Everyday Sensing and Perception

Andrew A. Chien
Vice President &
Director of Intel Research
Corporate Technology Group
Agenda

Introducing Intel Research
Motivation
Everyday Sensing and Perception
Key Vectors and Example Projects
Question and Answers
Intel Research Mission

“Drive off-roadmap, high-impact exploratory research vital to Intel”

Exploratory Research

World class technical expertise

Open Collaboration, university ties

Multi-disciplinary teams
Engaging the Research Community Worldwide

- Close University Collaboration (Labs)
- Deep University Relationships (Focus Schools)
- Joint External Research Projects (Research Council)

All over North America, Europe, Asia, ...
“Essential”

Essential Computing

Simplifying and enriching all aspects of work and daily life
Computers Excel at Analytical Tasks

- Automation of Detailed Tasks
- Complex Analysis and Optimization
- New Understanding -- Modeling and Simulation
What People do Everyday

- Laugh
- Learn
- Touch
- Move
Will sensors and inference trigger a “Cambrian” explosion?
Everyday Sensing and Perception (ESP)

“Drive fundamental research advances that enable computing systems to become aware in everyday activities and environments”

Requirements for broad use:
Accuracy, Coverage (variety, environment), Energy-Efficient, Privacy Preserving

Achieving “90% accuracy for 90% of your day” would move inference from hand-crafted scenarios into broad use (mainstream applications)

ESP: Making computing systems aware of their users and context in everyday activities and environments
Elements of Everyday Sensing and Perception

- Happy; should stop eating sugar
- Reminders: Yoga class, reserve table at Wang Bao He
- Time to switch to news channel
- Should I model or enroll in medicine

Intel Developer FORUM
ESP Challenge: Efficient Sensing

"Other names and brands may be claimed as the property of others."

Sensing must be managed for energy efficiency
ESP Challenge: Deriving High Level Understanding

**Raw Sensor Data**

**Clean, Segmented Data**

**High Level Semantics**
- Walk, Leave, Clean
- Happy, Angry
- Dangerous, Friendly
- He Said “I Don’t Like You”

**Actions**
- Suggest, Avoid
- Help, Coach
- Move Toward
- Focus Sensing
ESP Challenge: Real-time Performance

Real-time video event detection requires 4 Teraflops at 10kW today. In the future, <1W on handheld?
Everyone wants to have FUN

Aware of activity, environment, mood, likes and dislikes
- Activities: motion, sound, images
- Mood: speech, motion, or physiological
- Likes: above+actions (purchases, views, conversations)

Actions: Advise, Suggest, Funny Comments, Pick music, Point out, buy gifts, other “smart” applications

Video courtesy: Carnegie Mellon University, USA

“Other names and brands may be claimed as the property of others.”
Nurture your Knowledge and Growth

Understand Interests and Motivation; Goals and current Capabilities
- Interest from read/browse/talk, repetition
- Like and Motivation from emotional response
- Goals from conversation – or direct interaction

Action: Teaching What you want to learn, Right level, Right way that you can learn, and When you are ready
Action: Understand Conversation Dynamics and Coaching
Living in a Material World

Understand physical objects and dynamics
- Recognition – “Can you get my X?”
- Pickup and Move – Safely
- Gentleness, Power, Grace, and Cute!
Action: Catch me, arrange that, carry me, dance!

“Other names and brands may be claimed as the property of others.”
Let’s Go Places

Understand Location and Physical Context – “Coordinates”; “Starbucks”; “In a crowd”; “Meeting a blind date”
Find a way – across a crowd; room, square, Mall, City - Avoid obstacles, Navigate, Multi-modal transport
Understand Movement rules (Don’t hurt others things, Obey traffic laws – when appropriate!)
Action: Direct, Move, and Adapt

Video courtesy: Carnegie Mellon University, USA
ESP: Computers helping in Everyday Activities

Laugh

Learn

Touch

Move
Mash Maker: The Web, the way You Want it

Customized web pages by adding Widgets
Add visualizations, data from other sources, transformations...

Open and Extensible
Use a simple Open API to write new widgets to enhance pages in new ways

The Mashups come to You
Mash Maker suggests mashups it thinks you will like on its toolbar
Facebook on Map

Expedia with legroom

Yelp with craigslist

“Other names and brands may be claimed as the property of others.”
Mash Maker: Technology Preview!

Intel® Mash Maker
- Browser extension developed by Intel Research and Software Solutions Group
- To be unveiled at Web 2.0 Conference on April 22, 2008

Includes support for Internet Explorer and Firefox
- Advanced widgets, visualizations, data from other sources, open extensible API

You’re invited to the future of the web
MashMaker.Intel.com
Summary

Exploratory Research and Engagement with the Research Community
Essential Computing
Everyday Sensing and Perception – driving exciting advances in awareness which enables new capabilities
For More Information

IDF Sessions
- FUTS005 Biosensors and Information systems: Changing the paradigm for biomedical research and practice
- FUTS006 Rise of the Collective: Addressing the Needs of New “Communities” in the Age of the 3D Internet

IDF Demos (Showcase Area)
- BU025 Composable Computing
- BU029 Personal Robotics
- BU028 Electronic Biosensor Arrays

See www.intel.com/research
Questions?
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