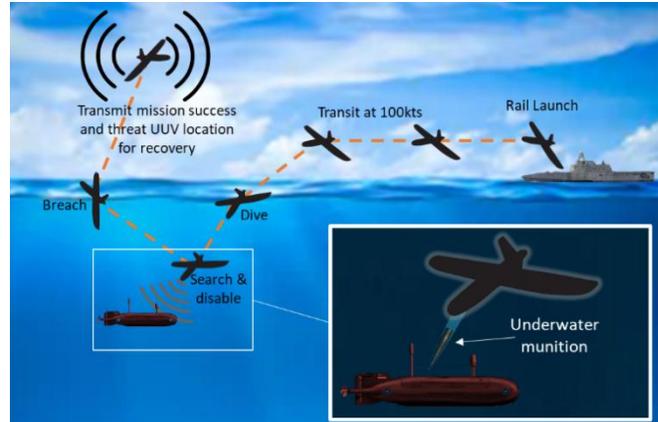


Cross Domain Systems Overview

Cross Domain Solutions (CDS) is an engineering firm that specializes in autonomous underwater and airborne drones. The technical team has developed unmanned underwater vehicles for hundreds of customers including the United States Navy, United Kingdom Royal Navy, Shell TechWorks, Titanic Research, and dozens of others. Additionally, the team's robotic systems have piloted several flight systems for Aurora Flight Sciences. CDS is a small business based in Medford, MA.



CDS is developing the Fast Reaction Vehicle (FRV), a low-cost fixed-wing drone capable of long-range missions in air and underwater. We believe the vehicle has significant applications for border security in the maritime environment. The key disruptor of FRV is breaching (transitioning from subsea operation to flight in air). A scalable fixed wing aircraft has never been able to perform this maneuver and continue flight. The Size, Weight, and Power (SWaP) for multiple payloads combined with the multi-modal vehicle creates an opportunistic and flexible capability. FRV is currently in development at TRL 5. Except for the breaching control strategy, all elements of FRV have been proven on other airborne and subsea vehicles by the CDS team. Many of these vehicles are operated by militaries and commercial entities across the globe (TRL 9). This vehicle will be able to assist with several border patrol missions including the following:

- **Harbor Patrol Counter-UUV:** Unmanned Underwater Vehicles (UUVs) are being proliferated and being used for nefarious purposes. In harbors these can be detected with underwater sensors but often there is no way to engage them without a boat and underwater sonar which takes time. The FRV would be positioned around important harbors. If a UUV is detected it would be triggered to fly to the location and quickly scan underwater with a side scan sonar. It can then breach and provide data back on the threat or it could disable it with an onboard effector such as a munition. This allows the possibility of exploitation of the threat vehicle.
- **Intelligence, Surveillance, and Reconnaissance (ISR):** The FRV can loiter on water or just below it for long durations of time (months). When required it can be activated to perform ISR with a camera on possible ship threats. It can then transmit the video in near real time.

FRV is expected to be reused but its low cost makes it expendable if advantageous. To further reduce costs, the manning and footprint requirements are minimal. A single LD3 container is capable of launch and recovery of up to 10 FRVs with one operator. It can also be launched and recovered from a small rib if required.

The CDS team has deep experience in this domain. The inventor of this disruptive system, Van Livieratos, is an industry leading engineer. He has led industry groups in unmanned flight and underwater systems at Aurora/Boeing, Bluefin, and Hydroid for efforts for the US military. Additionally, as a chief engineer for Aurora Flight Sciences, his robotic systems have piloted many manned aircraft. All CDS personnel are U.S. Citizens.

Specs	Modeled FRV Specs
Size	100" wingspan, 60" length, 6" dia
Weight	20kgs (4+ kgs payload)
Range	50km+ (air); 20km+ (underwater)
Extend Range	JP-9 backpack (adds 100s of km)
Speed	100kts airborne; 20kts+ subsea
Depth	100m+ (based on mission req)
Turn Time	Mission ready in 10 minutes
Comms	High Bandwidth RF, Acoustic

Point of contact: Muk Pandian, Muk@CrossDomainSystems.com (949)322-8239
Technical point of contact: Van Livieratos, Van@CrossDomainSystems.com (781)859-9505