This Study

- Freight movement is highly time sensitive which encourages truck drivers to take the fastest route to the destination, which is not the most eco-friendly route.
- The objective of the work is to use the develop a cargo routing tool using representative drive cycles.
- Eco-routing is selecting the optimal route based on the minimization of emissions and the associated impacts.
- Geo-fencing is designating specific areas as “sensitive.”
- Combining eco-routing and geo-fencing could bring about great benefits.

Disadvantaged communities

- Identifying sensitive and vulnerable communities such as neighborhood with schools, hospitals, etc.
- CalEnviro Screen Score calculated using pollution burden (exposure) and population characteristics (socio-economic factors).

General Methodology

- Collecting real conditions driving data (telematics, portable measurement systems)*
- Identify representative drive cycles that minimize different criteria*
- Find the relationship between vehicle speed, engine speed, and the criteria of interest
  
  \[ y = 5E-07x^2 + 1E-05x + 0.001 \]

- Find the relationship between vehicle speed, engine speed, and the criteria of interest.
- Create study area network containing the various attributes.
- Geo-fence the disadvantaged communities identified using Cal Enviro Score.
- Develop the optimization routing algorithm depending on the operational mode used.
- Find the route that minimizes the criteria of interest while accounting for the disadvantaged communities.
  
  * Conducted by Prof. Jose Ignacio Huertas at the Monterrey Institute of Technology (Mexico)

Future Scope

- Identifying disadvantaged communities specific for the region of Southern California
- From deterministic to a stochastic routing tool.
- The current version of the tool used historic deterministic link speeds. The idea is to expand the tool to develop a stochastic shortest path algorithm.
- System impacts under equilibrium conditions
- Developing and solving an eco-routed traffic assignment problem under selfish and selfless driver behavior
- Designing scenarios considering different vehicles operating modes, and interventions that could lead to the greatest improvements.