University of Michigan

Department of Mechanical Engineering

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| ME566 | | Winter 2013 |
| Project Title: | Power Split Hybrid With Supercharged HCCI Engine | |

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| **Project Scope**  Using HCCI engine combined with electric motor to form a power split hybrid powertrain system for a new clean vehicle with good fuel economy. |

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| **Approach** | |
| * Architecture   Power split system with engine, motor generator and battery.  Controllers of each component cooperate to switch modes. |  |
| * HCCI: applying supperchager to elevate the engine load. |
| * Modes   Starting mode: engine starts  Frog mode: low-speed with frequently stopping  Acceleration mode: engine and motor combined  Normal mode: engine only  Stop mode: engines stops |

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| **Tasks**   * Literature review and collect data for the parameters of modes switch conditions, * Analyze engine model * Setup the simulation model |

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| **Deliverables**   * Simulation of different modes the hybrid vehicle model * Analysis on the drivability, fuel economy and emission of the model * Applications and future improvements |

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| **Time table in weeks**  Week 5-6: Literature review, data collection and parameters calculation  Week 7-9: Setup of the engine and system simulation model  Week 10-13: Analysis of the simulation results  Week 14-15: Optimizing the system and writing reports(including feedback) |

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| **References**  Musardo, Rizzoni, “A-ECMS: An adaptive algorithm for Hybrid Electric Vehicle energy management”, IEEE Conf on Decision and Control, 2005  D. Sutanto, H.L. Chan, C.C. Fok,, “A new battery model for use with battery energy  storage systems and electric vehicles power systems”, Power Engineering Society Winter  Meeting, 2000. IEEE Volume 1, 23-27 Jan. 2000 Page(s):470 - 475 vol.1.  D. Hermance,S. Abe, Hybrid Vehicles Lessons Learned and Future Prospects, SAE 2006-21-0027  Rudolf H. Stanglmaier and Charles E. Roberts, Homogeneous Charge Compression Ignition (HCCI): Benefits, Compromises, and Future Engine Applications, SAE Paper 1999-01-3682 |