Research at Intel Day 2008

Technology Zone and Demo Guide

Carry Small, Live Large Zone

Carry Small, Live Large is a vision of the mobile future where our experiences—while we work, play and simply go about our daily routines—are greatly amplified and enriched. Through powerful, small form factor mobile devices that have new ways of interacting with the environment and people around them, and new ways of experiencing internet based data and services, our daily personal entertainment, interactions with others and the environment around us will soon be greatly enhanced.

Tera-scale and Visual Computing Zone

Tera-scale Computing is Intel's research and vision to deliver the hardware and software innovations needed to scale multi-core processors to 10s to 100s of cores. Tera-scale performance will be essential to enabling compelling new usage models such as Visual Computing, which will bring together photorealism, interactivity, HD video and audio as well as computational modeling to enable real-time, life-like, immersive computing experiences.

Exploratory Zone

Intel's exploratory research and vision for off-road map, high impact research is vital to Intel. The researchers are looking to fundamentally change our research methodology, building multi-disciplinary expert teams that span many competencies and collaborate openly with industry and academia.

Health Zone

The diagnostic, decision support, and telecommunications systems found in the hospital today may become part of the everyday lives and homes of most consumers tomorrow. Across many continents and cultures, Intel is conducting pioneering research into how disruptive technologies may foster this shift to personal healthcare.

Enterprise Zone

Intel's labs are tackling a number of projects aimed at addressing the needs of the Enterprise, from the datacenter all the way down to the desktop and mobile platforms. In this zone we will highlight projects related to security and power balance/utilization.

Technology for Developing Regions Zone

Intel is focused on exploring ways that technology can enhance and improve the daily lives of people in developing regions of the world—where technology proliferation and needs are different from more developed regions. Using ethnographic research, we are exploring fundamental needs that people have, and bringing that knowledge to Intel's product groups so the company can design platforms that are more tailored for these regions.

Silicon Zone

At the heart of Intel innovation is silicon technology. And Intel continues to set the pace, with breakthroughs like its 45nm high-k/metal gate process technology. Silicon innovation allows the company to continue to build chips that embody the technologies dreamed up by researchers in Intel's labs, and put those technologies in the hands of people around the world.

Carry Small, Live Large Zone

Interactive 3D Streaming: Power of IA for Mobile Immersive 3D

The innovative idea behind 3D streaming is to render sophisticated and performance demanding 3D content on a powerful server, then compress the results in a smart way and send (stream) them to a client which wouldn't be capable of performing the heavy rendering itself. The concept implementation developed and optimized jointly with leading telecom ISV Comverse* can serve mobile clients (e.g. MID or UMPC) via 3G cellular /WiMAX networks.

Flexible Compression for Wireless Displays

Flexible codecs that can be optimized for content and usage will be necessary in order to enable wireless displays for a range of mobile devices, including laptops and MIDs. This demo will show a remote wireless display solution, optimized for both video and productivity applications, based on an H.264 codec which can adapt power consumption and bit rate subject to bandwidth, delay and quality constraints.

Improving Platform Energy Efficiency

Intel's research in Platform Power Management (PPM) is paving the way for dramatic improvements in energy efficiency. We will demonstrate our early work in PPM based on a modified operating system and hardware platform that achieves a 34% reduction in idle power consumption versus traditional platforms.

Real-Time Visual Mobile Object Recognition

Object recognition has been a grand challenge in computer vision for decades because it will let computers see the world more like humans do. This demo showcases the first real-time object instance recognition system that recognizes whether an image contains an identical copy of an object the system has been trained to recognize.

World's First Embedded Balanced Antenna for Digital TV

As demand for mobile-friendly digital entertainment grows, the anticipation of Digital TV to fuel mobile use is growing. In this demo, Intel showcases the world's first balanced antenna design to integrate Digital TV reception into a laptop computer. Research focuses both on the antenna radiation performance as well as its noise rejection to enable the reception of DTV signals at 470MHz-860MHz UHF band.

Secure Digital Wallet

Secure user input and output is a fundamental problem for the PC given the focus of the criminal element to steal user information. In the prototype we show a secure PC wallet with a randomized keyboard being used in an E-commerce transaction and compare it with another system using traditional smart card based authentication. The secure wallet is running on Intel VT based hardware with a security visor. This technology has a future in MIDs which do not have AMT-like hardware for security technologies.

Ensemble Computing In and Around the Home

This collaborative effort between Intel and the Copenhagen Institute of Interaction Design focuses on how distributed and mobile devices sharing computing and display resources can amplify user experiences in and around the home. This demo includes a concept video illustrating how mobile ensembles support and enhance a shared video creation experience.

Energy Efficient Communication

This demo shows how our work on energy efficient communication enables significant energy saving for both the wireless communication device as well as the overall platform. It demonstrates how the Wireless NIC converges very quickly to find an optimum on/off pattern for the current workload saving significant energy for the device (between 4 to 6 times for workloads like VoIP or video streaming) as well as for the overall platform.

Context Aware Technology: The Power of Adaptive Mobile Computing

This demo shows how context awareness and composability can be used to demonstrate the power of adaptive mobile computing. It will show how applications can be developed to more easily adapt to users' contexts by using external peripherals, collecting sensory input and using a general-purpose analytics engine.

Location-Based Services and New Input Methods

Location-based services (via GPS, cell tower, or WiFi access point triangulation) linked with Internet information is becoming valuable for mobile devices. New input sensors (like accelerometers and magnetometers) may benefit users of today's small form-factor products. The purpose of this demo is to show Intel user interface innovations for usages where intuitive "steering" of an application may be valuable.

WiFi/WiMAX Seamless Handover

Mobile devices are fueling the end-user desire for anytime anywhere access to the Internet and other services without any disruption while roaming. This project showcases our research to enable heterogeneous seamless handover between a WiFi and WiMAX network. This work was done in collaboration with Nokia R&D and Nokia Siemens Networks R&D.

Wireless Display Discovery & Secure Connection

Wireless connectivity and device composition are critical aspects of Carry Small, Live Large research. This demo demonstrates solutions to two sub-problems: (1) power-efficient and reliable service discovery by a novel combination of layer-2 and layer-3 service discovery and a new layer-2 "triggered association" feature; and, (2) easy and secure wireless connection.

Carry Small, Live Large Zone (continued)

Plastic Time: Mobile Computing and Daily Life

Busy? Rushed? Feel squeezed? Your time shrinking? Our research shows your "busyness" is likely framed by "plastic time." Plastic time is highly interruptible, shrinking and expanding around other activities. In particular, plastic time characterizes modern life and its relationship to mobile internet technology use today and for the foreseeable future.

Cliffside Wi-Fi PAN technology

Maintain a connection to the WLAN while also connecting up to eight Wi-Fi enabled devices directly to your notebook via your Cliffside Wi-Fi PAN.

Dynamic Composition: A User-Friendly Approach to Building Ad-hoc Systems from Mobile Computers

Dynamic Composable Computing (DCC) overcomes the limitations of small mobile computers by allowing users to create an enhanced mobile computing experience, wirelessly integrating more capable resources such as displays, storage, networking and processing made available on nearby computers. The DCC system takes advantage of emerging high-bandwidth wireless-technologies, such as UWB, to enable remote resources to be used as if local, and provides an intuitive graphical interface so users can create multiple wireless connections, or compositions, in a single action. A unique layer-2 wireless service advertisement mechanism accelerates the discovery of remote services, also improving the user experience. To illustrate the concept, a multi-user game executing on a desktop PC is shown wirelessly connecting to motion sensors (accelerometers) on two nearby UMPCs which then serve as game controllers creating a unique user experience.

Speech Interface for Creating Device Connections

Speech interfaces are particularly suitable for small mobile devices because of the limitation of the physical input and output channels. In this demo, we show how speech can be used to create connections between two UMPCs and a wireless display. This module learns from prior language examples and doesn't require the users to learn a specific grammar.

Multi-Client Display Composition

The small displays of many mobile devices are often a limiting factor for the device's functionality and lead to limited user experience. In this demonstration, we show how display composition can be extended to several mobile devices to alleviate this problem. With our multi-client display capability, we join the displays of multiple devices together into one large, unified display.

Wireless Remote Graphics Rendering Demo

Wirelessly displaying output from graphics-intensive games on remote displays is a challenge since the amount of graphics content (bitmaps, etc.) being sent can easily overwhelm available radio bandwidth. Remote graphics rendering gets around this issue by intercepting high level 3D graphics primitives at the graphics API level and sending them to the remote side for rendering. This reduces the amount of traffic by about 60 times when compared to traffic that normally passes over the PCI Express bus to the graphics card.

Tera-scale and Visual Computing Zone

Intelligent Photo and Video Search

Tera-scale processors will give devices the ability to understand the contents of visual media. The Intel China Research Center is developing techniques for the computational perception of people, objects, scenes and events and is a leading participant in the National Institute of Standards (NIST) competition on media mining. We demonstrate our latest results, with performance optimized for using many threads on many cores.

Interactive Ray-Tracing on Multi-Core IA

Ray tracing uses computational modeling to simulate light rays in a 3D scene. The trend to multi-core makes it possible to use ray tracing for interactive 3D graphics for a variety visual computing applications. We demonstrate a collaboration with researchers at VRContext to enable the visualization of extremely complex industrial models using Intel multi-core processors. We also provide an update on Intel's Real-Rime Ray Tracing research project targeting more photorealistic consumer applications.

Advanced Medical Visualization

Medical visualization is a highly parallel application that would use tera-scale processors if we had them today. We demonstrate a collaboration with Phillips Healthcare to optimize a Virtual Colonoscopy application that generates interactive models using real data acquired through CT (Computed Tomography) scans. Vectorizing and multithreading optimization with SSE4 and OpenMP nearly double rendering performance.

Pioneering Connected Visual Computing for Intel IT

Connected Visual Computing (CVC) describes an emerging class of applications that combine the realism of visual computing with the connectivity of social media. We show how Intel IT is using visual computing for applications from factory and data center monitoring to virtualization management and how we are integrating these applications with emerging CVC platforms such as Qwaq Forums Desktop Edition, which includes Intel's Miramar technology.

Qwaq Forums + Intel Miramar: When Virtual Worlds Collide

Intel researchers and Qwaq are collaborating to demonstrate how different Connected Visual Computing environments can be complementary. While "virtual worlds" such as Qwaq Forums focus on visual realism and social interactions, 3D "virtual information environments" such as Intel's Miramar focus on documents and data. In this demo we'll show how we have combined these two CVC applications into a single, cohesive user experience.

Enhancing C/C++ for the Next Wave in Throughput & Visual Computing

Ct is an Intel research effort focused on extending C/C++ to help mainstream programmers efficiently create highly-parallelized and scalable software that takes full advantage of Intel's current multi-core and future tera-scale processors. We show how Neusoft and Intel created a Ct proof-of-concept demo for a "smart car" that uses computer vision to track objects for driver assistance.

The Universal Parallel Computing Research Centers (UPCRC)

Earlier in 2008, Intel and Microsoft announced a program to launch research centers at UC Berkeley and the University of Illinois at Urbana-Champaign. The program's goals are to catalyze breakthrough research enabling the pervasive use of parallel computing. We describe the history, objectives and key aspects of the research programs which span applications, parallel programming, systems software and architecture.

The Future of Parallel Programming - Now! Whatif.intel.com

Intel researchers and developers are now publicly sharing prototypes of new technologies that simplify and advance the adoption of threaded software applications for multi-core IA, tera-scale and heterogeneous processors. The methodologies available for download today include Software Transactional Memory (STM), Performance Tuning Utility and an Adaptive Spike-Based Solver. See what whatif.intel.com has to offer and what developers can experiment with today.

Thalia: Hardware/Software Co-Design for Tera-Scale Processors

To ensure that future applications will take advantage of architectures with increasing core counts, the Intel Barcelona Research Center is co-developing parallel hardware and software today. We present Thalia, a research virtual machine tightly designed with the hardware underneath. This software layer can dynamically adapt and tune the running software to the underlying hardware to efficiently exploit its capabilities. We describe this technology and show examples of dynamic code optimizations.

DRAM Inside Processors: Solving the Memory Bandwidth Problem

The continued demand for higher microprocessor performance and the trend to multi-core necessitate much larger on-die caches, especially for server-class workloads. This makes dense low-voltage on-chip memories very attractive. We present an integrated DRAM that is 2X smaller than a traditional SRAM cell and runs off the same low voltage as logic transistors with a high bandwidth of 128GBytes/sec.

Ultra-low Voltage Video Encoding Accelerator

In order to improve performance/watt in future tera-scale as well as mobile architectures, Intel researchers are exploring circuits to accelerate key algorithms. We present Intel's first ultra-low voltage, special-purpose video encoding accelerator implemented in 65nm CMOS. We show operation down to 0.22V, an energy-efficiency improvement up to 9.6X, and industry-leading performance/watt of 411 GOPS/W.

200 Gb/s Integrated Silicon Photonic Transmitter

Intel's Silicon Photonics research vision is to use CMOS manufacturing to produce integrated optical devices that provide the advantages of optical I/O with substantial cost, size and power savings. This demo features a prototype integrated silicon photonic test chip that can deliver data rates exceeding 200 gigabits per second. Our researchers plan to scale such devices to over one terabit per second.

Exploratory Zone

Intel Bioelectronic Chip

The objective of this research project is to develop an electronic biosensor chip for Point of Care (PoC) medical data delivery as well as for laboratory testing. We designed a hybrid system composed of a silicon-based, field effect device (FED) that is decorated with biological macromolecules. These biological molecules provide the gating potential for the electronic device thus replacing the classical metal gate. This exciting technology could enable the use of the Intel Bioelectronic Chip at PoC as well as in acute situations when the immediate test result is critical. In addition, this technology could easily be integrated in medical IT platforms.

Electric Field Pretouch

We demonstrate a robot hand with a new sense, Electric Field Pretouch. This sense is used by some species of fish, but not by humans. Our hypothesis is that new sensors can enable improvements in robotic manipulation, just as the laser rangefinder sensor enabled breakthroughs in robotic navigation.

Common Sense Environmental Sensing

Citizens are often motivated to seek information. The Common Sense team is developing prototypes of mobile environmental sensing platforms that empower individuals and communities to gather, analyze and share information in order to influence environmental policy. We will present our prototype and the results of our current deployment on street sweepers in San Francisco.

Mash Maker: The Web the Way You Want it

Intel Mash Maker is a browser extension that allows you to enhance existing web pages with new information and visualizations. Wish that site had a map or a calendar? If you have Mash Maker then you can modify it so that it does. View the web through mash-tinted spectacles. Unleash the power of the internet. See Mashmaker.intel.com and get started.

Dynamic Physical Rendering

The Dynamic Physical Rendering project is working towards a "material" that can change its shape under software control. This material, which would be composed of tens of millions of tiny robot modules, could then be used to mimic arbitrary objects and 3D scenes. Applications could include tangible, interactive 3D visualization; new forms of user interface; new communications media; smart antennas; and, 3D faxing. This presentation will illustrate our vision for creating these modules and the software needed to operate them and will show recent and updated hardware prototypes we have developed.

Computer Vision Tracking of Stemness

Clinical translation of stem cell research may revolutionize medicine. Challenges remain toward understanding of cell biology as well as stem cell manufacturing. These call for engineering toolsets to study cell behaviors and their associated stemness. We present a fully-automated computer vision system that simultaneously tracks and analyzes thousands of cells observed using time-lapse phase contrast microscopy.

Growing Up In An Emerging New Media and Mobile Ecology

New research on American preteens/teens with a specific interest on relationships between technology use and social relationships, media literacy and consumption/production skills.

Interactive Search Assisted Decision Support in Dermatology

This research aims to help doctors retrieve visually similar, medically relevant cases from large repositories so they can make more informed decisions about a given case. We present a system that enables dermatologists examining a skin lesion to study similar, relevant dermoscopy images from a database and weigh their information such as pathology results before making decisions.

Personal Robotics at Intel Research Pittsburgh: The Robot BarKeep

The Personal Robotics project aims to enable robots to perform useful tasks in unstructured home and office environments. BarKeep is an autonomous robot developed at the Intel Research Pittsburgh lab that demonstrates integrated perception, navigation, planning and grasping for the task of loading mugs from a mobile Segway™ into a dish rack, using an anthropomorphic robot arm.

The Intel Corporate Research Council

The Intel Corporate Research Council (CRC) manages long-range, university-based research for Intel. This presentation provides an overview of the CRC including descriptions of some of the most promising research currently underway and an assessment of the impact the CRC has had on the high tech community over time.

Cascaded Silicon Raman Laser

In this exploratory research project, Intel achieved continuous lasing in silicon using the Raman effect. This breakthrough was recently published in the journal Nature Photonics. The application of this type of laser for methane gas detection is discussed, one of many possible uses for the technology.

Health Zone

Personal Health Research Suite
This suite provides a vision of aging in place technologies to address the looming worldwide age wave. While extremely forward thinking, each component of the system is grounded in and describes actual research pilots conducted by Intel. Researchers will be on hand to demonstrate in detail these specific components.

Understanding Unmet Needs in Healthcare
Through anthropological fieldwork, we strive to understand and describe personal healthcare needs, motivations and experiences. Studies completed in the home, in the hospital and in the community will be displayed through posters and videotaped interviews in the following areas: Global Aging Experience, Clinical Nursing, Home care and Health in underserved regions.

Evaluating a Home-based Test for Parkinson's Disease
This research test guides patients with Parkinson's disease through a series of six motor and tremor assessments, similar to those doctors now use in-clinic to track disease progression. More frequent monitoring in the home will provide data that may someday be used to improve diagnosis and drug strategies.

Mobile Heart Health
Experience a Mood Phone designed for emotional self-awareness and stress reduction. This system monitors subjective and physiological stress and intervenes when help is most needed. Visualizations and touch screen interfaces translate practices of psychotherapy, mindfulness and yoga to brief experiential mobile interactions. The system is grounded in positive psychology, preventive cardiology and ethnographic research on distress.

Technology for Long-Term Care
Aiding with daily activities of the elderly costs over $150B to the US annually. The Technology for Long-Term Care project is aimed at showing that sensor-based, automated monitoring of activity can lower the burden of care. We demonstrate a research system, currently being evaluated jointly with care providers such as the Veterans Administration, that could improve detection quality and system cost dramatically.

Mobile Technologies for Health
The sensing, fusion and analysis of multiple streams of a person's vital signs are essential to enable a broad range of personal health applications. Research for enabling fusion, analysis and context, with reliable, continuous, private data flow on mobile platforms, using wireless collection and transmission, will be shown.

Developing Massively Parallel Electrical Sensors to Uncover Personal Genetic Makeup
Semiconductor fabrication has entered the nanometer realm - the dimension of biomolecules. We are exploring technology to enable silicon-based biosensors for parallel DNA sequencing, an application critical to understanding the genetic basis of diseases. We envision a chip containing millions of biosensors that could decode a DNA sequence quickly and efficiently.

Silicon Photolithographic Chips for Biomedical Applications
Photolithography is a well-established semiconductor process for manufacturing silicon microprocessors. We have successfully applied this process to synthesize biomolecules on silicon wafers and fabricate biochips that display highly desirable performance characteristics. Current efforts are focused on integrating these biochips with Intel's advanced sensor/microelectronics capabilities to create powerful tools for biomedical research.

Real Time Gait Analysis
Demonstration of an integrated multimodal system approach that may provide early detection of postural and neuro-cardiovascular instability. The demonstration will feature new technologies for monitoring, processing and providing relevant feedback utilizing multi-factorial algorithms for real time gait analysis. The application of the technology in a clinical environment will be demonstrated.

SHIMMER Wearable Sensing Platform
SHIMMER: Sensing Health with Intelligence, Mobility, Modularity, and Experimental Reusability provides an extremely compact, extensible platform for long-term wearable sensing as a stand-alone or low-power wireless device. This demo highlights the flexibility of SHIMMER including a variety of physiological and behavioral sensor configurations, accessories, wireless communication and remote device management.

BioMOBIUS™ – Open Research Platform
BioMOBIUS™ is an open, shareable technology research platform developed by the TRIL Centre which supports the rapid creation of technology solutions for biomedical research and more. This demo will feature interactive demonstrations of the key platform features such as drag and drop programming, biosignal processing, sensor and hardware integration.

Technology Research for Independent Living
The TRIL Centre is focused on addressing the urgent need for innovative health care technologies in the face of a looming healthcare crisis and a rapidly ageing population in Europe. This demonstration will presented an overview of the current research activities of TRIL through posters and video.

Everyday Technologies for Alzheimer's Care (ETAC)
The Alzheimer's Association and Intel have formed an unprecedented consortium to address the needs of millions of people living with Alzheimer's disease. The demo will showcase research underway at various universities which aims to improve the quality of life for people with dementia and their caregivers.

Enterprise Zone

Increased Data Center Density Using Power Clamping

Today's servers in data centers are often constrained by power, resulting in limited rack density. However, individual servers are mostly underutilized. Taking advantage of hooks in Intel silicon, this technology provides a governor mechanism that clamps power consumption, allowing additional servers to be added to the rack while minimizing performance impact during normal operation. Additional benefits include continued operation during brown-out conditions.

Dynamic Software Application Protection

Malware, including viruses, trojans and spyware are increasingly stealthy and targeted; costing billions of dollars per year. This research prototype demonstrates how to dynamically protect application software on a commercially available computer using Intel® VT and Intel® TXT. This approach builds on Intel silicon technology to create a trusted application within an un-trusted environment. The trusted application can then interact more securely with network services to enhance protection of user information or service data. This research could lead to increasing security and assurance for consumers utilizing Intel platforms.

Platform Enhanced Anti-Virus Capability

The exponential increase in sophisticated, stealth malware is making it difficult for security applications to keep systems free of malicious software. To help combat this problem, we show a research prototype utilizing platform features to enhance Anti-Virus tools. The unique Intel platform value offered by this technology is a feature with a secure chipset-based scanning function for anti-virus software that can detect hyperjacking, rootkits, viruses, bots and other malicious code hiding in host memory that is unseen by host OS and anti-virus agents. One source estimates that as many as 80% of today's systems world- wide are infected with malicious software.

HPC Application Acceleration on the Intel® QuickAssist® FPGA Acceleration Platform

The Intel® QuickAssist® FPGA Acceleration Platform (FAP) enables the rapid deployment of HPC applications and accelerates their performance by potentially orders of magnitude. FPGA accelerators are attached to the Intel platform by a novel system protocol layer (SPL) that implements the critical functions of an agent on the processor fabric (e.g., FSB, QPI). Rapid deployment is achieved by providing an accelerator abstraction layer (AAL) that manages the accelerator as an on-demand, uniform execution resource for host applications. In this demo, we display the architecture of a computational finance application ported to the FAP and demonstrate the performance improvement of the accelerated application over a functionally equivalent, unaccelerated application running on the same multicore platform.

Exploiting Population Diversity to Improve Laptop Security

Intel Research Berkeley, in a collaboration with UC Berkeley and UC Riverside, is exploring a new paradigm to improve the security of enterprise laptops that employees use both at work and at home. The homogeneity of today's technology renders computers easy to compromise. Our new approach builds on ideas from biological systems and seeks to integrate diversity into the security ecosystem of end host computers. People's computer usage patterns are very different and bring a natural source of diversity that can be exploited to make it significantly harder for attackers to control our laptops. Being self-aware of individual traffic and usage patterns allows machines to make more nuanced judgments about malicious activities. One of the ways we exploit this diversity is to personalize the configuration of each laptop's Host Intrusion Detection System (H-IDS). This approach is disruptive because it stands in contrast to common enterprise IT practices that prefer homogeneous configurations. Our research illustrates the benefits of this diversity approach that can improve laptop protection against modern-day malicious "botnets" while simultaneously lowering the rate of false positive alarms generated on today's laptops. In our posters, we explain our profiling methodologies and how diversity is incorporated in host-based defenses and we illustrate the power of our methods against challenging computer attack scenarios.

Technology for Developing Regions Zone

Intel® Rural Connectivity Platform
The Intel® Rural Connectivity Platform is a long distance, high bandwidth, Wi-Fi based backhaul connection. Running on standard 802.11a/b/g spectrums, RCP uses a TDMA based MAC layer to establish a point to point link of distances up to 100km / 62mi. The Intel® RCP can also operate in 'relay' mode to relay connections when ideal line-of-sight conditions cannot be achieved.

Technology Metabolism Index
The Technology Metabolism Index (TMI) is a quantitative/qualitative model that tells us which countries out perform the average rate of global technology diffusion for any given level of economic performance—and explains why.

Emerging Markets – Designing for the Middle & Upper Class Urban Populations
This demo explores the massive urban populations of the middle and upper classes of emerging markets like Brazil, India, China and Egypt. These markets are traditionally bombarded with typical Western products, often just marketed differently. This research highlights their culture and practices surrounding technology use and product concepts and is designed to help us think about people-driven, innovative opportunities.

Classmate PC: Designing Classroom Experiences
Our ongoing ethnographic and education research has shown how surprising and often counterintuitive classroom environments around the world are, particularly, in light of traditional office environments. The demo will illustrate this research through the evolution of Classmate PC family, highlighting the design issues and innovations that impact students' education user-experiences.

Applying Social Networking to Telemedicine in Ghana
Computer-mediated communication systems can be used to bridge the gap between doctors in under-served regions with local shortages of medical expertise and medical specialists worldwide. To this end, we have designed a prototype remote consultation system intended to provide the social, institutional and infrastructural context for sustained, self-organizing growth of a globally-distributed Ghanaian medical community. We are conducting a series of trial deployments in southern Ghana (Fall 2007) and central Ghana (Summer 2008).

Silicon Zone

ElectroMagnetic Probing of GigaHertz Busses
ElectroMagnetic Coupler Probing (EMCP) represents a significant breakthrough in gigahertz bus probing, integrating couplers and signal recovery ASICs with logic analyzer interface hardware, to achieve logic probing of gigahertz bus traffic without requiring direct electrical contact with the observed signals.

Intel's 32nm Logic Process
As Intel ramps its 45nm logic process, future processes are under development. We will show progress on the 32nm process, which is due for initial production in 2009. The 32nm process continues to drive Moore's Law by doubling transistor density compared to that at 45nm (as measured by SRAM cell size). It incorporates the 2nd generation of high-k/metal gate to further improve performance and performance per watt. And, it makes use of immersion lithography for patterning critical layers, a first for Intel. A functional 291 Mbit SRAM wafer built on 32nm will be part of the demo.

A Monolithic Optical Interconnect Platform
We demonstrate a low-cost, low-power, high-performance optical interconnect solution for high-speed I/O. These optical links, fabricated in a CMOS-compatible process, consist of monolithically integrated low-capacitance devices with demonstrated data rates of 20 Gb/s and are amenable to wavelength division multiplexing for further scaling.