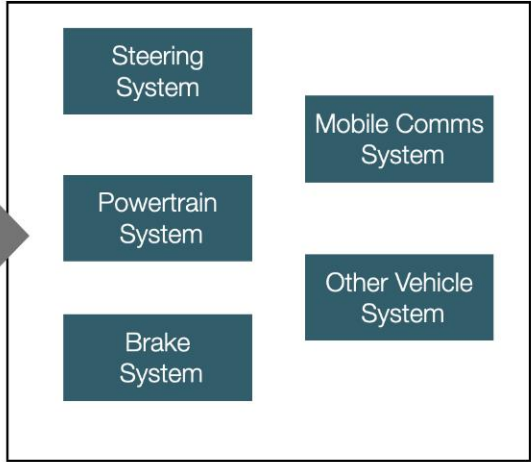
Fusion's CAVStar® Automated Drive System



Automated Vehicle System (Fusion Processing Ltd)



Vehicle Systems (Alexander Dennis Ltd)



CAVStar® is a complete, distributed system that converts a vehicle to SAEJ3016 Autonomous Level 4

The system comprises sensors, communications modules, redundant control modules and a safety driver interface

All software is develop in-house by Fusion

Alexander Dennis has integrated the Fusion ADS into its vehicle systems architecture

CAVForth2

Follow-on CAVForth2 project has been awarded funding from CCAV

- **Starting in 2024**
- **Continued operation** of existing fleet of five Enviro200AV
- **Route extension** beyond Ferrytoll P&R to Dunfermline city centre
- **Enviro100AEV zero-emission** autonomous bus to be added to fleet





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