

Project # E7

Project Title: Drone detection and classification implementation using FPGA.

Professor(s) Name(s): 1. Omar Saad Aldayel
2. Sami Alhumaidi

Number of Students: Two to three

Students Qualifications

EE301, EE420, EE422 and MATLAB.

Statement of Problem/Brief Description of the Project

In this project, the student will apply their analytical and numerical knowledge to design a low cost and accurate drone detection system using FPGA. The system should be able to detect and identify drones and their locations with high accuracy. The first phase of this project (should take place in the first semester), will involve the modeling of micro-Doppler signature and Matlab simulations. In the second phase, the students should implement their system of a Digital Signal Processor (DSP) or any type circuit board/controller and evaluate the pros and cons of hardware options in term of cost, reliability, size and accuracy.

Objectives

- (1) Study and understand the concept of array sensors and how they can be used to detect targets.
- (2) Study and understand few detection methods/Algorithms in the literature, compare them and, if possible, improve or enhance their performance.
- (3) Implement these method(s)/Algorithm(s) using MATLAB and evaluate their performance in terms of accuracy, computational complexity, etc.

Implement the candidate method/algorithm on real low-cost system.

Technical Approach and Expected Deliverables

- 1) Review of the recent literature on radar and micro-Doppler.
- 2) Correct and accurate software implementation detection method(s)/algorithm(s).
- 3) Knowledge of the hardware requirement to build the detector.
- 4) Evaluation of the pros and cons of this prototype and how it compares to other prototypes in terms of cost, performance and complexity.