CEC300 Project #4

ADS-B Part 1: Flight Data Generation:

The purpose of this assignment is to familiarize you with the process of automatic surveillance systems such as ADS-B. The outcome of this assignment will be a data log that shows entries that correspond with the reported position of two airplanes.

Inputs to the code:

For this assignment, consider that you have two airplanes (A and B). The following information will be given to you:

- Start time.
- Initial positions for A and B (latitude and longitude), altitude, and heading. Heading will remain constant for this assignment.
- Speeds for A and B in knots. For this assignment, assume that the speed will remain constant.
- Time step: this is the time step at which the information is broadcasted, and for this assignment, the time difference between two consecutive entries in the log.
- Total surveillance time: this would be the entire time that you are required to record the data for the airplanes.

Outputs to the code:

Your code needs to compute the new position for airplanes A and B after each time step, and record it on a text file (.txt) while including the time stamps. For this, you need to review how to translate the airplane movement to a new latitude and longitude positions, after each step. Use the provided slides titled "Geodetics" for guidance on how to do this.

- Generate a data log that shows the time stamp, the airplane name, latitude, longitude, speed in knots for both A and B. The data must be recorded after each time interval. Example: [ID, timestamp, lat., long., speed]= [A, 01/12/2018 18:16:01, 29.178661, -81.062119, 500].
- How are the airplanes are moving on a world map? Note that you could generate the entire surveillance data in a few seconds, although, in reality, the airplanes took much longer flying. To make it easier to visualize, include time delays in your routine so you can see how the airplanes moved. Update the airplane position each time you log data into the .txt file. Please keep the runtime (i.e., being able to see the entire flight time) less than 5 min.

Initial code parameters:

Airplane A is located at [29.180425, -81.058623] (lat., long.) flying at 500 knots, 30,000 ft ASL altitude, heading of 315° respect to true north.

Airplane B is located at [29.188851, -82.220902] (lat., long.) flying at 510 knots, 30,050 ft ASL altitude, heading of 45° respect to true north.

Total surveillance time: 8 min.
Time step: 5 s.
Start time: 12/01/2018 8:15:23
Note that some of these parameters have been simplified and might not be standard aviation or ADS-B parameters.

Files you need to submit:

- Report that includes your pseudo-code, as well as screen captures of your world map with the airplanes.
- You Matlab script that takes the initially given inputs, and generates the world map showing the airplanes' movement, as well as the output .txt file.
- Your generated .txt that has all the recorded surveillance data.

Hints:

Matlab has libraries available to show symbols on maps. You can use those and update the positions each time step. Find all the information on how to use it here: https://www.mathworks.com/examples/mapping/mw/map-ex49699798-create-your-first-world-map