Overview

Garmin ecoRoute technology provides a set of navigation features that allow consumers to reduce their impact on the environment and save money. This is accomplished by suggesting routes and driving behaviors that minimize fuel consumption.

There are patents pending related to the algorithms and methods used by Garmin ecoRoute technology.

Fuel Consumption Estimation

A major building block of ecoRoute technology is the ability for Garmin navigation devices to estimate fuel consumption.

When a user enables ecoRoute on their navigation device they are asked to enter the following vehicle characteristics:

1. Fuel type (unleaded, diesel, etc.)
2. Fuel price
3. City fuel economy
4. Highway fuel economy

After the vehicle characteristics are gathered the information is used to build a fuel consumption model tailored to the user's vehicle. The fuel consumption model allows ecoRoute to estimate fuel consumption given speed and acceleration/deceleration as input.

Fuel Consumption Reporting

The fuel consumption model is used to record observed fuel consumption in real-time as a user drives. Users may view fuel reports that display distance, travel time, fuel used, cost of fuel used, average fuel economy, and carbon footprint.

If a user finds that the ecoRoute fuel consumption estimations are higher or lower than expected they may calibrate the fuel consumption model by adjusting the fuel economy vehicle characteristics.

Fuel Efficient Routes

The fuel consumption model is used to predict fuel consumption for any route. When predicting fuel consumption it is determined what speeds the user is expected to travel along the route as well as any acceleration, deceleration, or stationary situations. This information combined with the fuel consumption model produce a fuel consumption prediction.

The fuel consumption prediction is further enhanced by observed driving behaviors. For example, a user that tends to accelerate aggressively will be predicted to use more fuel than another user that typically accelerates more smoothly.

Fuel consumption prediction allows for ecoRoute to determine a fuel efficient route to any destination. Fuel consumption prediction also allows the navigation device to display the fuel cost prior to navigating a route.

Driving Challenge

The ecoRoute driving challenge indicates how efficient a user is driving on a scale from 0 (least efficient) to 100 (most efficient). The instantaneous driving challenge score is displayed on the map when a user enables the driving challenge feature. The instantaneous score is computed differently depending if the user is currently accelerating, decelerating, or driving a constant speed. If a user is accelerating the score reflects how smooth they are accelerating. The more aggressive a user accelerates the more aggressive the score is penalized. A similar algorithm is applied when the user is decelerating. When a user is driving at a constant speed the speed value alone is used to determine the score. The fuel consumption model is used to determine the optimal speed for the user's vehicle. The more a user deviates from the optimal speed, the more aggressively the score is penalized.

An overall driving challenge score is computed by averaging the instantaneous score over time. Average speed, acceleration, and deceleration scores are also computed and displayed to the user.