

## **Abstract**

Eco-routing offers large fuel saving opportunities for vehicles. However, road grade is often neglected in fuel consumption models as it is difficult to determine accurate estimates. This leads to over-or under-estimation of fuel consumption in energy consumption models.

There has been little development regarding large-scale analysis of road grade effects on eco-routing performance. Since fuel consumption and emission models are sensitive to road grade estimates, providing large-scale road grade profiles would aid in the eco-routing process. Existing Intelligent Transport Systems (ITS) like modern public bus transport could be used to collect large-scale road grade profiles around a city. By creating a large data-set of road grade profiles, it may be possible to improve simulations and models of fuel consumption that could be implemented in eco-routing systems.

The experiments performed in this dissertation utilise On-Board Units (OBU) on a modern public bus service to investigate a number of factors relating to road grade. Different methods for determining road grade are evaluated with the intention to assist in the development of a process for large-scale road grade data-sets using ITS. The results highlight the range of approaches to determine road grade which may be applied to ITS when using OBUs. Ultimately, the study provides an independent evaluation of existing methods for determining road grade and presents a new combined approach to determining road grade.