**EE 6900**
**"Simultaneous Localization and Mapping (SLAM) for Robotic Systems"**

**Spring 2015**

*Project # 4*
*(due Wednesday 1 Paril 2015 at midnight via e-mail)*

**The goal of this project is to perform EKF SLAM implementation for the Victoria park data set and document your results.**

This project is a continuation of Project #3, so the functions you developed for Project#3, can be reused for this project.

This project consists of the following tasks:

a) Implement a Matlab function that performs the data association step. The Matlab function should have the following header:

```
function [c] = data_association_step(x,P,z,R);
```

where 'c' is a vector whose elements indicate if a particular measurement is new and should be added (corresponding entry in 'c' is -1) or already existing (corresponding entry in 'c' equals the index of the landmark i.e. 4 for landmark 4). An example would be c(1) = -1 means that measurement 1 is a measurement of a new landmark, whereas c(4) = 6 means that the 4$^{th}$ measurement is a measurement of landmark 6.

b) Implement a Matlab function that performs the EKF update step. The Matlab function should have the following header:

```
function [x,P] = update_step(x,P,z,R,cor)
```

Note that within the template, the measurements are setup as a 2-by-N matrix, where each of the columns is one measurement. Feel free to change this if your implementation calls for a different setup.

c) Run the Matlab template 'project04_template.m' with all your subroutines. At the end it plots both your computed trajectory and the corresponding GPS trajectory.

d) Document your approach, figures and finding in a report using the report document template 'report04.docx'. Make sure to address the speed of the algorithm and the reasons why this method slows down as time progresses.