Emerging Technologies Fact Sheet

Chair:
Lars Erik Holmquist, Swedish Institute of Computer Science
Conference: Wednesday 16 December – Saturday 19 December
Exhibition: Thursday 17 December – Saturday 19 December

The Facts

- The Emerging Technologies program will showcase a wide range of new interactive technologies from all over the world. In addition to many works from Japan, there are submissions from Europe, USA and other parts of Asia.

- A total of 68 submissions were received; this is over 100 percent increment from SIGGRAPH Asia 2008.

- 27 pieces are accepted and will be on display at SIGGRAPH Asia 2009.

A Quote from the SIGGRAPH Asia 2009 Emerging Technologies Chair:

"This year, one focus of the Emerging Technologies program is novel display technologies. We will show various forms of haptic interfaces such as fur and paper-based interaction. Attendees can also see new technologies for high-dynamic range imaging, which makes it possible to capture and display more life-like photos and videos with a high fidelity of light. Even more futuristic display technologies include floating holograms, a machine that can copy light conditions, and a screen that is used as both input and output. Lastly, attendees can also expect some fun and games and hands-on interaction with robots. I am very pleased with the great variety available at the Emerging Technologies program, and hope that the attendees will have a lot of fun with these thought-provoking and engaging pieces."

SIGGRAPH Asia 2009 Emerging Technologies Program highlights include:

- **Kaidan: Japanese Horror Experience in Interactive Mixed Reality**
  Keisuke Inoue, Taiki Wada, Kazuhiro Kitamura, Shigeaki Nishino, Ryosuke Ichikari,
  Ryuhei Tenmoku, Toshikazu Ohshima and Hideyuki Tamura
  Ritsumeikan University

  Enter an old Japanese ghosthouse and get scared by strange creatures that come at you in three dimensions! This novel demonstration provides the ultimate nightmare experience. Virtual ghosts depicted by first-of-its-kind

technology, scary sounds, and visual mixed-reality experiences attack visitors in a dark, spooky Japanese room. Ghosts are luridly dramatized using relighting techniques, and visitors are terrified by various gimmicks in the room.

Wearing a head-mounted-display and earphones, visitors see and hear screaming ghosts in an old Japanese home. When the ghosts attack, visitors fight back with a sword device. In another scenario, visitors can use the sword device to become a heroic samurai warrior in an action movie.

- **DIY Hardware: Reinventing Hardware for the Digital Do-It-Yourself Revolution**
  Shigeru Kobayashi
  Gainer/Funnel

  Satoru Tokuhisa
  Xtel

  Jamie Allen and Jo Kazuhiro
  DIY Energy

  Ryota Kuwakubo
  pri/pro

  Nicolas Villar
  Dragonfly

Making and programming computing hardware has always been an activity reserved for the experts. The complexity of the tools involved in designing circuits and programming embedded devices has traditionally put these tools far outside everyday experience. Now, as the digital do-it-yourself revolution gains momentum, hardware is becoming accessible, and some adventurers are conscientiously turning it into simply another material for people to play, invent, and express themselves with.

DIY Hardware presents several projects at the forefront of this movement that are addressing important technical challenges and effecting changes in public understanding of technology. Ultimately, this work will contribute to empowerment of a much wider segment of the population, who will gain the ability to create, shape, and hack digital environments and artifacts that will form an integral part of our everyday future.

- **SCHEMA: Multi-Party Interaction-Oriented Humanoid Robot**
  Yoichi Matsuyama, Hikaru Taniyama , Kosuke Hosoya , Hiroki Tsuboi , Shinya Fujie and Tetsunori Kobayashi
  Waseda University

  See how a robot can help you learn Japanese language! Most of our daily communication occurs in groups, at school, home, and work place, so this project proposes a robot that can participate in routine human conversations.

  Traditional human-robot interaction studies have focused on one-to-one interaction. SCHEMA is a robot that participates in and activates group communication. The system design is based on psychological theories of multi-party communication. When a master of ceremonies in a quiz game selects a question with a mobile device, the question is projected on a screen.

  Panelists (SIGGRAPH Asia 2009 attendees) answer the question as SCHEMA recognizes the context of the game using speech recognition and image processing of participants faces, visual gaze, and other nonverbal cues. Then the robot selects its behaviors and targets (panelists) at appropriate times and with appropriate utterances to maximize its participation in the game.

- **SixthSense: A Wearable Gestural Interface**
  Pranav Mistry and Pattie Maes
  MIT Media Lab

  Experience the next generation of human-computer interfaces, where data "floats" in front of you!

  This prototype is comprised of a pocket projector, a mirror, and a camera. The hardware components are contained in a pendant-like wearable device. Both the projector and the camera are connected to the mobile computing device in the user's pocket. The projector projects visual information on walls and other physical objects, which become interfaces, while the camera recognizes and tracks the user's hand gestures and physical objects using computer-vision techniques.

  SixthSense implements several applications that demonstrate the usefulness, viability, and flexibility of the system. The map application allows users to navigate a map (zoom in, zoom out or pan) displayed on a nearby surface

with intuitive hand gestures. The drawing application lets the user draw on any surface by tracking the fingertip movements of the user's index finger. SixthSense also recognizes user's freehand gestures (postures). For example, the system implements a gestural camera that takes photos of the scene the user is looking at by detecting the "framing" gesture. For example, users can display and flick through photos on any surface or wall, draw icons or symbols in the air with their index fingers, select a magnifying-glass symbol to go to the map application, or draw an @ symbol to check their mail. The SixthSense system also augments physical objects by projecting more information about them as users interact with them. For example, a newspaper can show live video news or dynamic information can be provided on a regular piece of paper.

- **Daichi's artworking: Enjoyable painting and handcrafting with new ToolDevices**
  Mai Otsuki
  Ritsumeikan University
  Paint and build computer artistic objects in three dimensions that feel almost real. One day, a boy named Daichi created a sketch of a lovely table and chair, and he wanted to convert them to 3D models. But he realized that he does not know how. His computer skills are limited.

  In conventional computer systems, it is not easy to create 3D models and paint on them, because the human interface provides only a mouse, a keyboard, and a 2D display. With this new mixed-reality system, even Daichi can use a set of input devices and metaphors based on famliar real-life tools to create finished 3D art without learning complex software systems.

  Previous systems used metaphors of existing tools, but Daichi's Device makes the metaphors "real". It imitates tool shapes and applications, and it provides tactile and audio sensations. Users can create and paint on real 2D surfaces, real 3D objects, and virtual objects.

- **Instant Broadcasting System: Mobile Collaborative Live Video Mixing**
  Arvid Engstrom, Liselott Brunnberg, Josefin Carlsson and Oskar Juhlin
  Mobile Life at Interactive Institute

  Create your own live broadcast by mixing video stream from many cellphones at the same time!

With Instant Broadcasting System, people can collaboratively produce, edit, and broadcast live video using only mobile phones, a laptop computer and available mobile networks. In this demonstration, it is used as a VJ system that supports visitor-generated video, flexible content selection, a communication back channel, and real-time loop editing. These features move the system beyond previous webcam-based VJ concepts.

The first generation of applications in this genre enables broadcast of live video streams from various user contexts over mobile networks such as 3G. Instant Broadcasting System explores a second generation of such applications, in which professional techniques for col-laborative live video editing are made available on mobile platforms. Using networked camera phones, it is possible to mix live concurrent video streams from multiple users for public display on the internet and locally. The design space adapts these new possibilities, previously only available to professional TV-production teams, to amateurs in various contexts. For example, parents might use it to broadcast multiple live images of soccer matches where their children are competing. Or, as demonstrated by the Instant Broadcasting System, night-club patrons and viewers of public exhibitions can share their experiences in real time.