# Radar Processing Project

Due 08/16

#### 1 Description

The final course project is designed to give you hands-on experience working with real radar data. You will be given sample radar signals and will be asked to determine the speed of a target. If a target's velocity vector has some portion in the direction of the radar sensor/antenna, a (Doppler) shift in frequency with respect of the original transmitted frequency occurs. Your task will be to identify the speed of the target by using Fourier analysis techniques. Your solution should load a sample radar file, perform appropriate signal processing and Fourier analysis to determine the most prominent target (if one can be found).

The main emphasis of the project will be the design and development of radar analysis and software processing systems using a computational tool such as Matlab. The project should be completed individually. Each student must submit a project report summarizing findings at the completion of the course.

### 2 Report

At the completion of the project, a report must be generated to describe the project and summarize the findings. The project report should be approximately 4-6 pages and contain the following sections:

- 1. Abstract This brief summary of the project purpose presents a general overview of the project topic and solution.
- 2. Description The project description provides and introduction to the project topic and expands upon the abstract. This section completely explains the specifications of the project: e.g. the objectives, functionality, and components used.
- 3. Implementation The project implementation provides the details on how the specified problem was solved. This implementation will include the software packages and libraries utilized, your programming methodology, efforts to optimize the project code, and any difficulties encountered while implementing the design.
- 4. Experimental evaluation The experimental section describes how the project program performance was evaluated. This section should provide examples that highlight the input/output relationships of your system and how the results can be observed and confirmed. Be sure to clearly present the findings for each experiment in an easy to read format (e.g. a Table).
- 5. Summary The conclusion of the report should provide a summary of the project aim and results as well as highlight both what was learned working on the project and what further directions would improve the project.

## 3 Deadlines and Deliverables

The following highlight the important dates and items to be submitted for the project. The project will be worth 30% of your final grade. Final hard copy version of the report (4-6 pages including figures/tables) along with an electronic submission including the report and code should made by August 16.

#### References

You are able to use whatever programming language is most natural but we highly recommend using Matlab (available at UNLV computer labs). For those without easy access to Matlab you can try to use Octave (the open source Matlab clone) or Python with NumPy/SciPy.

- 1. https://www.mathworks.com/academia/student\_version.html
- 2. https://www.gnu.org/software/octave/
- 3. https://www.scipy.org/
- 4. https://www.numpy.org/