

Project Name: Acoustically detecting and localizing the unmanned aerial vehicle using vector sensor

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Lab Development: Acoustic signal processing lab

Project Summary:

Unmanned Aerial Vehicle (UAV) is commonly known as a drone and is extremely difficult to detect it using radar due to its small size. Detection of UAVs is very essential and important to prevent misuse of UAVs for various purposes such as surveillance, attacks, etc. It is much easier to detect the UAV acoustically. A single sensor can detect only the presence of a UAV while for localization purposes one needs an array of sensors. The number of sensors required may vary from a few hundred to several thousand depending on the resolution. Due to the use of the array of sensors the overall size of the device for detecting and localizing the UAV will be large. In place of a regular array of sensors, an Acoustic Vector Sensor (AVS) can be used to detect and localize the UAV. The advantage of AVS is that its size is very compact as compared to the regular sensor array. The AVS is a device that can measure acoustic particle velocity and pressure using a set of standard microphones or accelerometers. The AVS device is able to determine the direction of arrival (DOA) of an acoustic source. In this project proposal, we aim to develop signal processing algorithms for the detection and localization of UAVs. The development of algorithms will involve fine-tuning and verification from field data. For this purpose, a prototype acoustic vector sensor system shall be designed and fabricated to make measurements followed by real-time signal analysis to detect and localize UAV. All security agencies, organizations like DRDO, Army, Navy, etc. will be highly interested in the outcome of this project.

Deliverables: Prototype AVS system including hardware and robust signal processing algorithms and for real time determination and localization of UAV ii) Final report on prototype AVS system, real-time signal processing algorithms for determination and localization of UAV and AVS hardware