FPGA Coding Task

**Objective:** Write VHDL code that resides on the FPGA that can execute a full radar image formation function. This task can be divided into sub tasks to show success on the way as separate coding modules that can be demonstrated.

**Purpose:** Command and control the hardware to operate the required radar mode. Learn about multiple aspects of VHDL hardware control in context of radar; discrete signal timing, analog to digital conversion, math computations in FBGA fabric, reading and writing to memory, VGA display interfacing.

**Approach:** Develop code than is demonstrated in modules that can be progressively integrated together aimed demonstrating complete real time radar mode. Obtain lap top from last year that has some baseline code. Olivier Barbier from last year who is back on campus as a grad student is familiar with the current code and should be consulted with. Proposed modules are below.

1. A to D conversion and value storage into memory that can be verified with 7seg display. Code from last year exists that does the conversion but I am not sure if the transfer to memory was completed.
2. Math computations inside the FPGA with the values from 1) stored in memory. Basis function constants for the Fourier transform also need to be stored in memory. I think integers have to be used to avoid excessive memory usage. This task I think was never started.
3. Timing discrete generation that switches the RF path between transmit and receive phase centers. Also generates fast pulse signal through VHDC conn to form the 20 nS Tx pulse. The PMOD outputs can be used for switching RF paths since they are slow.
4. Displaying math computation results real time on the VGA display. The pixels in display are divided into groups that represent angle of arrival of the target energy.

Note; Having static modes for these modules where switches and pushbuttons might be used to debug code is advised.