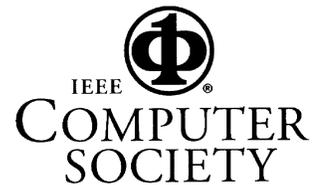# Image Understanding and Web Security

Henry Baird

Internet services offered for human use are suffering abuse by programs ('bots, spiders, scrapers, spammers, etc.). We mount a defense against such attacks with CAPTCHAs, "completely automatic public Turing tests to tell computers and humans apart." These are special cases of "human interactive proofs" (HIPs), a class of security protocols allowing people easily to identify themselves over networks as members of given groups. I will review the five years of evolution of HIP R&D, highlights of the first NSF HIP workshop, and applications of HIPs now in use and on the horizon.

One of the best ways to build a CAPTCHA is to exploit the gap in ability between humans and machines in attempting to read images of text. I will describe two such reading-based CAPTCHAs:

- PessimalPrint, motivated by studies of physics-based image degradations, uses images synthesized pseudo-randomly over certain words, typefaces, and image qualities; and

- BaffleText, motivated by the psychophysics of human reading, uses image-masking degradations that seem to require Gestalt perception skills that people are especially good at.

Both of these CAPTCHAs have been validated by experiments on human subjects and commercial OCR machines, and both have successfully resisted attack by advanced computer-vision techniques (so far). I'll offer proposals for an image understanding research agenda to advance further the state of the art of web security. [This work was carried out while the speaker was at the Palo Alto Research Center; it was joint with Richard Fateman, Allison Coates, Kris Popat, Monica Chew, Tom Breuel, & Mark Luk.]

Dr. Henry Baird is a Professor of Computer Science & Engineering at Lehigh University. He is a Fellow of the IEEE and of the IAPR. He has published three books and sixty-nine technical articles, and holds seven patents. With Manuel Blum of CMU, he organized the 1st NSF International HIP Workshop, held at PARC in January 2002.

Date: Thursday, February 19, 2004, 8:00 pm (Refreshments at 7:30 pm)   Place: Sarnoff Corp., Routes 1 and 571, Princeton, NJ   Information: Dennis Mancl (908) 582-7086, Jim Matey (609) 734-2868   On-line info: **http://www.acm.org/chapters/princetonacm**

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A pre-meeting dinner with the speaker is held at 6:00 p.m. at Ruby Tuesday's Restaurant on US 1. Please send email to **princetonacm@acm.org** in advance if you plan to attend the dinner.