A SIMULATION PLATFORM FOR HYBRID ELECTRIC VEHICLES

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Project Goal: Modeling and Simulation for Hybrid Electric Vehicles

Background
- 2.08 billion vehicles on the planet by year of 2030
- Traditional energy (Oil) storage limited
- Alternative power sources
- Alternative powertrain architectures
- Environmental concerns

Simulation Platform
- Fast evaluation and analysis of new design
- No need prototype at initial stage of development
- Cost and time saving

User Benefits
- Open system platform. New models can be integrated
- Matlab/Simulink environment. Models are easy to be developed
- Forward-facing and backward-facing approach
- Graphical GUIs for guiding simulation
- Standard drive cycles are ready for simulation
- Impacts of parameters on vehicle performance can be evaluated iteratively

Simulation for Ford Escape

Simulation for Multimode

Modeling
Electrical Dynamics:
\[ V_S = \frac{1}{R_L} \left( I + \frac{1}{R_L} \right) \]

Mechanical Dynamics:
\[ F_{mech} = F_{mot} + F_{var} + F_{F} + \frac{1}{2} \rho C_d V^2 + M_{friction} + M_{air} \cos\theta \]

Next Steps
- Optimal energy management Strategy
- Extended energy storage system
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