

# Antonio Howard

---

Major: Mathematics

University: Lincoln University

Faculty Mentors: Phil Buckley and Darren Rodke

Mentor Department: Midwest Research Institute Kansas City

Funded by: NSF Program Alliance for Collaborative Research in Alternative Fuel Technology and MU Access in Engineering

## **Fuel system design for an absorbed natural gas vehicle**

Antonio Howard, Stephen Eastman, Darren Radke and Phil Buckley

With energy and environmental concerns mounting as the global energy demand increases, alternative fuels are drawing more and more attention. Natural gas is one such alternative fuel. However, the major shortcoming of natural gas is that it must be highly compressed in order to store at a comparable energy density to liquid fuels. For this reason, The Alliance for Collaborative Research in Alternative Fuel Technology (ALL-CRAFT) aims to develop low-pressure, high-capacity storage technologies for natural gas (methane).

Midwest Research Institute (MRI), an ALL-CRAFT partner, is assigned the task of developing a fuel tank and fuel delivery system for a natural gas-powered vehicle modified to store the natural gas using adsorbed natural gas (ANG) technology. The design work done thus far has dealt with the logistics of modifying the vehicle's fuel delivery system to accommodate the use of the ANG tank in addition to the pre-existing compressed natural gas (CNG) tank.

The fuel system of a 2005 Honda Civic GX will be modified by installing an ANG fuel tank to serve as an auxiliary tank to the existing higher pressure CNG tank. Additional capabilities will be added while maintaining all of its original functions. One such capability is running either from its CNG or the ANG tank, with emphasis on maximizing mileage from ANG tank use. Moreover, the CNG tank will be equipped to simultaneously fuel the engine and refill the ANG tank upon the latter's depletion. An on-board CPU will be installed to control this modified fuel delivery system and record data such as mileage accrued from each tank.

The MRI involvement in the project is only at the end of the first of two stages towards completion but this initial research should provide a solid foundation to complete the design.