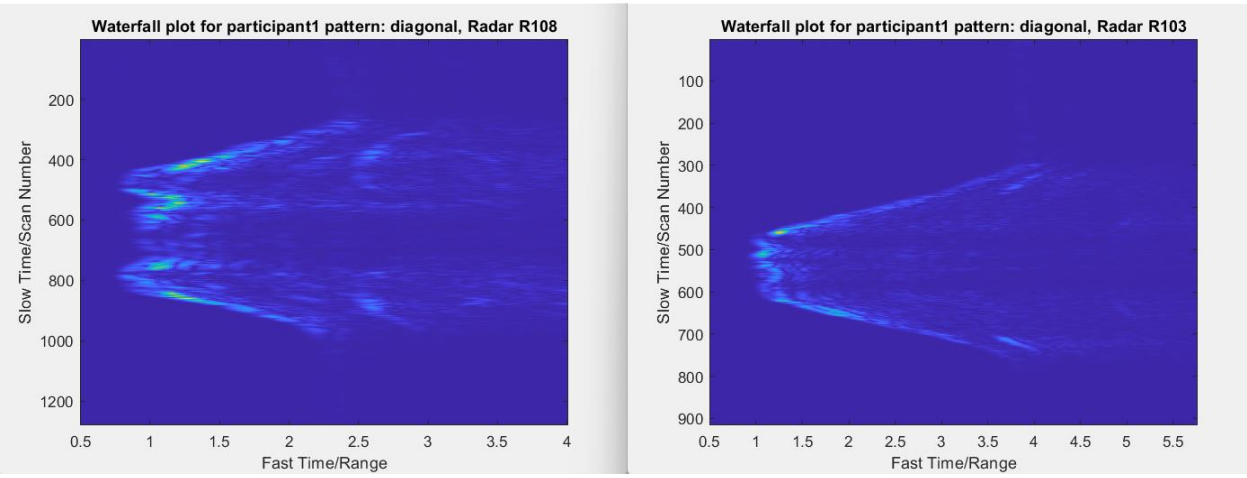
Assignment 3: Indoor Localization using RaDAR

Step 1:

To create this, **run the file createWaterfall.m** in the code folder.



Here we can see that the person comes closer to Radar103 with time, does some minor back and forth for few seconds, between 1 and 1.5 meters and then goes back. By doing this however, for R108 which is on the window wall, he is actually moving closer till he is adjacent to the radar during his diagonal path and then as he moves ahead, he starts going further from the radar. So, even though he is moving in one direction, we notice a peak at time scan 400 and then user moving further away till 1.5 m(when right in front of radar108). The little back and forth is shown by the noise from scan 600-700, and then when the user start going back on the diagonal, he actually comes closer to Radar108 first (700-800) and then keeps going farther. The two waterfalls can accurately help us deduce that the user might be walking in a diagonal to obtain such plots for the two radars.

Step 2: (figures on pg 2-3)

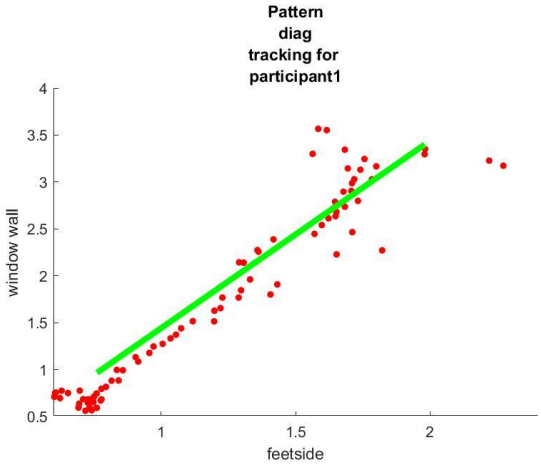
To generate all figures below, **run the file main.m** in the code folder.

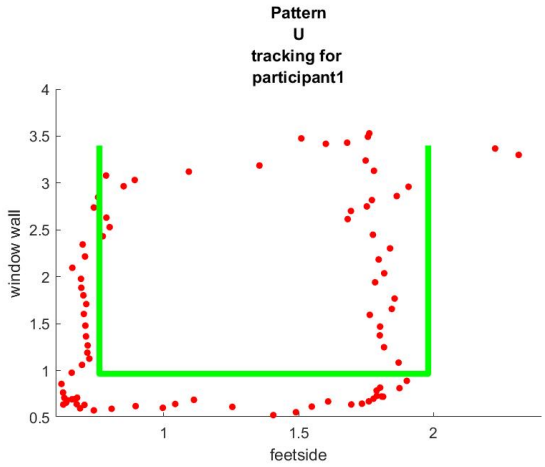
One can notice by tweaking the code that instead of mean, if I take median of all circles while windowing, for some patterns I get better results, whereas some patterns I do not.

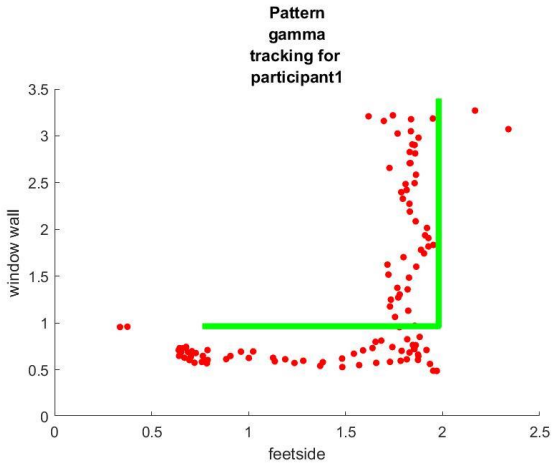
Also, for participant2's diagonal pattern(pg3), for some reason there is a perpendicular line to the actual line. Maybe someone else walked too across the perpendicular path at the time of those scans. While diagonal localization looks the best using this method, U pattern has major difficulty with many points far from ground truth and few points along the open edge. L, gamma and four patterns also seems to work promisingly for both participants, with a few countable points predicted wrong.

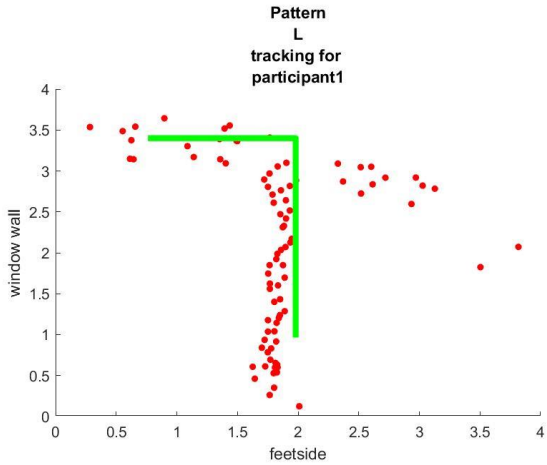
In general, if ground truths are not provided, we can definitely find the general pattern that the user would have followed using this pattern, **by excluding the points which are too impossible** for the user to jump to suddenly without a following a continuous path.

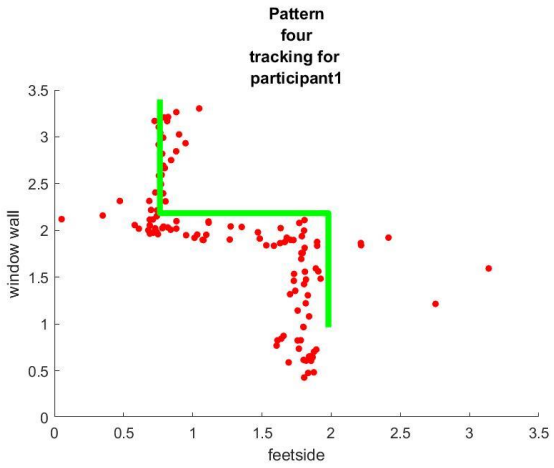
Participant 1:











Participant 2: