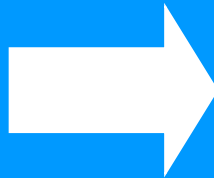




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# Cargo Screening Ferret



Tony Dodd and Ferret Team



# Problems with Current Systems

- External screening - remoteness
- Bulky – fixed location
- Expensive – build, maintenance, training
- Require ultra-high sensitivity
- Difficult to interpret results
- Lack of operator confidence



# Aim

To develop a novel approach to cargo screening where we take the sensors to the contraband and provide confident and reliable detection.





# Key Challenges

- Getting the sensors into cargo containers
- Searching cargo containers
- Novel, compact sensors
- Processing the information
- Ensuring the system is usable and instils confidence



# The Ferret Team

## Robot

Dr Tony Dodd  
Dr Yuanming Zhang  
+PhD+UG

## Data

Dr Mahroo Eftekhari  
Ayodeji Akiwowo

## Sensors

Dr Luke Wilson + RA  
Prof Tong Sun + RA

## Human factors

Prof Denis Smith  
Richard Farry



# Robot Development

- What platform?
- Produce prototypes and evaluate
- Navigation inside cargo containers (remote/(semi-)autonomous)
- Key issue – what is inside the cargo container?
- Key challenges – getting inside container, miniaturisation, navigation



# Sensor - Quantum Cascade Lasers

- New type of semi-conductor laser (mid-IR)
- Ideally suited to trace gas detection
- Fingerprinting
- Key issue – current QCL for single substance detection
- Key challenges – detection of multiple substances, miniaturisation



# Sensors – Optical fibre Based

- Antibodies on/within optical fibre
- React with known substances
- Perturbs the optical signal
- Fingerprinting
- Key issue – what antibodies to use
- Key challenges – create antibodies, develop sensor network

# Data Processing and Fusion

- Current detection uses individual methods
- Crude use of data fusion
- Key issue – can we combine sensor information to provide reliable and confident detection?
- Key challenges – combining QCL and optical sensor outputs, confidence in detections, communicating to users



# Human Factors

- No system will work without operator confidence
- Need to ensure the users will use the system and be happy with it (improve on current systems)
- Key issue – instil confidence in users
- Key challenges – capture user requirements, trust, user interface requirements, training



# Systems Integration

- A key theme throughout project
- Need to develop a system that is usable, reliable and can do the job
- Ongoing discussions and evaluation of all project aspects to ensure final success
- Final demonstration and evaluation
- Key challenge – how do we get all this in a miniature package?



# The First Year (a lot of preliminary work)

- User requirements
- Talk to UK Border Agency/look at what carried in cargo containers and how
- Initial platform design ideas and prototype development
- Design and synthesis work for sensors
- Data representation, sensor modelling and suitability of fusion algorithms



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# Questions?

