

## 機械學習在定位與製圖之應用

### Machine Learning in localization and mapping applications

課程概述 Course description :

本課程主要目標是學習如何使用多感測器進行導航定位與製圖以及先進人工智慧如何進一步推升該領域之應用，透過學習基本理論來進一步了解新技術機器如何解決既有之瓶頸。第一堂課講授傳統導航參數估計，包含最小二乘法與卡曼濾波器之理論並以導航相關問題練習最佳化估計理論。本課程偏向較多實際應用而非數學推導，且包含導航相關範例與實驗以練習實際操作之能力。第二堂課講授現代類神經網路基礎並帶入現代機械學習用於預估導航誤差之相關理論，第三堂課為基礎SLAM與現代機械學習之輔助，最後一堂課將講述NeRF與其它具有高潛能人工智慧技術。

This course is designed to learn the basic theory of estimation and SLAM as well as the contribution of machine learning in this field. The first part of the lecture will cover the conventional filters, such as least-square estimation and Kalman filter. The emphasis of the course is less on mathematical derivations and more on the practical implementation of these approaches. The examples and labs in the course are geared toward navigation applications, although a background in this field is not assumed nor required. The second part will cover the basic theory of neural network and its contribution in navigation application. The third part of the course will cover modern neural networks used in SLAM. The fourth part is going to learn neural radiant field and correlated techniques that have high potential power in near future.

日期 <b>Date</b>	進度說明 <b>Progress Description</b>
8/7 9:30~12:00	Least-Squares Estimation, The Kalman Filter generalization
8/7 14:00~16:30	Theory of neural network and machine learning in navigation
8/8 9:30~12:00	Modern SLAM with ML
8/8 14:00~16:30	Neural Radian field and its application
8/9 9:30~12:00	Seminar