GT560: 칼만필터의 원리와 응용

(The principles and applications of the Kalman filter)

구 분		내 용		
과 목 구 분		선택		
과 목 번 호		GT560		
교과목명	국 문	칼만필터의 원리와 응용		
	영 문	The principles and application of the Kalman filter		
담 당 교 수		공승현 (Prof. Seung-Hyun Kong)		
강의:실험:학점 (숙제시간)		3 : 0 : 3 (6)		
학·석사 상호인정교과목 여부		인정	개설학기	Fall
교과목 개요		본 과목은 최적제어에 필수인 최적의 시스템 상태추정 기술인 칼만필터의 원리를 공부하고, 칼만필터 기반의 다양한 변형 필터(확장 칼만 필터, 무향 칼만 필터, 강인 칼만 필터, 다중 모델 필터, 파티클 필터)를 소개한다. 또한, 이동체의 움직임을 예측하는 최신 응용 분야의 예로 다중 모델 필터를 소개한다. In this course, we study the principles of Kalman filter that is essential to the optimal system estate estimation for optimal control and we introduce variants of Kalman filter (ex. extended Kalman filter, Unscented Kalman filter, Particle filter). In addition, we introduce multiple model filters as an example of recent applications that estimate vehicle motion.		

Grading:
Attendance (10%) In-Class Q&A (10%) Homework (20%), Mid-Term Exam (30%) Final Exam (30%)

Pre-Requisite:

MAE500 (Mathematical Methods in Mechanical Engineering), EE210 (Probability and Introductory Random Processes)

Course Schedule:

Period	Contents	Period	Contents
1week	Overview of the Kalman filtering Matrix algebra	9week	Verifying filter performance Multi-model filtering
2week	Probability and random variables Stochastic process	10week	Interacting Multiple Model (IMM) Filter Autonomous Mulitple Model (AMM) Filter
3week	Least-Squares Estimation (LSE) Maximum Likelihood Estimation (MLE)	11week	Robust Kalman filter
4week	Mean Square Estimation (MSE) Maximum A Posteriori (MAP) Estimation	12week	Discrete-time Extended Kalman filter (EKF)
5week	Derivation of the Kalman filter	13week	Unscented Transformation Unscented Kalman filter (UKF)
6week	Shaping filter	14week	Introduction to particle filter
7week	Fading-memory filter Constrained Kalman filter	15week	Implementation of the particle filter
8week	Midterm Exam	16week	Final Exam