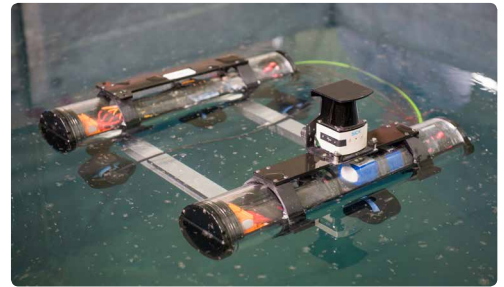
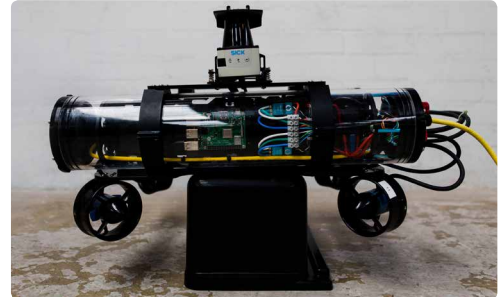


# MallARD

Floating robot for underwater exploration, inspection and characterisation.



TRL 1-2  
basic  
research

TRL 2-3  
research to  
feasibility

TRL 3-5  
technology  
development

TRL 5-6  
technology  
demonstration

TRL 6-8  
system/  
subsystem  
development

TRL 8-9  
system test,  
launch and  
operations

## The sMall Autonomous Robotic Duck (MallARD) is an Unmanned Surface Vehicle (USV) developed to autonomously characterise spent fuel ponds or wet silos.

The MallARD has been designed to carry a Cerenkov Viewing Device (ICVD) to aid the IAEA in monitoring international facilities. There is a flexible central payload area that can be used to carry a wide variety of sensors or equipment.

The MallARD has been successfully demonstrated at multiple events for the IAEA and in front of numerous stakeholders.

MallARD has been successfully deployed in two active spent fuel ponds in Finland.

## APPLICATIONS

MallARD can work autonomously, following a defined "lawnmower" pattern, and will hold position even in moving water with strong currents. Applications include:

- Nuclear fuel storage facilities, both on new build and decommissioning sites
- Industrial liquid storage tanks and silos
- Dockyards
- Canals



## TECHNICAL SPECIFICATION

Parameter	Value (units)
External dimensions	610mm x 430mm x 350mm
Weight	10.6kg (without payload)
Payload weight	Up to 25kg depending on mounting location and the addition of further ballast, which would affect external dimensions.
Payload size	Base 190mm (w) x 190mm (l) x 450mm (h), assuming a sensor in a housing half underwater. Can be modified and is dependent on sensor payload position.
Communication interface	Tethered Ethernet or Wi-Fi
On-board computing?	Broadcom BCM2711, quad-core Cortex-A72 (ARM v8) 64-bit SoC @ 1.5 GHz
Battery/run-time	Battery powered: 2-4 hours, indefinite if tethered.
Tether/tether management	25m neutrally buoyant tether as standard. Tethers from 5m – 300m available.
Drive system	4 x brushless thrusters
Velocity	0.2 ms <sup>-1</sup> to maintain control system accuracy. Higher speeds are available with reduced position accuracy.
Built in sensors	Waterproof lidar with a 25m range and localisation accuracy of ±12mm. Lidars with a larger range can be incorporated.
Operation mode	Full tele-operation available. Autonomous – path following in a defined “lawnmower” pattern and position hold, even when external currents impact the MallARD.

## COMMERCIAL OPPORTUNITIES

### Offering

- Technology demonstration on your site, or an inactive demonstration at short notice at a University of Manchester facility.
- Partnering opportunity to commercialise the technology.
- In the near future, a CE marked, built to order commercial product.

### Needs

- Demonstrations to key stakeholders.
- Collaboration opportunity for CE marking support, deployments in relevant environments, or developing regulatory paperwork for commercial deployments on a nuclear site.
- Technology demonstrations to non-nuclear industries such as water wells or dockyards for ship hull inspection.

