

**Symposium on  
ADVANCED EVALUATION TECHNIQUES and  
HARDWARE-IN-THE-LOOP TRAFFIC SIMULATION**

Benson Hotel, Portland, OR  
July 29, 2003

How do we evaluate our traffic control systems? What technologies and testing procedures are being used today or are under development? One such system is hardware-in-the-loop simulation (HILS), in which an engineer or technician uses a traffic controller and the timing plan that has been programmed for it with a microscopic simulation model to test the operation of the controller. For example, the engineer can use HILS to compare different control strategies in her office or in the signal shop and then select the best one for field implementation. Some fine-tuning can also be done in the signal shop before deployment, cutting down on the time spent in the field.

The purpose of this workshop is to find out what HILS technologies are currently available, how they are being used, what new tools need to be developed so that they can be used more effectively, and what research needs must be considered so that HILS can be more effectively included in standard traffic operations practice.

The one-day workshop on hardware-in-the-loop traffic simulation will be held in conjunction with the 2003 Summer Meeting of the TRB Traffic Signal Systems Committee in Portland, Oregon. Speakers will include researchers, practitioners, and educators currently using HILS. Demonstrations of HILS applications will be shown and vendors of HILS equipment will be present and have equipment on hand.

The workshop is scheduled from 8:00am to 3:00pm on July 29, 2003 in the Benson Hotel. The workshop will be offered as part of the Traffic Signals Systems meeting.

For more information please contact:

- Roelof Engelbrecht at 979-862-3559 or roelof@tamu.edu
- Michael Kyte at 208-883-2540 or mkyte@uidaho.edu

Alternatively, see the website at [signalsystems.kittelson.com](http://signalsystems.kittelson.com) for meeting details, registration information, and call for posters.

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**FINAL AGENDA**

**Session 1: Hardware-in-the-Loop “HITL” 101 (8:00 – 9:00am)**

8:00 – 8:20am: Introduction into HITL – Darcy Bullock, Purdue University

- What is hardware-in-the-loop?
- Why would you use it?
- Historical perspective

8:20 – 8:40am: Framework for HITL – Montasir Abbas (for Roelof Engelbrecht), Texas Transportation Institute

- What do you need to do HITL?
- Hardware and software requirements
- Functional components

8:40 – 9:00am: Hardware Issues – Brian Johnson, University of Idaho

- Interfacing with controllers
- TS1, TS2, 170, 2070 standards
- Control issues (latency, update frequencies, etc.)

**Session 2: Design and Testing Applications of HITL (9:00 – 10:00am)**

9:00 – 9:20am: Testing using HITL – Larry Head, Siemens Gardner Transportation Systems

- How can HITL be used for pre-deployment controller testing?

9:20 – 9:40am: Light Rail Priority Design – Susan Langdon, Siemens Gardner Transportation Systems

- Houston Metro Light Rail traffic signal priority design

9:40 – 10:00am: Bus Priority Design – Kevin Balke, Texas Transportation Institute

- Houston Metro bus priority sensor location design

**Break (10:00-10:20am)**

### **Session 3: Operations, Research and Education Applications of HITL (10:20am-12:00pm)**

10:20 – 10:40am: Application in Florida – Ken Courage, University of Florida

- How to help local authorities understand and use HITL

10:40 – 11:00am: Non-traditional Hardware-in-the-Loop – Paul Zebell, City of Portland

- How the City of Portland used a Programmable Logic Controller to interface with controller hardware

11:00 – 11:20am: Research Applications at the Texas Transportation Institute – Montasir Abbas, Texas Transportation Institute

- Summary of HITL based-research performed at TTI

11:20 – 11:40am: SCOOT-in-the-Loop – Peter Martin, University of Utah

- Integrating real-world adaptive traffic control strategies with traffic simulation

11:40am – 12:00pm: HITL in Education – Mike Dixon, University of Idaho

- Using HITL in traffic engineering education
- University of Idaho Traffic Signal Summer Workshop.

#### **“Kicking the Tires” Lunch (12:00 – 2:00 pm)**

- Lunch
- Vendors demonstrating HITL equipment:
  - McCain Traffic Supply showing the CID II
  - Naztec/Trafficware showing SimTraffic CI
  - Innovative Transportation Concept (ITC) showing VISSIM
- Poster Sessions and demonstrations

### **Session 4: Wrap-Up (2:00 – 3:00pm)**

Moderated by Michael Kyte, University of Idaho

- Moderator’s comments/summary
- Where do we go from here?
- Research needs
- Research problem statements