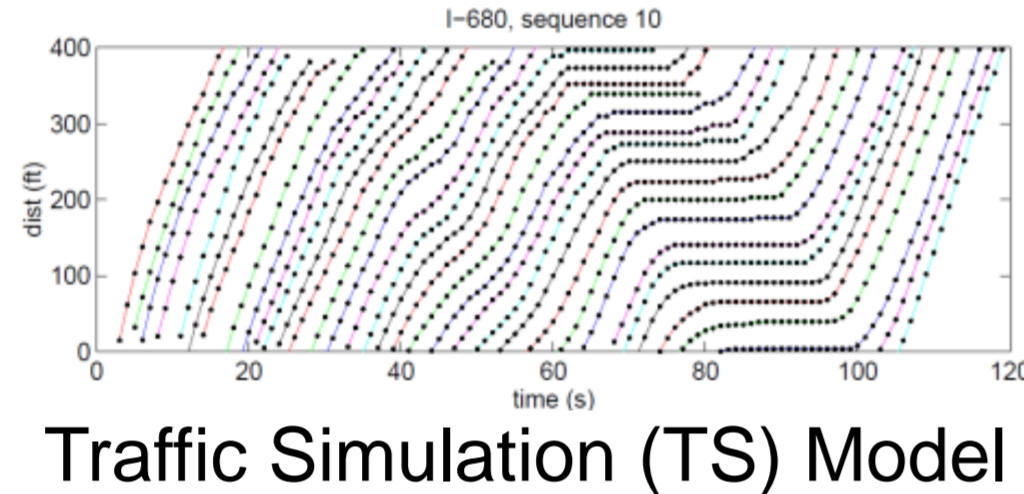# OpenEnergySim: A Collaborative Platform for Green ITS

Helmut Prendinger[1], Arturo Nakasone[1], Marc Miska[2], Kugamoorthy Gajananan[1], Martin Lindner[1], Juan Camilo Ibarra Lopez[1], Brian Ravenet[1], Tri-Thong Truong[1], Julien Viana[1], Masao Kuwahara[2,3]

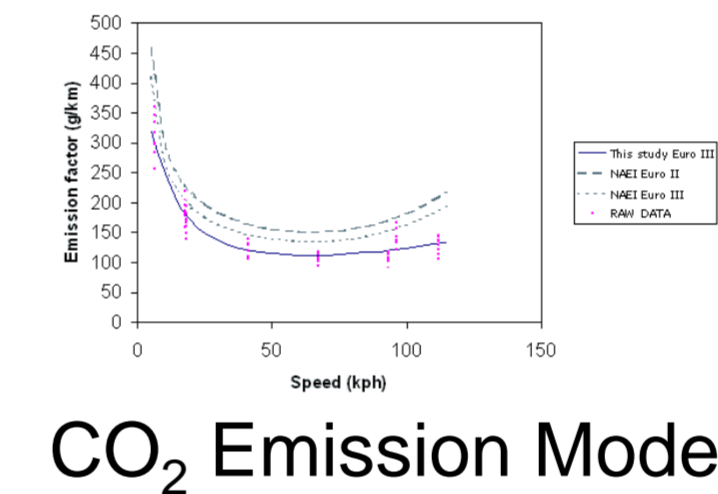[1]National Institute of Informatics   [2]IIS, The University of Tokyo   [3]Tohoku University

Real World

OpenSim World Simulator

Traffic Simulation (TS) Model

Computation of Traffic Simulation & CO_2 Emission

CO_2 Emission Model

① (Re)computation

Traditional Cycle

Reliable estimation of impact of ITS on CO_2 emission

Re-calibration of TS model

② Visualization & Application of ITS

③ Assessment of ITS

Parameter Learning in Driver Models

Local Calibration

Immersive Traffic Network

Visualization of Traffic Simulation & CO2 Emission

Why is CO_2 emission high?

Interactive Installation of Green ITS Measures

Virtual Kashiwa-City Interchange Intersections LaLaPort

- Inspect adequacy of TS model
- Discover sources of CO_2 emission

- Experts can manipulate ITS effectors interactively

Simultaneous Immersive Driving of Multiple Users

Estimation of "Human Factor"

How do drivers respond to ITS?

User's avatar

EneMeter

Increase awareness of energy use

"In-world" Large-scale Survey

Human Drivers

Educational scenarios

International Standardization Framework

OpenEnergySim

International Validation

Miniature Traffic Networks (Reference Models)

Comparative validation of impact of ITS on CO_2 emission

International Collaboration

3 user avatars (US,JP,EU)

E.g.: Combining CO_2 model (US) and Traffic Simulation model (JP)

TS and CO_2 emission models

TS PATH	CO_2 CMEM
TS Avenue	CO_2 JARI
TS TU Delft	CO_2 PHEM

- Real-time communication based on shared sources
- Drafting future ITS standards

Towards international standardization of assessment methodology of ITS on CO_2 emission (US, JP, EU)

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