

Homework 4 – SLAM Implementation

The objective of this homework is to run a full SLAM implementation in MATLAB. The process and observation models, as well as the sensor data, are based off of a paper by Eduardo Nebot, “Autonomous Navigation and Map Building Using Laser Range Sensors in Outdoor Applications”. Read the first three sections of this paper (downloadable from the SLAM web page) in order to complete this homework assignment.

After downloading the Matlab SLAM template from the web page (slamSimulation.zip), complete the following parts:

1. Fill in the equations for the process model (slam.m)
2. Enter in the equations for the process model Jacobian and covariance (slam.m)
3. In new_state.m, a prediction for the new landmark position is made. Enter this in.
4. Enter in code for the observation model Jacobian. Note that this shows up in two places. The first is when a new landmark is added to the state vector (updateNew.m) and the second is when an already existing landmark is reobserved (updateExisting.m)
5. Enter in the correct code for the EKF update equations (updateNew.m and updateExisting.m)

After running the simulation with the correct code, the figure below is displayed

