What is F.A.S.T.?

F.A.S.T. is a continuous micro-simulation model, developed using Java®, for simulating traffic flow patterns on a freeway.
F.A.S.T. uses micro-simulation approach to simulate traffic by individual vehicles, and the macro approach by using the collective dynamics of traffic flow (like density, flow, stop-and-go waves, etc) to analyze the traffic performance.
F.A.S.T. is particularly well suited for simulating complex traffic patterns developing over time.
F.A.S.T. shows how the interaction of perturbations (resulting from shockwaves) and bottlenecks together with a high traffic inflow will cause different types of traffic jams.
F.A.S.T. is flexible, allowing simple calibrations of different parameters in order to conduct different scenarios depending on the parameters' values.
F.A.S.T. allows thousands of agents (vehicles) to operate independently at the micro level, but at the same time collecting measures of effectiveness at the macro level.
F.A.S.T. is open source allowing other modelers to download the source code and manipulate the functions.
F.A.S.T. is a Java® Applet, so it works on all major platforms (Mac, Linux, Windows, etc).
F.A.S.T. is an agent-based traffic simulation model designed to be used to study the impact of CACC (Cooperative Adaptive Cruise Control) on the traffic flow **(work in progress – not fully implemented).**
F.A.S.T. allows traffic engineers to experiment with different control strategies and design configurations and determine their impacts on the overall system.
F.A.S.T. is an extension of the two-lane micro-simulation model originally developed by Martin Treiber, found in: http://www.traffic-simulation.de/

Features

System:

- Cross-platform: runs on Mac, Windows, Linux, et al
- Open-Source (source code is downloadable)

Language:

- Language used is Java®
- Fully programmable and well documented
- Simple structure
- Mobile agents (vehicles) travel on the freeway that is stationary

Environment:

- The model GUI is in 2D
- The model is originally set to 2.5 Km scalable to 10Km
- Parameters are controlled by sliders
- Simulation time clock can be fast forwarded or seen in slow motion (set by a slider)
- Data about each and every operating agent is tracked
- Data is outputted into Excel or any other statistical framework

Web:

- Documentation, source codes, and demo model are found on the author's web page: www.georgearnaout.com

Why traffic simulation?

There are countless of advantages for using simulation in the area of traffic science. Traffic simulation is an adequate tool for modeling dynamic traffic systems. Simulation models have numerous advantages over physical field experiments. The main advantages of traffic simulation models are:
- They are less expensive to build,
- they are more flexible to alter,
- results are obtained faster, and
- they are more feasible for analysis and observing complex patterns.

When dealing with complex systems like traffic flow, computer simulation is essential in order to detect behaviors that are not apparent through visual observation. F.A.S.T. simulates the effect of performance metrics that describe the traffic performance like:

Speed limits

Travel Time

Overtaking

Merging from ramps

Shockwaves and other perturbations

In future versions of F.A.S.T., intelligent vehicles embedded with CACC technology will be introduced:

To simulate the impact of the new technology on the traffic flow before investing in it.

To simulate the behavior of vehicles with cooperative adaptive cruise-control systems. With an increasing percentage of these vehicles on the freeway, does the traffic flow become more stable (i.e.

less shockwaves)? Does it have any unforeseen negative effects? Can the traffic flow per lane be increased?

Why F.A.S.T. and not other commercial micro-simulation models?

Other models do a tremendous job on simulating daily traffic very accurately. However, accuracy comes with great complexity. The level of details in these models comes with many model parameters (more than 45 parameters are not uncommon). This increases the model sensitivity to errors and complicates the calibration making the model inflexible. In addition, F.A.S.T. collects macroscopic measures that result
from the microscopic properties of the model. Other commercial micro-simulation models are limited to microscopic measures only.