Industrial Perspectives on Verification of Autonomous Systems

Dr. Hadrien BRIDE

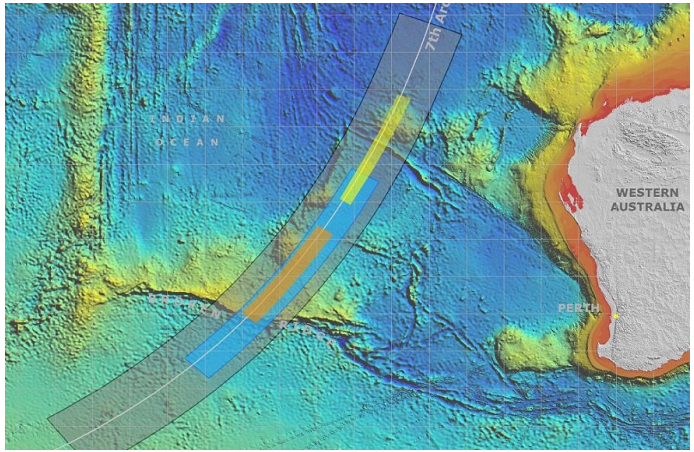
Institute for Integrated and Intelligent Systems (IIIS)
h.bride@griffith.edu.au

AUV: An emerging market

Domain: Intelligence, Surveillance and Reconnaissance

Who: Defence and law enforcement agencies

Need: Autonomously survey vast area of and report back



Traffic monitoring

Search and rescue

Border surveillance

Disaster monitoring

Industrial scale AUVs are now available

Endurance: up to 100h
Operating depth: up to 6000m

Endurance: up to several months
Operating depth: up to 6000m

One major setback is the lack of trust

Consequences of error unacceptably severe

Trust remains a major challenge in the development, implementation and deployment of AUV

Verification and validation are essential to the progress of AUV trustworthiness

High QoS requirements + Anticipation of regulatory framework

Traditional approach

Based on the composition of task-specific components

Adapted methods and tools for V&V: e.g. model checking

Challenges

Control of the complexity - Development of automated abstraction methods

Evaluation of component performances in uncertain/unstructured environment

New approach

Based on statistical techniques: e.g. deep learning

Lack of adapted methods and tools for V&V

Challenges

V&V of systems with time-variant characteristics

Explainability/traceability (the black box problem)

Quantifying the resistance to adversarial examples

Dealing with components from both approaches

Mix trustworthy and fault-tolerant components with untrusted components

Challenges

Build trustworthy systems from untrusted components

Monitor and manage untrusted components

We are addressing these challenges
And we invite you to join us

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