An Innovative Vehicle-Powertrain Eco-Operation System for Efficient Plug-in Hybrid Electric Buses

Performing Organizations:
University of California at Riverside (CE-CERT)
Oak Ridge National Laboratory
US Hybrid

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Project Team

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Dr. Abas Goodarzi: president; hybrid powertrain design, manufacturer & integration

Riverside Transit Agency:
Technology

Develop an innovative vehicle-powertrain eco-operation system for plug-in hybrid electric buses through co-optimization of vehicle dynamics and powertrain controls.
Technology

• Employ emerging connected vehicle applications:
  • Eco-Approach and Departure
  • Eco-Cruise
  • Eco-Stop

• Utilize advanced machine learning and prediction techniques to optimize both vehicle dynamics and powertrain controls

• Algorithm inputs:
  • On-board Sensors (drivetrain, vehicle position/state, passenger count)
  • Route Information (bus-stop, schedule, road grade)
  • Traffic/Signal Information (current and downstream)
Technology-to-Market Approach

• Work closely with US Hybrid to commercialize the plug-in hybrid electric bus technology targeted at transit agencies

• Develop a marketing plan through direct interaction and interviews with other transportation technology targets

• Create “toolkit” of algorithms that can be licensed towards other transportation modes beyond transit (e.g., trucks, commuting cars, shared-use vehicle fleets)

• Merge this technology with the deployment of automated vehicles
Key Challenges

• Improving transit bus energy efficiency by at least 20% while meeting stringent emission standards
• Achieving 20% energy savings on “mild” routes
• Obtaining permission to test the technology in real-world environments
• Obtaining funding for cities to deploy connected vehicle infrastructure
• Convincing transit agencies to embrace this new technology
• Migrating the developed algorithms and technology to other transportation modes