Calculation and Visualization of Bicycle Traffic Flows

Tjern, Martin
Lidberg, Gustav

A digital simulation tool has been developed for the purpose of investigating the possibility of approximating bicycle traffic systems with a Monte Carlo simulation. Alternative types of transport are important in our fossil fuel based world in order to reduce environmental impact. Cycling can replace motorized vehicles for shorter distances, however this requires an infrastructure which would allow the transition to a more sustainable path. The project revolved around two major focal points: firstly, how simulation softwares can be designed to adequately facilitate the planning and visualization of infrastructure with respect to bicycle traffic, and secondly what the actual difficulties in doing so would be. The project resulted in a program that both enables modeling of bicycle traffic systems and the use of algorithms such as Dijkstra's algorithm within the system. The program is able to simulate intelligent and realistic cyclists, as well as produce statistically certain results within reasonable amounts of time. Monte Carlo-simulations performed in the program gave promising results which could be used to plan traffic systems, such as the distribution of travel time and risk exposure for the systems artificial bicycles. The simulation method tested in the program seems to have great potential in describing reality well enough to let the simulation results serve as a decision-making basis for planning bicycle infrastructure; which in the long term promotes travelling by bicycle. The limitations applied to the model do leave relevant factors unmanaged in the simulation and therefore, further field studies are required to evaluate the accuracy of the simulation results.

Awards Won:
Third Award of $1,000