# Homework Assignment - UGV GNC in Simulink

## Due date : October 8, Monday, 2018

Figure 1 shows "Guidance" Subsystem within "GNC" subsystem of the simulink model **trackVehicleNewVer6b_Encoders_DR_GNC.slx**.

Simulink model **trackVehicleNewVer6b_Encoders_DR_GNC.slx** is available in class blackboard. As discussed in class and shown below, the navigation and guidance algorithms are implemented in Simulink using basic Simulink blocks. In this assignment, you are required to implement some part of these algorithms using "MATLAB Function" block. Specifically, you are required to replace enabled subsystem "Subsystem1", highlighted within the yellow box in Fig. 1, by a MATLAB Function block. Once this is done, the new "Guidance" Subsystem should look like the one in Fig. 2.

1) Once "MATLAB Function" block replaces the enabled Subsystem, you should save **trackVehicleNewVer6b_Encoders_DR_GNC.slx**

as **hwGNC_<yourUTANetID>.slx**.

2) This new simulink model should generate the same results as **trackVehicleNewVer6b_Encoders_DR_GNC.slx** when run in the default case, where the UGV moves through four wayPoints at (3,-3), (4,1), (6,1), and (1,3). You should run the simulink model in two cases: (1) Set constant to 1 in constant block "oneLoop" (see Fig. 3), and (2) Set constant to 0 in constant block "oneLoop" (see Fig. 4).

3) A hint: You should consider using "**persistent** variables" in MATLAB Function block(s). **persistent** is to "define variables that are local to the function in which they are declared yet their values are retained in memory between calls to the function."

4) Another hint: You should make sure that the "MATLAB Function" blocks are executed at the same rate as the blocks they are replacing.

5) For the hints, you can see two simulink models uploaded on blackboard, **persistentExample.slx** and **persistentExample_doubleDelays.slx**.

6) **hwGNC_<yourUTANetID>.slx** is the only file you are required to upload to blackboard as your submission.

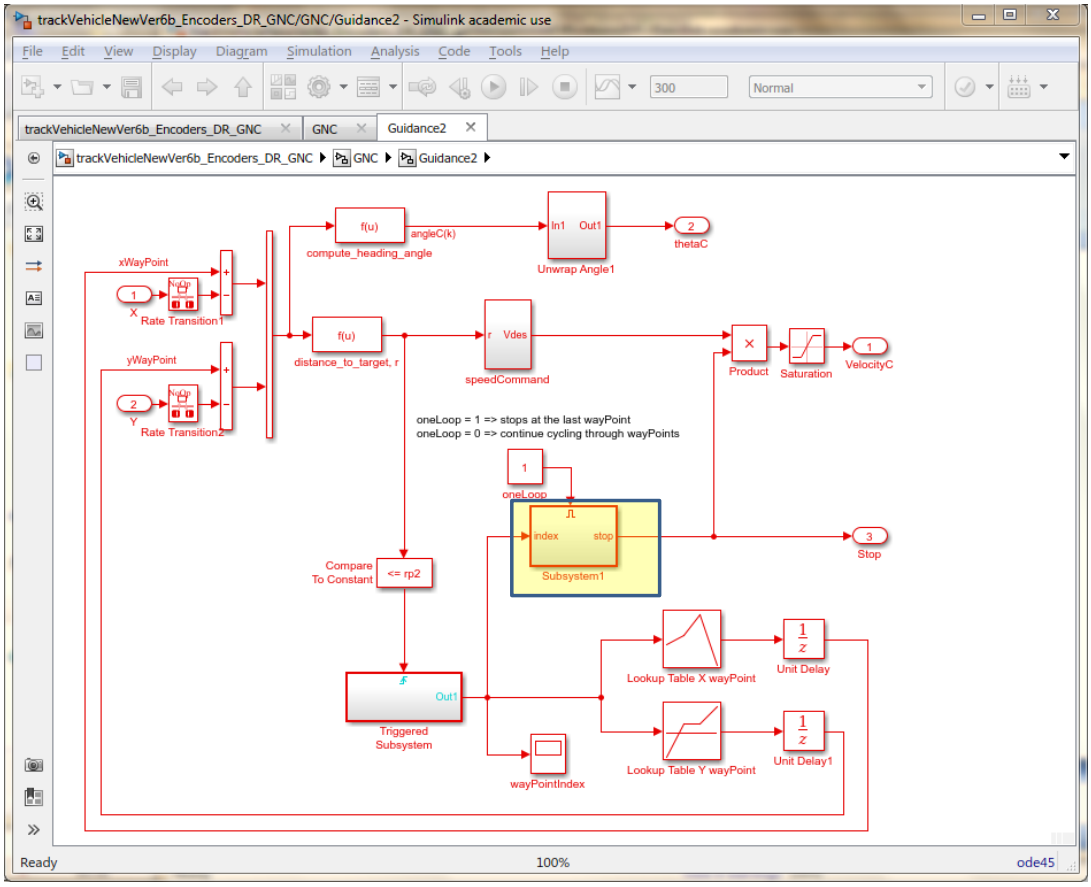


Figure 1: Current Guidance Subsystem with “enabled” Subsystem1

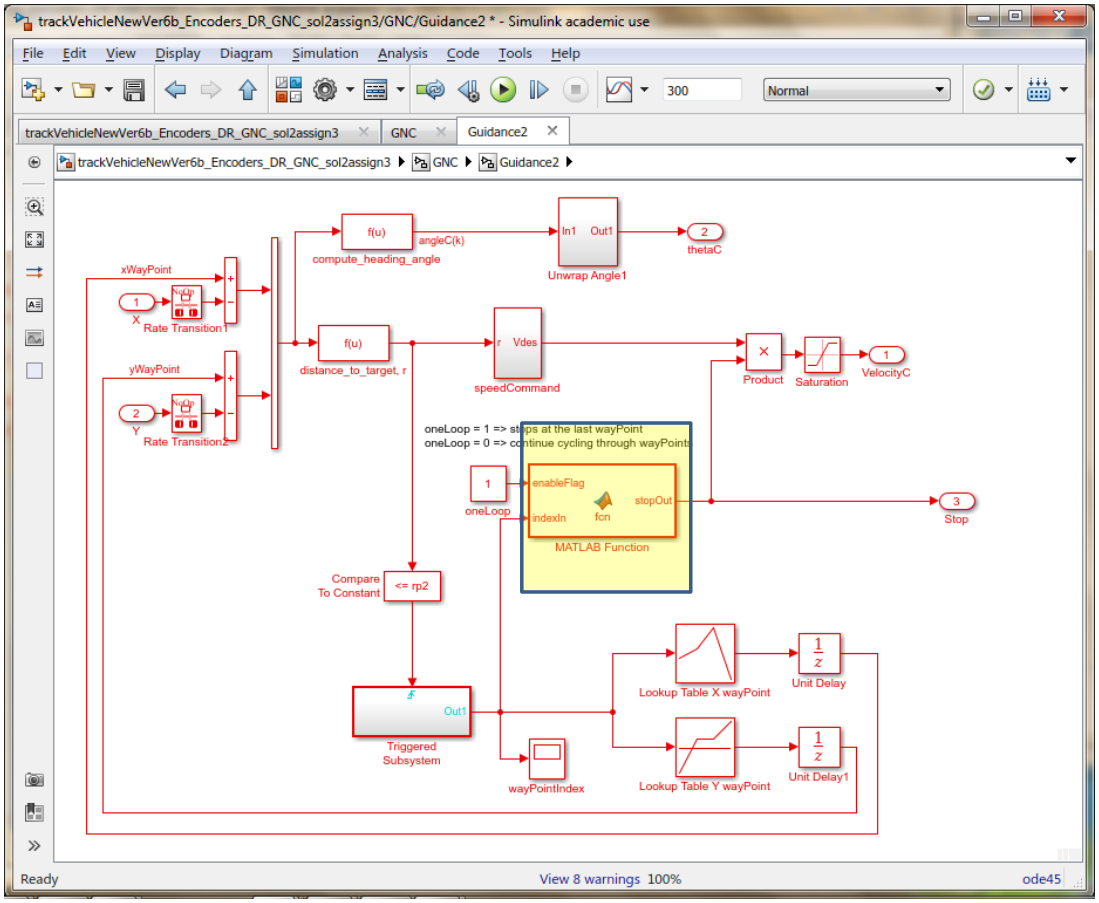


Figure 2: Guidance Subsystem with MATLAB Function block replacing "enabled Subsystem1" of the current model

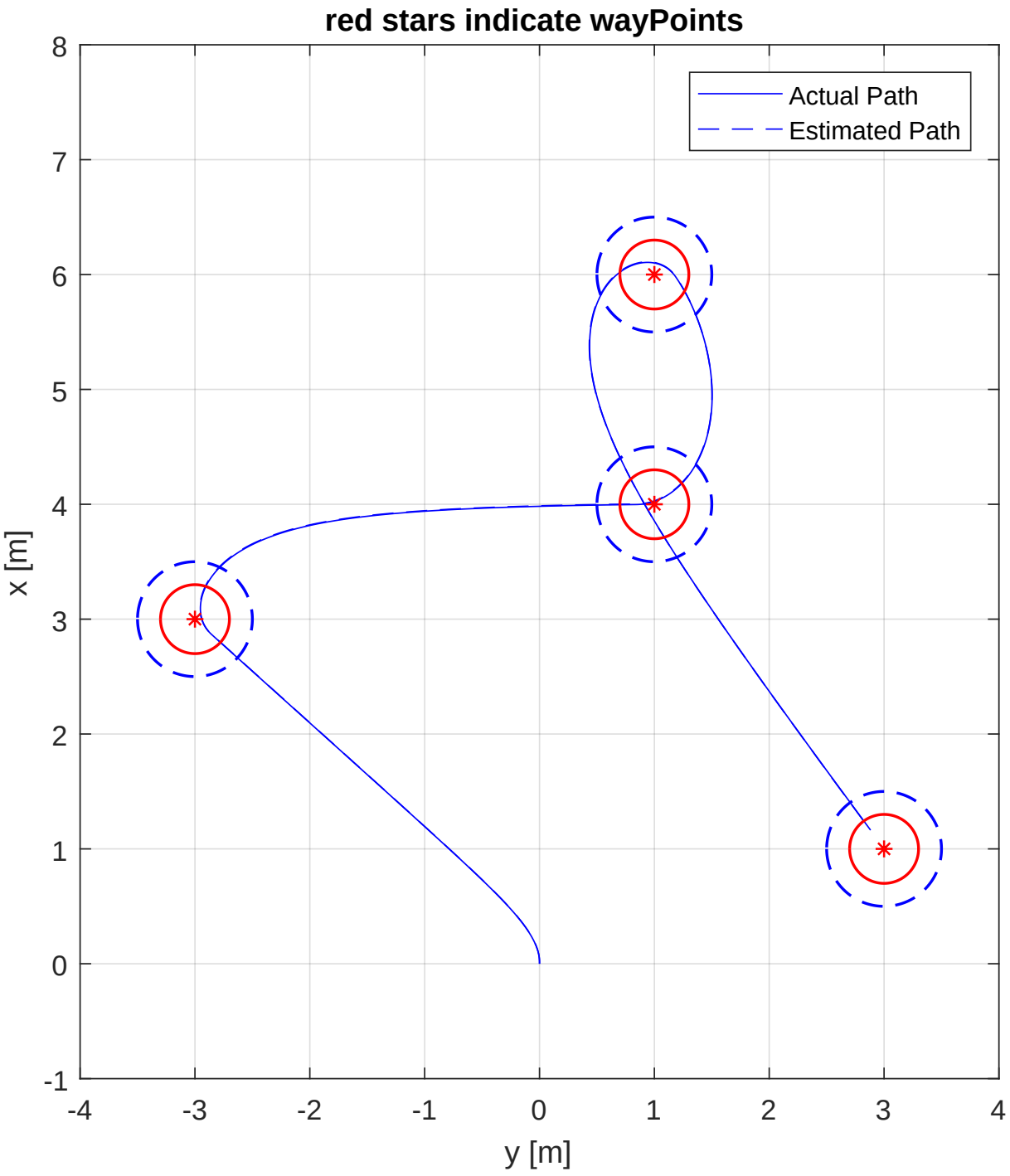


Figure 3: Simulation Result when oneLoop = 1

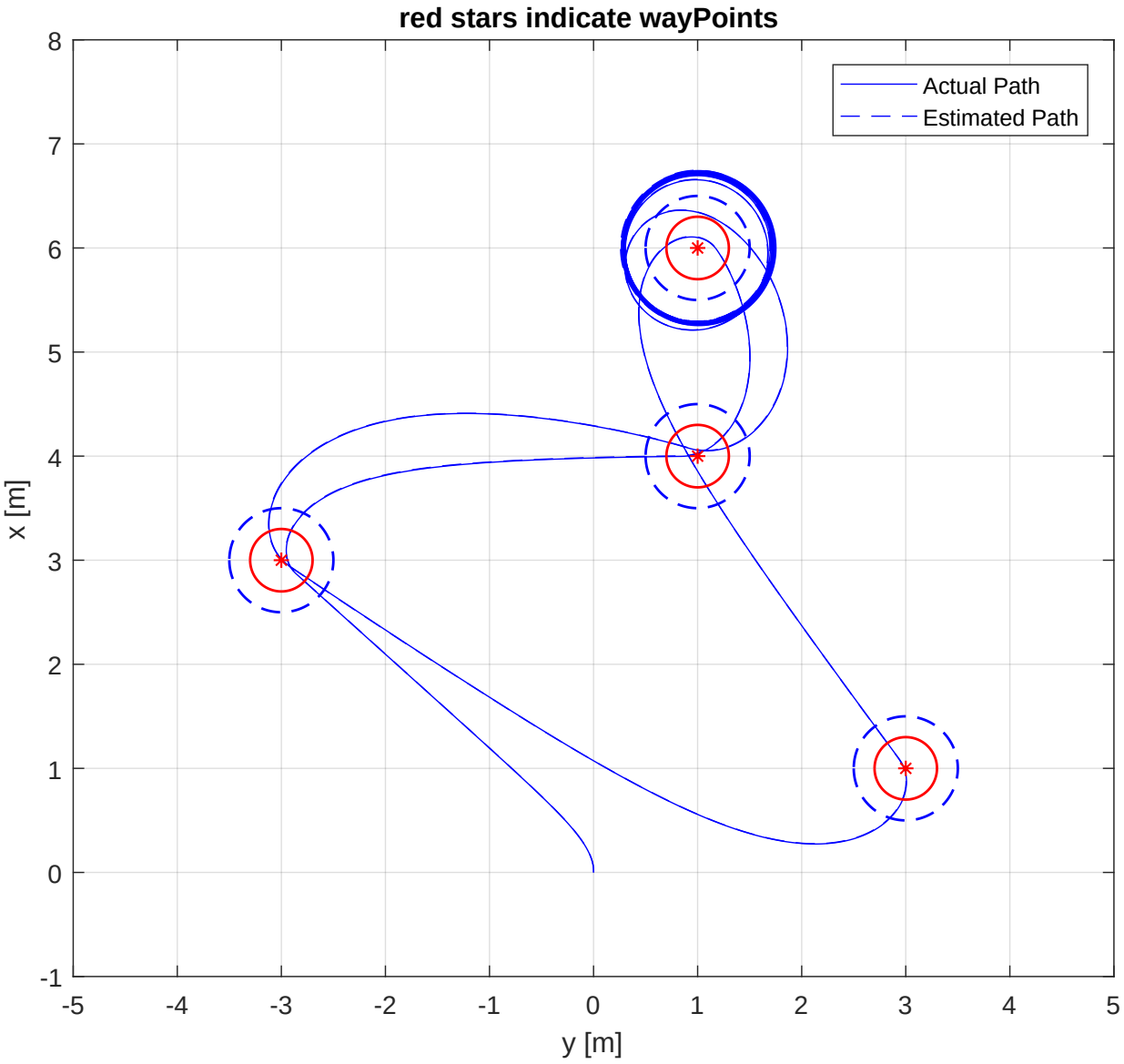


Figure 4: Simulation Result when oneLoop = 0