Some hints about Project 2, part A

If you consider initial position = [0;0] and initial heading =90°, you should get a path similar to the one shown in the following figure.

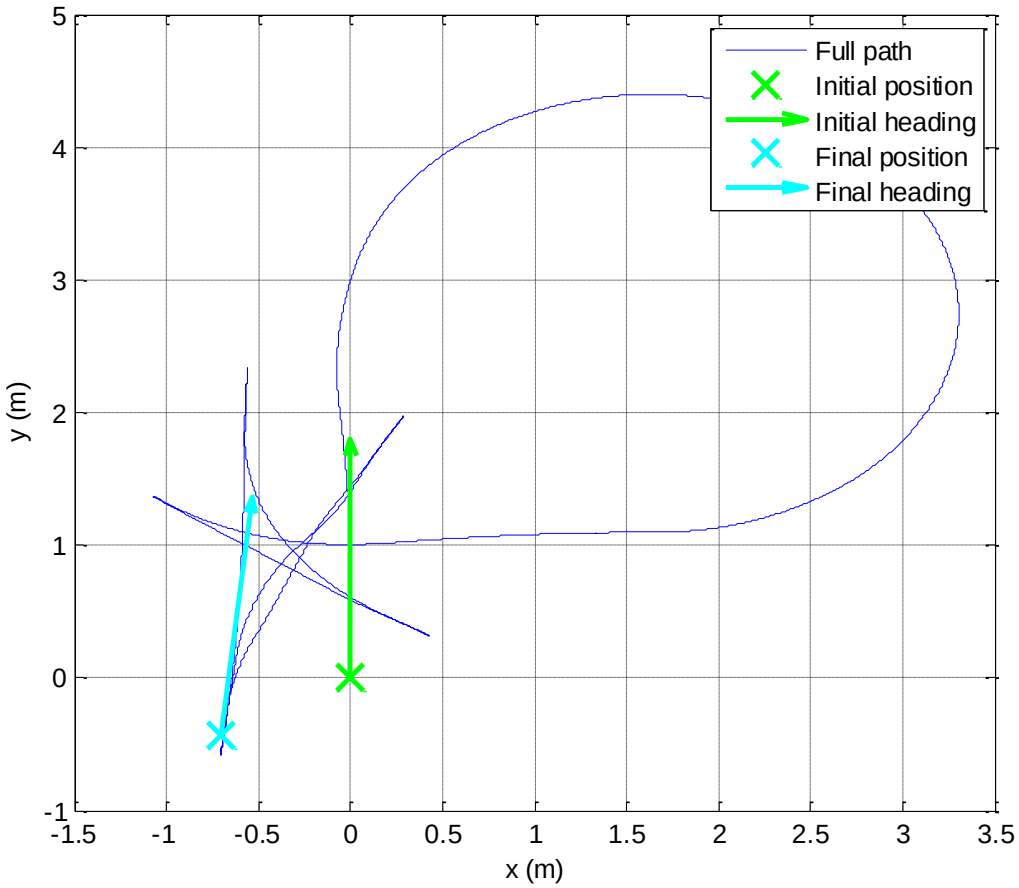
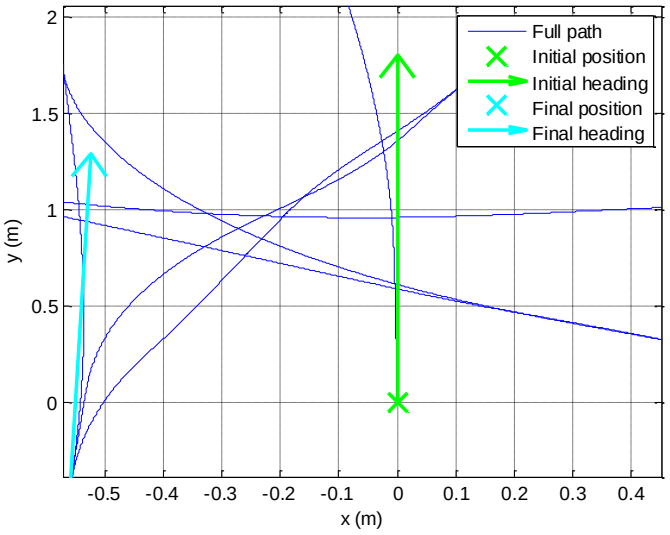


Figure 1 (Your estimated path would look like this one)



This result is obtained if the initial conditions are assumed [x0;y0;heading0] = [0;0;90º]. If you use a different one, your predicted path will have identical shape, but it will be rotated and displaced. For instance, if you assumed heading0=0, you would get:

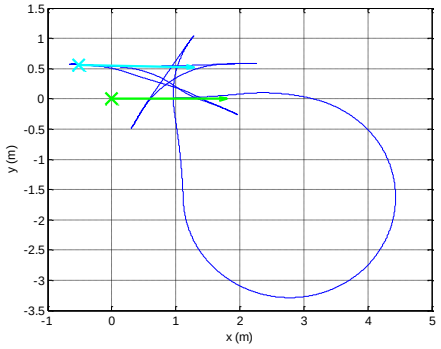


Figure 2: Path when using certain different initial condition.

Predicted Heading

The gyroscope's measurements are polluted by noise, which is composed by a fluctuating component (which behaves almost as a Gaussian White noise), and by a bias (i.e. a constant offset). The bias can be estimated by exploiting the fact that the UGV was stationary (completely still) during the first 25 seconds (at least). (you can appreciate it by inspecting the speed). For estimating the gyroscope's bias, you can average the gyroscope's measurements (during that period of time). That value can then be subtracted from the raw measurements of angular rate, before being used in the kinematic model.

If you assume initial heading =90º), and if you subtract the estimated bias, then your predicted heading should be like the following one:

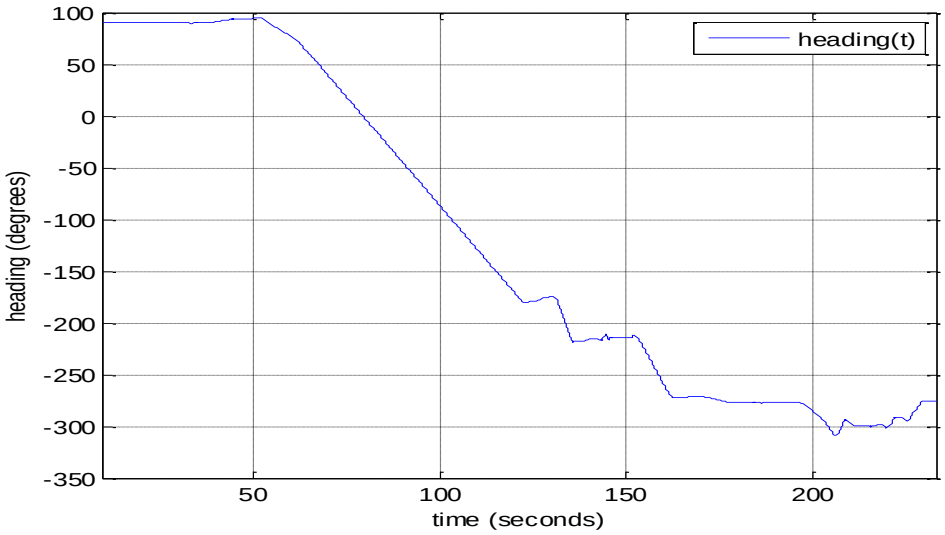


Figure 3: Your predicted heading should be similar to this one.

Questions: ask the lecturer (j.guivant@unsw.edu.au)