Course Topic: *HCCI Engine Control*

Outline:

Homogenous Charge Compression Ignition (HCCI) engine is a clean and efficient type of IC engines. Control of HCCI engines is a crucial topic for today's automotive powertrain industry which limits mass production of this novel type of IC engine. In this course, the major dynamics of these engines are identified and proper methods to model them are discussed. Next, techniques for model-based control of HCCI engines are studied and implemented. Finally, performance of the designed controller is tested by experimentally validated simulation models. Results are to be in forms of reports and simulation control results (Table A).

Table A: Project/Course Description

Item	Description	Deliverable	Final grade contribution
1	Literature survey – control of HCCI engines	Literature survey report	10%
2	Physics-based modeling of HCCI dynamics	Report + a simulation model validated by experimental data	20%
3	Study of control techniques desirable for HCCI dynamics	Report	10%
4	HCCI engine control (I) (combustion timing)	Report + Control Simulation Results	15%
5	HCCI engine control (II) (IMEP, exhaust temperature)	Report + Control Simulation Results	25%
6	HCCI engine control (III) (requirements and assessment for a hybrid electric vehicle framework)	Report + Preliminary Simulation Results	20%