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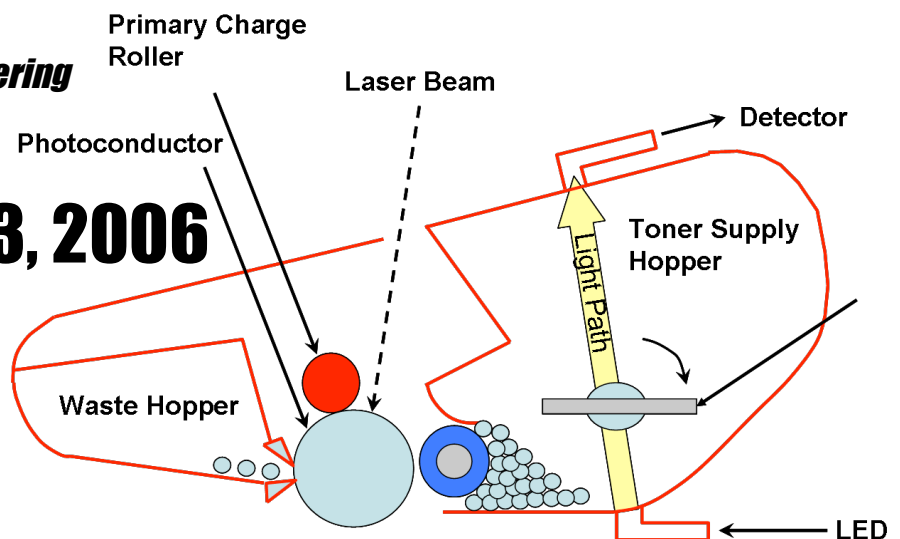
# Toner-Level Sensing Technologies in Laser Printer Toner Cartridges

## Marcos Esterman

*Assistant Professor  
Industrial and Systems Engineering  
RIT*

**4pm, Wed, May 3, 2006**

**Auditorium of the  
Center for Imaging  
Science**



**Canon's Optical Toner Level Sensor**

Adapted from Ren, et. al., "Investigation of the Behavior Of Optical Based Toner-Level Sensing", IS&T's NIP21: International Conference on Digital Printing Technologies Baltimore, MD; September 18, 2005; p. 169-172

This talk will include a brief overview of the Electro-photographic printing process, including the theory of operation of a generic printer cartridge. Existing patent literature for tracking toner usage will be discussed with a brief review of some common issues experienced by end users. Work being conducted on this topic in the RIT Hardcopy Printing Output Research Lab will be introduced.

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**Speaker Bio**

Dr. Esterman joined the Industrial and Systems Engineering Faculty of the Rochester Institute of Technology as an assistant professor in 2004. There he teaches product and process development, and systems engineering. He was awarded a PhD in Mechanical engineering from Stanford University in 2002 and he earned his BSME in 1988 and MSME in 1990 from the Massachusetts Institute of Technology. From 1990 to 1994, he was a development engineer at General Electric Medical Systems in Milwaukee, Wisconsin. In 1995 he began at Stanford University to work on a PhD under the direction of Dr. Kosuke Ishii. In 1997, he returned to industry to work for Hewlett-Packard's Imaging and Printing Division in Boise, Idaho. At HP, he held a variety of positions in manufacturing and R&D while concurrently conducting his PhD research. His analysis work at HP enhanced design and product architecture decisionmaking. In addition to his RIT position, he holds an appointment as an affiliate assistant professor of mechanical engineering at the University of Idaho – Boise. His current research focuses on structured product development methods, with an emphasis of design for reliability and warranty and design robustness. He also actively conducts research in systems modeling of hardcopy output printing devices.