



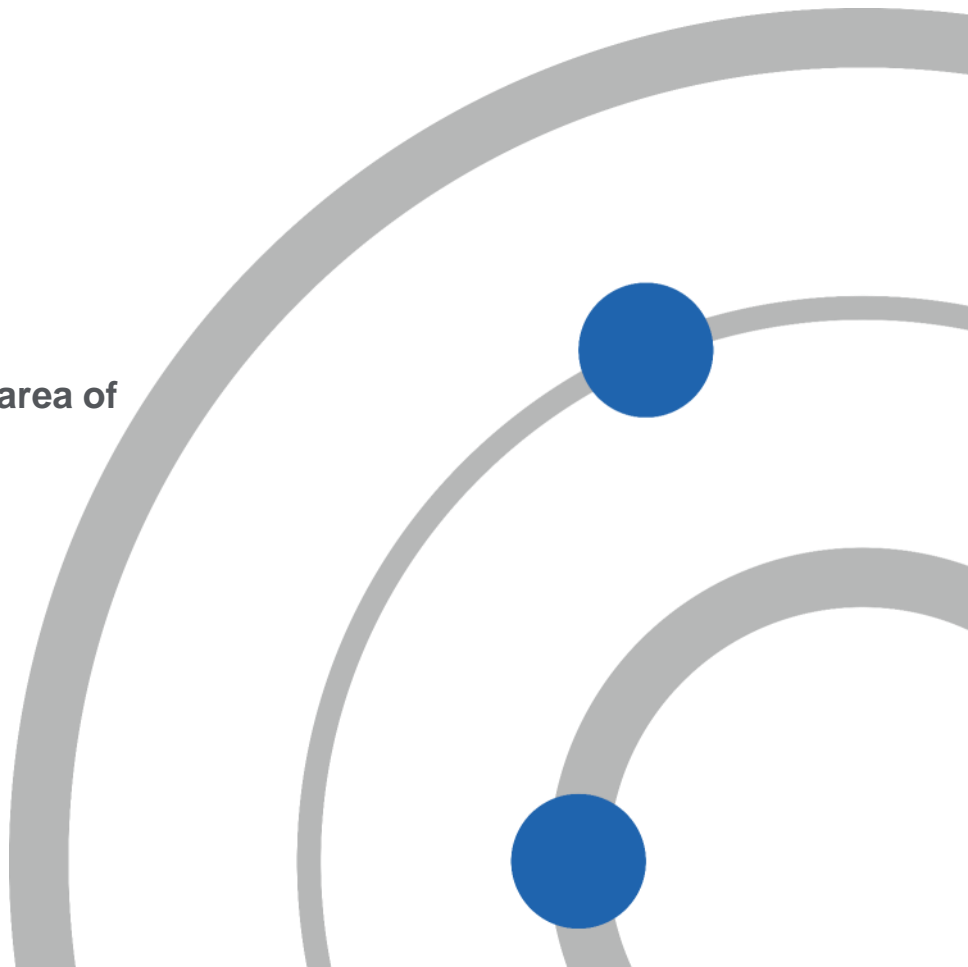
Centre for  
**Connected  
Autonomous  
Automotive  
Research**



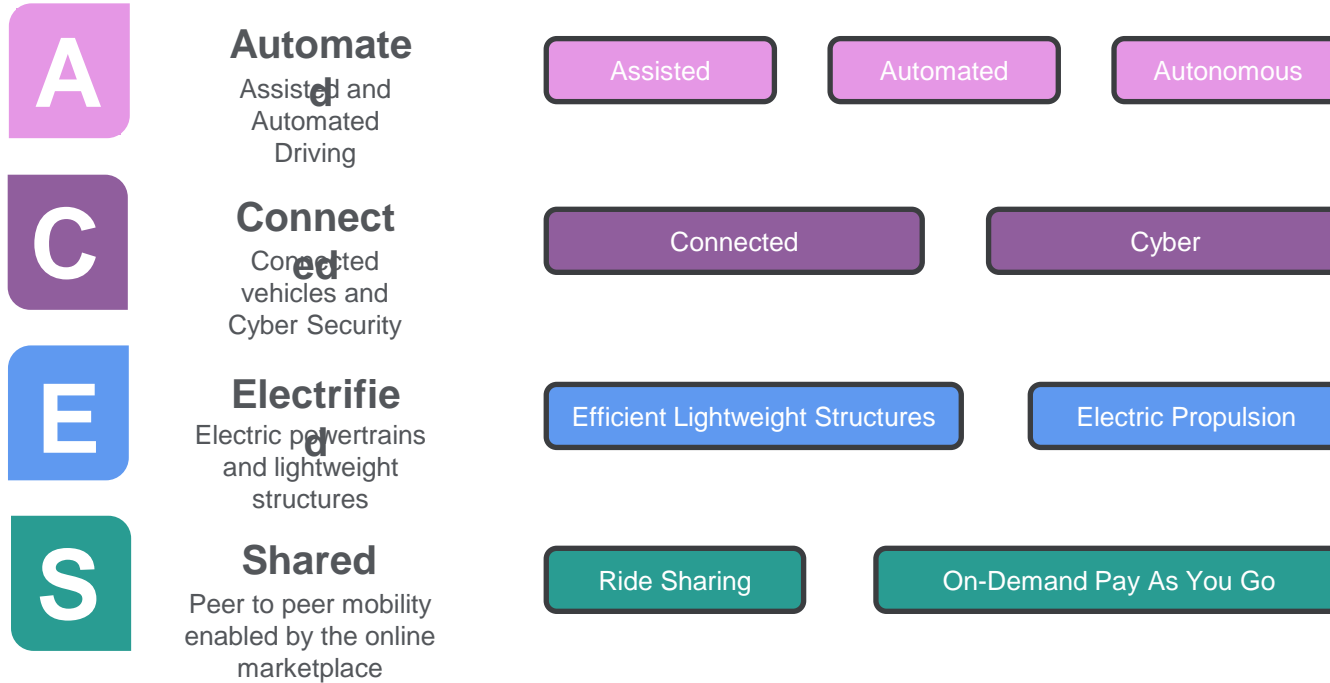
# CCAAR

Our collaboration with Coventry University in the area of  
**Connected and Autonomous Vehicles.**

Dr Anthony Baxendale  
Head of Horizon Scanning, HORIBA MIRA



# The automotive sector is going through a period of unprecedented change



# HORIBA Automotive – Medium / Long term Strategic Direction

*“Enabling safe, secure and sustainable vehicles”*



Test Systems : Testing Services : Engineering Consultancy

# Accelerating industrial research through academic partnerships – Creative Innovation

- **Exploratory research coupled with an entrepreneurial spirit of innovation**
  - Benefits from working with Universities
- **Cultural divide - making university industry partnerships work is not easy even when there is a willingness on both sides to do so!**
  - Building on the strengths of both cultures requires champions who understand both worlds
- **We have been able to achieve this with Coventry University**
  - Shared vision starts at the top, successful implementation starts at the bottom
- **Partnership covers:      Education : Research : Recruitment**

# Putting it into action



## Centre for Connected Autonomous Automotive Research

### Aims (HORIBA MIRA perspective)

- Undertake collaborative research to accelerate the development of HORIBA MIRA products & services
- Establish an environment to simulate, test & evaluate the security & safety of vehicles
- Develop a pipeline of talent to support growth
- Create a foundation to build Strategic Collaborative Projects

# Sponsored PhDs

- PhD students are integrated into our business structure
- Become part of part of HORIBA MIRA's values & culture
- Designed to achieve business impact in short timescales
- Requires pragmatic IP & funding arrangements
- Develops research skills and future talent for HORIBA MIRA



# PhD examples

# MiCar video





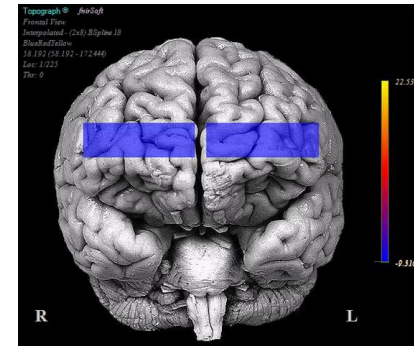
# Implications of highly automated driving

- Gradual pathway to deployment of fully automated driving e.g. Autobahn Chauffeur with  $v_{max} = 130$  km/h
- Function availability depends on preconditions. If preconditions not met control is returned to driver
- Advantages: System can rely on capability of humans for handling of unknown or complex situations
- Disadvantages: Transition creates **new risks**. Human Automation Partnership (HAP) becomes an integral part of the process.
- How do we assess an effective HAP for highly automated driving?
  - Safety
  - Cognitive load



# Assessing HAP for highly automated driving

- Many changes occur in the brain during workload
- The pre-frontal cortex, located in the frontal lobe is where information is processed
- Oxygenation changes in the pre-frontal cortex occur during varying levels of cognitive workload.
- fNIRS allows us to assess this
- Allows real time analysis of blood flow through the capillaries in the pre-frontal cortex
- **Research Aim:** To examine the nature of delegated authority to the driver within an autonomous car.
- **Approach:** Real-Time analysis of higher cognitive function during different tasks



# Strategic Collaborative Projects



Major New Facility on HORIBA MIRA Proving Ground

Safe environment for testing CAVs up to the limit of their operability

# Complementing HORIBA MIRA's existing City Circuit





## Thank you

감사합니다	ありがとうございます	Cảm ơn
Dziękuję	धन्यवाद	Grazie
Merci	ขอบคุณครับ	謝謝
Gracias	Σας ευχαριστούμε	நன்றி
Teşekkürler	شكرا	Obrigado
Danke	Большое спасибо	Děkuji
		Tack ska ni ha

**HORIBA**



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