DIN STRATEGIC INVESTMENT INITIATIVE
SECURE AND EFFICIENT UAV TO UNDERSEA SYSTEM COMMUNICATION WITH MINIMAL RISK OF EXPOSURE

PROBLEM

In order for Defence undersea systems to gain an instantaneous warfighting edge through the use of valuable information gathered by Uncrewed Aerial Vehicles (UAV), decision makers need to take risks of detection related to the time spent at or near the surface to access the information.

The challenge in such a situation is to 'stay safe, stay undetected' while accessing the UAV's Intelligence, Surveillance and Reconnaissance (ISR) information that enables them to 'complete the mission' or gain tactical advantage. Regardless of where the UAV is launched from, the challenge is to minimise detection risk of the undersea platform through efficient communication of the pivotal ISR data in a secure manner.

The undersea platform's time at or near the surface (the time at risk of detection) should be minimal in order to motivate it to take the risk while ensuring the integrity of the information received, providing the need for secure data transfer.

NEED & RELEVANCE TO DEFENCE

The communication channels available to undersea systems is substantially limited when such systems cannot surface due to environmental and other situations which in turn restricts its actionable intelligence considerably. In a hostile environment, an undersea asset or platform relies on its acoustic or other communication channels, which is often limited to ambient underwater acoustics or achievable acoustic profiles.

Any tactical information that a platform received at the start of the mission from surface stations can possibly be outdated and/or un-actionable. To this end, today's advanced UAV technology offers great advantage in that up-to-date ISR information can be gathered and communicated in a timely manner. However, in order to preserve the inherent strategic advantage offered by undersea systems and platforms, it is crucial not to identify their location or their presence altogether.

Current modes of ISR acquisition for undersea systems involve rising close enough to the surface in order to gather information, mostly in form of optical information, which poses a high risk of exposure. Acquiring ISR information from UAVs is a promising alternative because of the wealth of information a UAV can carry and has access to. UAV acquired ISR knowledge can in fact add great capability and tactical advantage to complete the undersea platform's mission. However, exposure of location (if not presence) still remains a major risk in this exercise, in that such exposure poses a risk to both the undersea platform and the UAV. Hence, secure information transfer to the undersea system with minimal risk of detection would be of great advantage to Defence.

It is also of interest if the information transfer can be achieved without requiring the undersea asset or platform to rise to or near to the surface. A successful method of communicating and updating ISR, if achieved, can be relevant to all frontline units, whether human or uncrewed.

RESEARCH QUESTIONS

How can we ensure secure and efficient communication between ISR UAVs and undersea systems with minimal risk of exposure??

EXPECTED OUTCOMES

A prototype for secure communication methods and enabling hardware systems/hybrid solutions that facilitate UAV to undersea communication with minimal risk of exposure. The proposed methods/systems should minimise the near-surface / surface time (if any) of the undersea resource or platform while ensuring secure information transfer.

The DIN SII seeks to demonstrate achievement of a TRL between 4 and 6 in the 12-18 month timeframe of the SII project.

Some practical demonstration / experiment / trial may be required.