The Evolution of Mobile Technology

Part 6:

“A new paradigm in mobile user interfaces”

December 10, 2009

Moderated by Jim McGregor
Chief Technology Strategist
In-Stat

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Introduction

- **Welcome to the Evolution of Mobile Technology webinar series, featuring:**
  - Designing of High-Performance and All-Day Battery life
  - Design Challenges of Supporting Multiple Connectivity Technologies Architectures
  - The Evolution of Mobile Processing Architectures
  - Breaking Down Challenges in Open Source – Tricks of the Trade
  - The Impact of the Cloud on Mobile Devices
  - ***A new paradigm in mobile user interfaces (Dec. 10)***

- **Today's host:**

Jim McGregor, Chief Technology Strategist, In-Stat

- **Agenda:**
  - 5-minute overview
  - 35-minute discussion by panelists
  - 20-minute live Q&A

- **Webinar archives for previous presentations and today's available at:**
  - www.ti.com/wirelesspresentations
  - www.instat.com

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Panelists

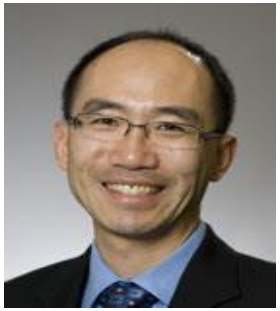
Fred Cohen, TI

- **Director, OMAP wireless ecosystem, wireless business unit**
- Identifies, engages and retains TI's partners in the service and software IP domains; leads a technologically-rich, diverse software ecosystem that works to deliver the best return on investment to the wireless and ASP business units, and provides maximum value for TI's customers

Ludvig Linge, TAT

- **Co-founder, vice president**
- Develops TAT business in new directions, looking into future applications for mobile user interfaces; has a strong interest in both human factors and the technology that is needed to make gadgets more exciting and user-friendly

Andrew Hsu, Synaptics



- **Technology strategist**
- Primary technical contact for Synaptics' worldwide customers in the handheld space since 1999; led company's efforts in establishing presence in the mobile handset market, and developed Synaptics' ClearPad technology

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Overview

- **Designing to a new paradigm** (Jim)
  - How UIs are changing the direction of technology
  - The impact on the consumer & industry

- **TI and its partners together deliver exciting UI experiences** (Fred)
  - Importance of the ecosystem
  - TI's role in advancing mobile UIs

- **Intelligent sensors: What they look like today and tomorrow** (Andrew)
  - Synaptics' customized interface solutions
  - The evolution of mobile UIs: Today and into the future

- **UI innovations that will make an impact in 2010 and 2011** (Ludvig)
  - Features that will be realized with intelligent UIs
  - TAT's glimpse into the future, provided today

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Link to the digital world

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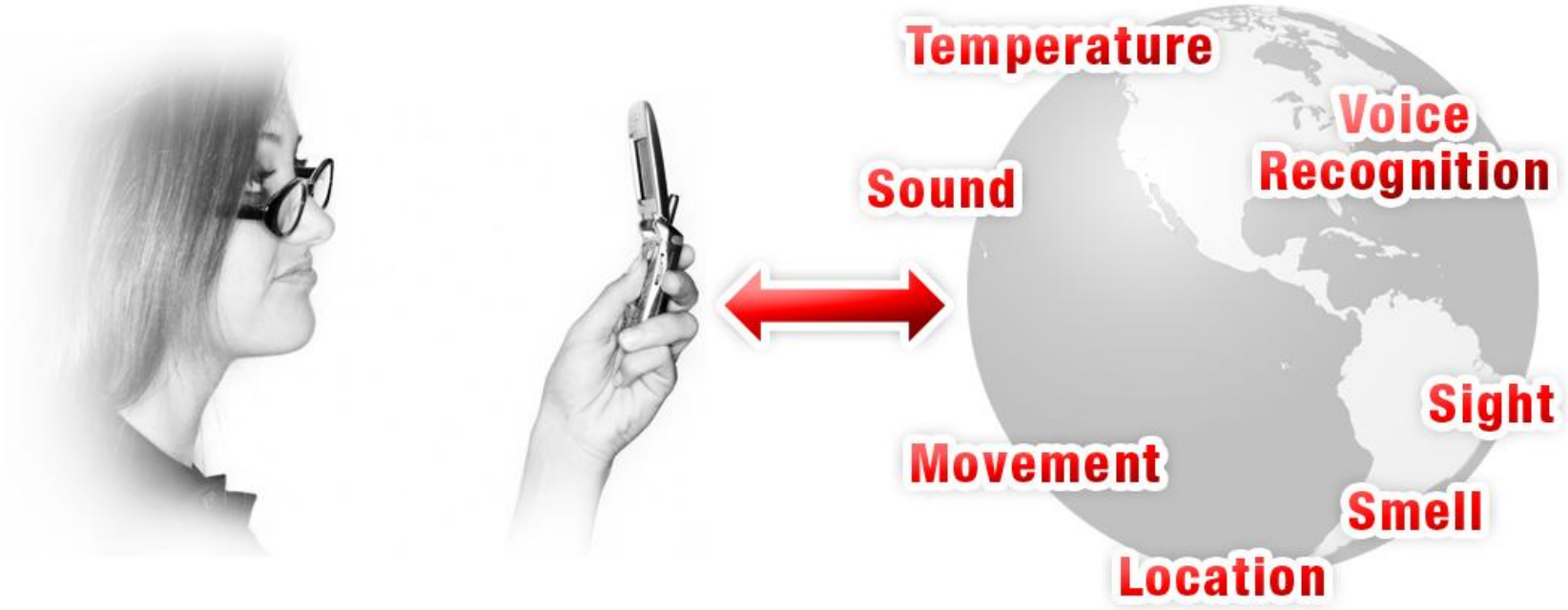
Link to the physical world



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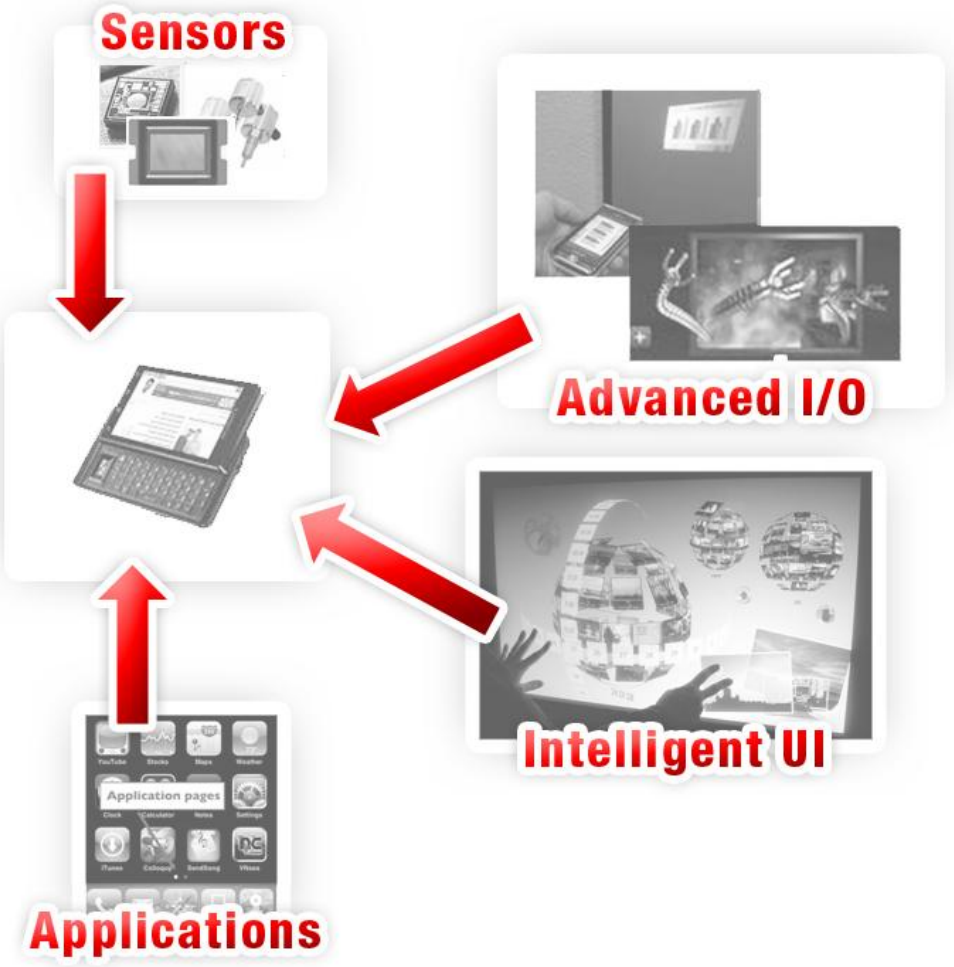
Bridging the gap



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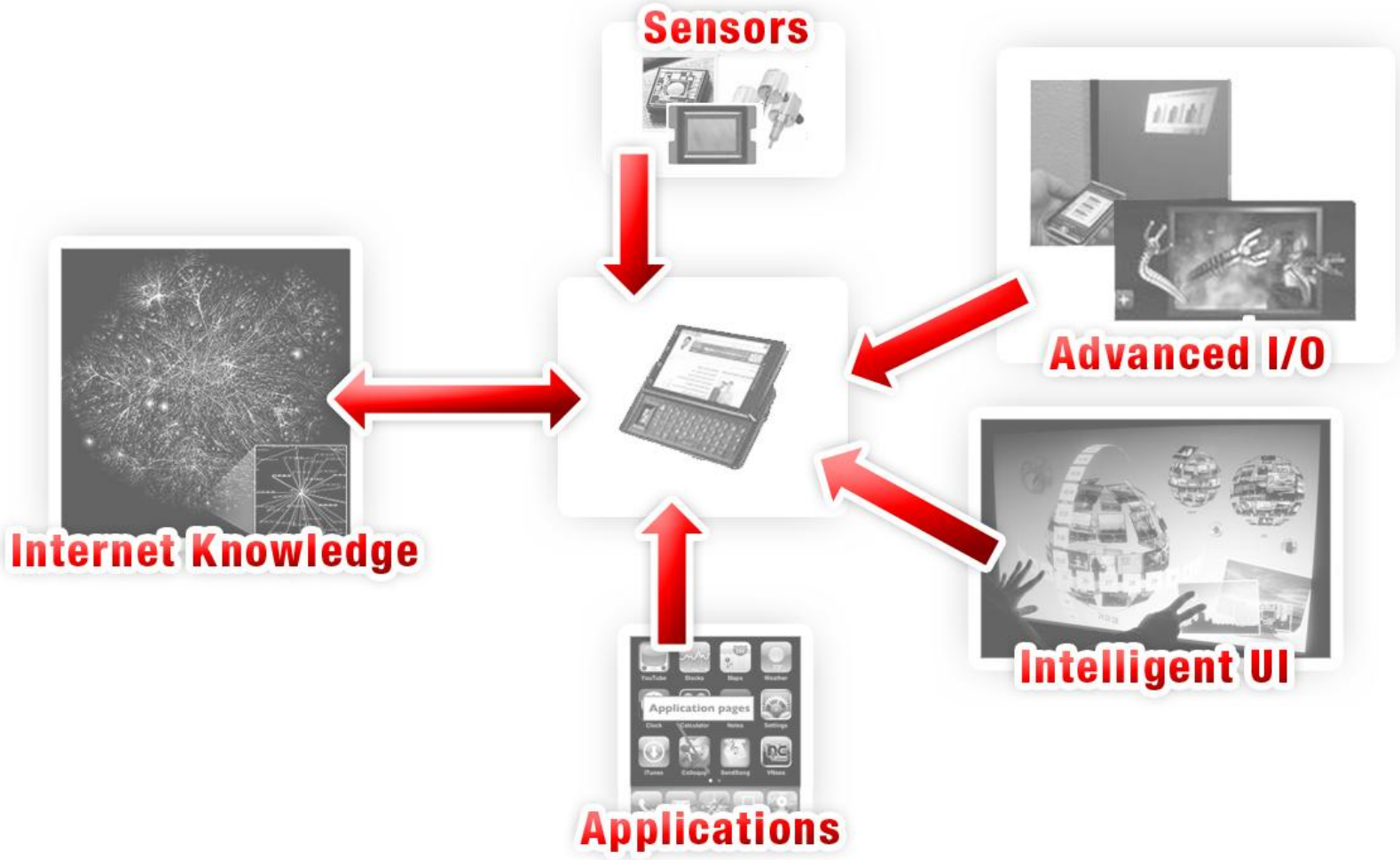
Bridging the gap



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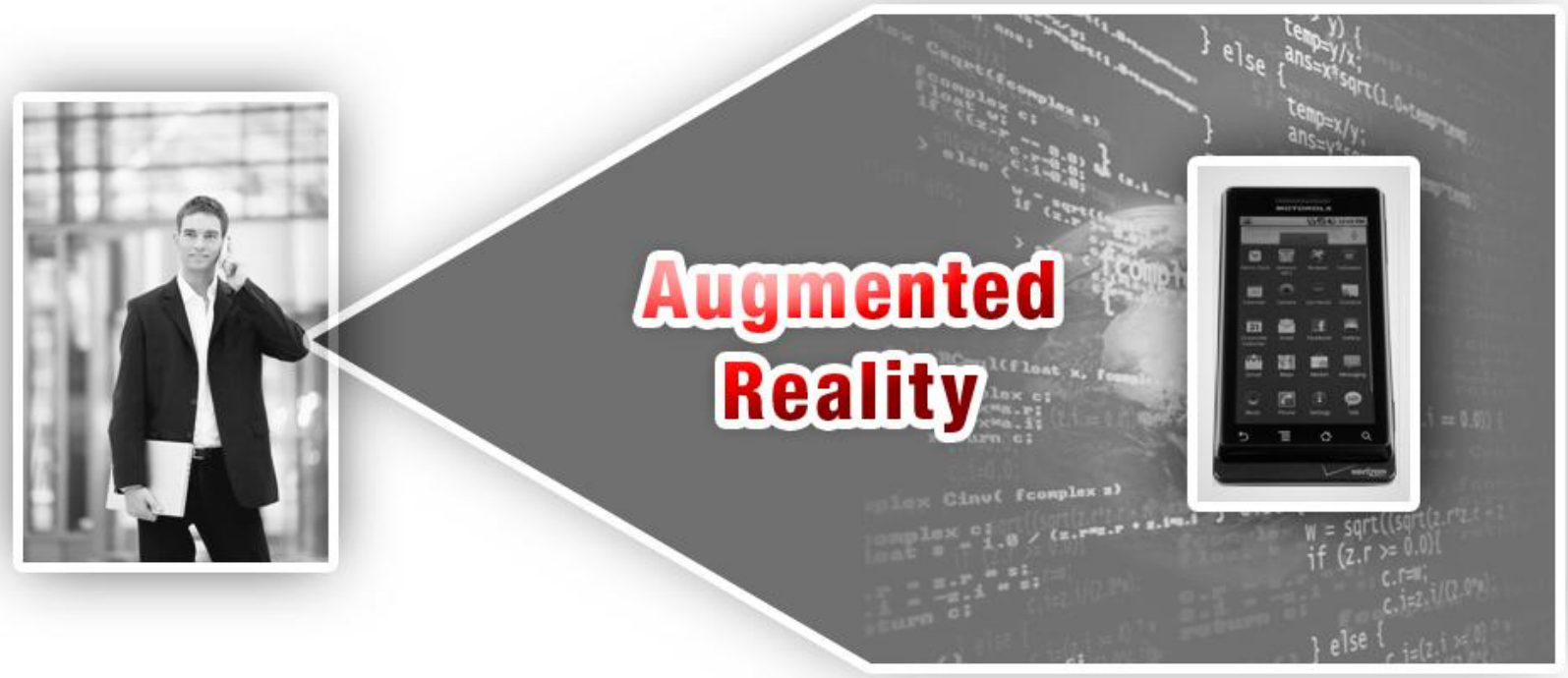
The new paradigm



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Industry impact

- Devices
  - Higher complexity
  - Increasing performance demands
    - Processing
    - Graphics
    - I/O
    - Connectivity
  - SW Stack is critical
    - UI
    - Browser
    - Applications
  - User and application initiated
  - Increased usage
- Services
  - Bandwidth is critical
  - Increased data traffic
  - New opportunities through network intelligence
    - Content aggregation and storage
    - Services
    - Virtual environments
  - Mixed business models
    - Voice
    - Data Messaging
    - Data Access
      - On-line (Nav, social networking, productivity...)
      - Off-line (tracking user info, monitoring information…)

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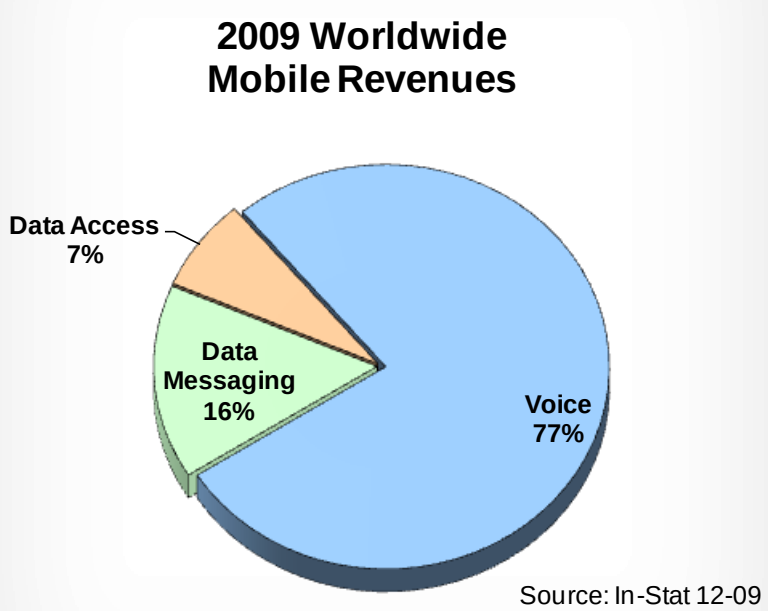
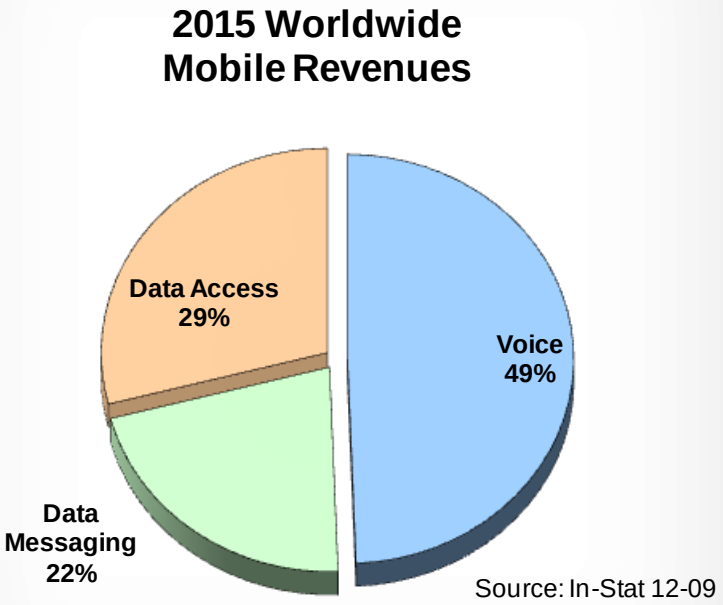
Forecast





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Innovate. Partner. Succeed.
TI and its partners together deliver exciting UI experiences!

Fred Cohen
TI

Mobile devices' evolution

Calls, SMS, productivity

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Mobile devices' evolution

Ultra low power

Education

Security

Creativity

Technology **convergence** and device **proliferation**

Entertainment

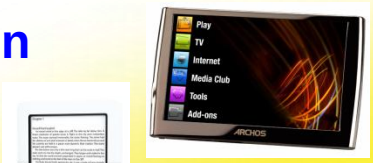
Life style

Health

Search

Calls, SMS, productivity









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Key ecosystem component: TI and partners together create the best user experiences

15K+ Beagle Boards
2K+ Zoom MDPs shipped

300+ software vendors,
50+ service partners

http://www.omapzoom.org/index.html

Your OMAP processor-based projects

OMAP application processor

SYMBIAN ANDROID Windows Mobile

beagleboard.org

To join TI's OMAP™ ecosystem, contact Guy Harris (gharris@ti.com)

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OMAP™ processors enable immersive user experiences

- OMAP market momentum
- OMAP performance fuels innovation
- OMAP roadmap secures your investments

Open Development Platforms

OMAP 2 processors | OMAP 3 processors | OMAP 4 platform

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Proven partner success: OMAP™ 3 processor-based devices hitting the market

palm **Pre**

cnet Best of CES 2009 AWARDS

SAMSUNG **i8910 Omnia HD**

Best of MWC 2009

Sony Ericsson **Satio**

DELL **Latitude ON**

MOTOROLA **Droid A855**

NOKIA **N900**

AlwaysInnovating **Touch Book**

EMBLAZE Mobile **Else Intuition**

htc quietly brilliant **Dopod T8388**

ARCHOS **5 Internet Tablet**

LOGIC **Torpedo SOM**

SAMSUNG **H1**

Partners' contributions include: UI, game, imaging, graphics, players, security, codecs, browser, flash, integration and more

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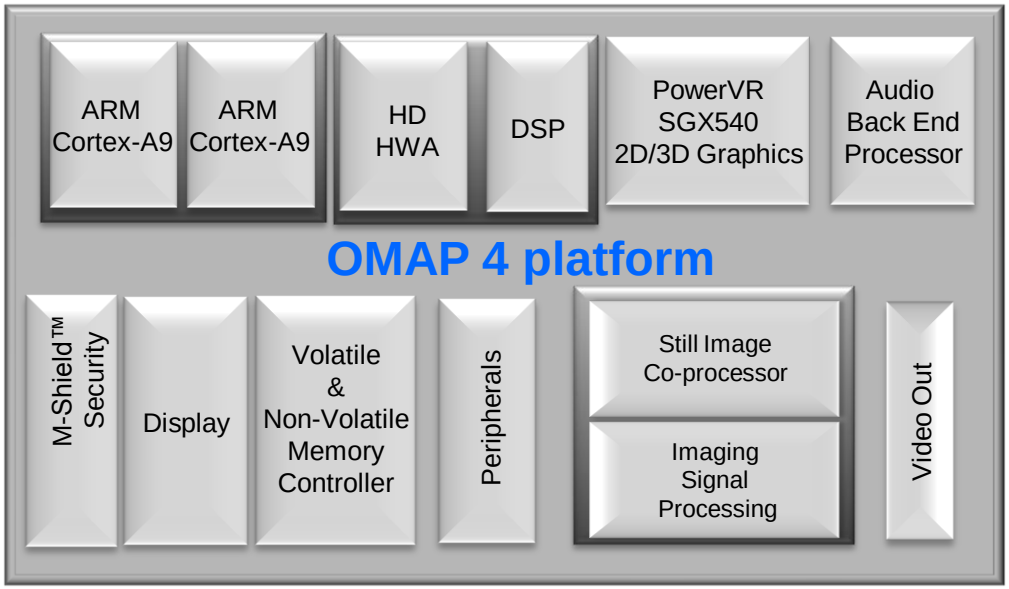
Leverage OMAP™ platform to develop exciting user interfaces!



- Powerful CPUs
- Powerful DSP
- 2D and 3D Graphics accelerators
- Support multiple displays, HDMI (OMAP 4 platform)
- Complete platform with sensors and drivers (Zoom board)
- Sensor interface
- Video acceleration
- PicoDLP support (OMAP 4 platform)
- Energy management
- Audio subsystem (OMAP 4 platform)

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Me and my device: Game changers in the new UI paradigm

Intuitive UIs

Consumers cite the UI as one of their top criteria for choosing a device, with brand, design, service, content and price. (OEM)

The UI is the window between me and a world of infinite apps (a user)

The UI is a gateway to the Mobile Web. (Carrier)

- Open source, Linux, Android, more
- Apps stores
- Social media
- User based content/upload
- Localization
- Projection
- Virtualization
- Mobile TV
- More possibilities to come!

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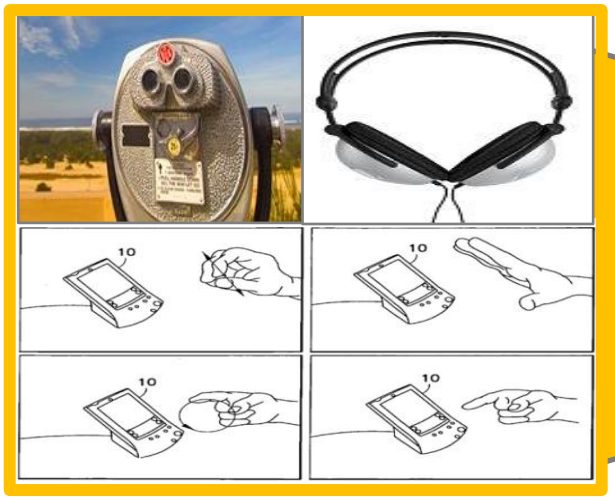
Versatile and intelligent user interfaces



- Visual
- Audio
- Touch
- Gesture

Phones pick up senses **around** you and **about** you

More unique ways to interact

- Touch the screen: Touch screen controllers
- Touchless gesture in front: Camera(s)
- Read the screen: Multiple displays
- Write on the screen: Wireless pen
- Rotate, Roll, Shake: Sensor array
- Speak and listen: Mic, speakers
- Squeeze the device: Sensors

Users don't want to search, they want to **find**! And work, play, communicate, share, create, learn…

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More UI innovation

User experiences

- Multitask and multi displays
- Augmented reality
- Share multimedia experiences
- Interact with a projected image
- Enjoy real 3-dimensional UI display

- Multiple display technology
- Augmented reality technology
- Projection technology
- 3D stereo display technology

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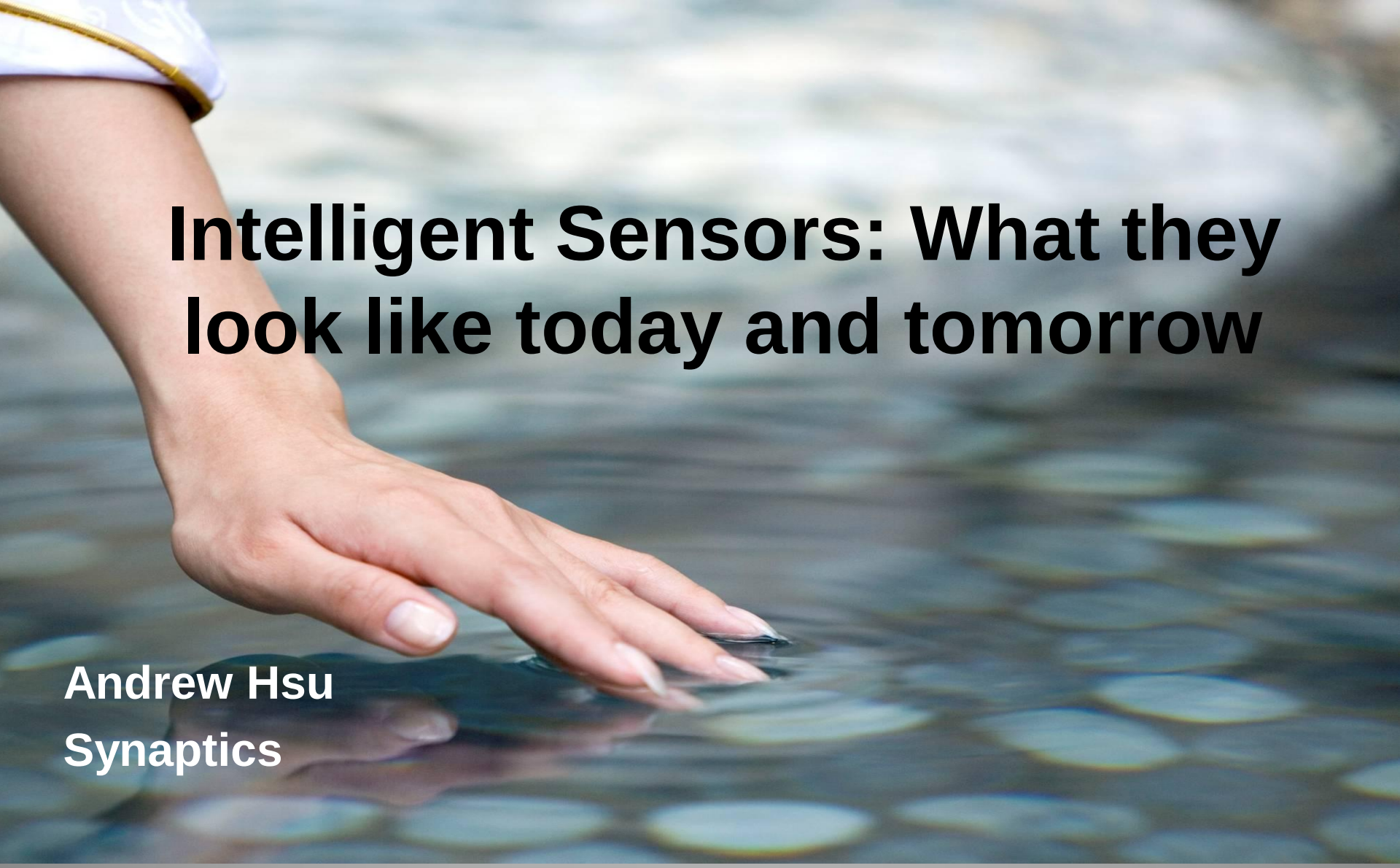

Intelligent Sensors: What they look like today and tomorrow

Andrew Hsu

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Synaptics enables innovation

Industry leader for innovative human interface solutions

> 600M solutions shipped, > 1500 unique designs to market

Industry firsts: TouchPad, ClickWheel, Touchscreens, MultiTouch, Proximity

Marquee customer base in growth markets

Market leadership in Notebooks and Mobile

New deployment in adjacent PC Peripheral and Digital Entertainment markets

Strong core competencies and systems know-how

Founded in 1986 as neural network research company

~ 300 engineers (~ 60% of total headcount), half with advanced degrees

~ 200 patents issued or pending

Synaptics Customized Human Interface Solutions

Advanced User Interfaces | New Usage Models | Sleek Industrial Designs

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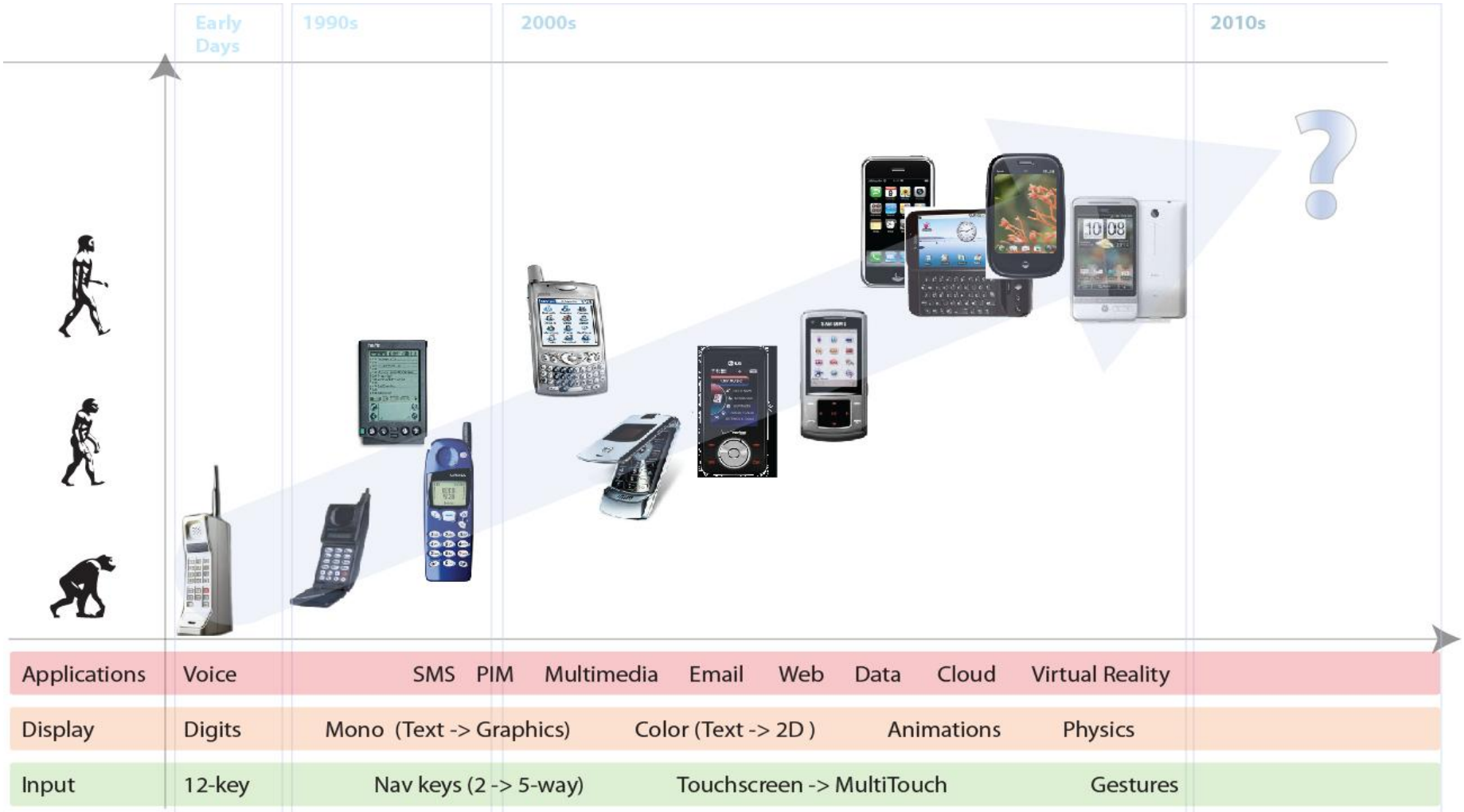
Current evolution of the mobile UI



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Display-based controls dominate

- Efficiency of space
- Direct manipulation UI
- Contextual UI (application-based)
- Adaptive UI (environment-based)
- Personalization of UI (“skinning”)
- Enhanced interaction (gestures)
- Fashion-forward Industrial Design

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Challenges of existing touch-only interaction

Operating the device necessitates persistent gaze…

Single-handed operation (especially while on the go) is cumbersome…

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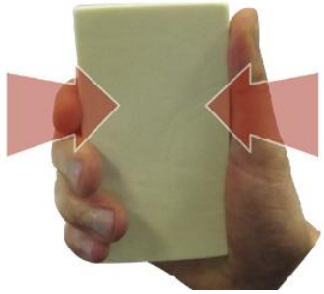
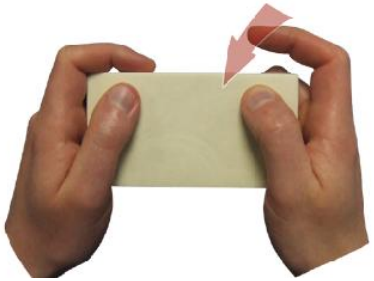
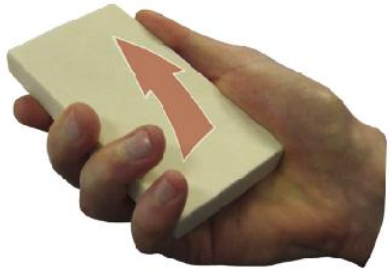
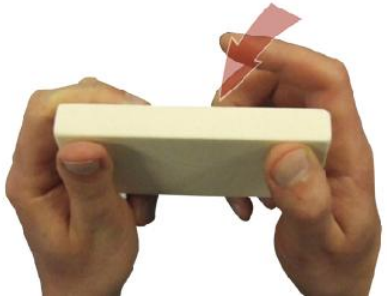
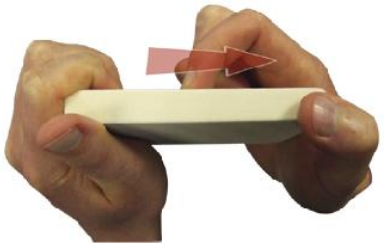
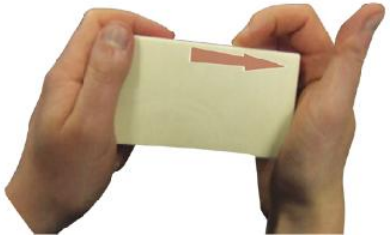
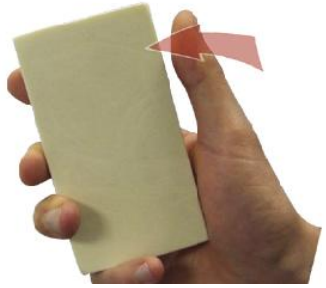
Enhancing display-based interaction

- Grip sensing
- Proximity
- Alternative touch input
- Haptics and Visual Feedback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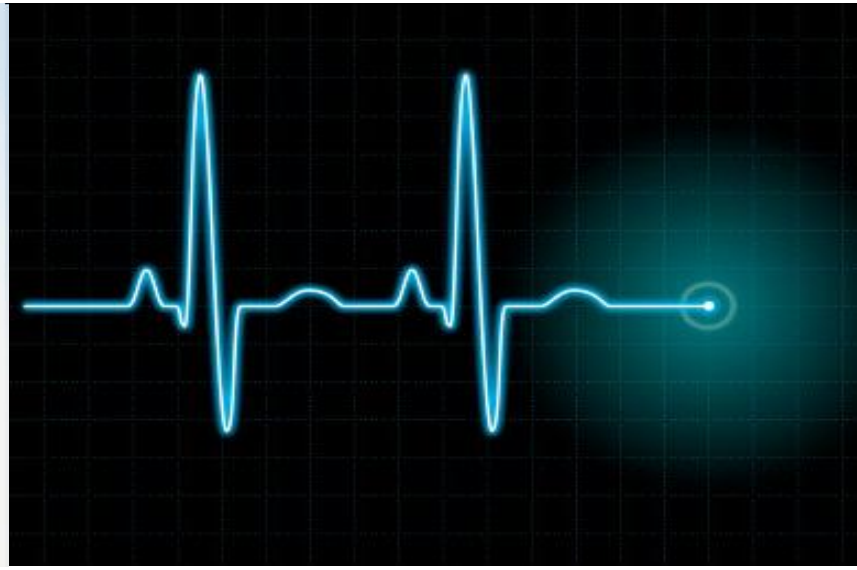
Future directions: Augmenting reality through mobile devices

New bio-sensory input integrates user data into fitness and medical applications:

- Heart rate
- Power
- Temperature
- …and more



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The future

Applications	Voice	SMS	PIM	Multimedia	Email	Web	Data	Cloud	Virtual Reality	Augmented Reality
Display	Digits	Mono (Text -> Graphics)		Color (Text -> 2D)		Animations		Physics	3D	Video
Input	12-key	Nav keys (2 -> 5-way)		Touchscreen -> MultiTouch				Gestures	MultiModal	

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The future

Existing sensors will **evolve and collaborate** to enrich the device's interaction with the user's environment.

Applications	Voice	SMS	PIM	Multimedia	Email	Web	Data	Cloud	Virtual Reality	Augmented Reality	
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UI innovations and trends that will make an impact in 2010 and 2011

Ludvig Linge

TAT

UI/UX in mobile moving forward

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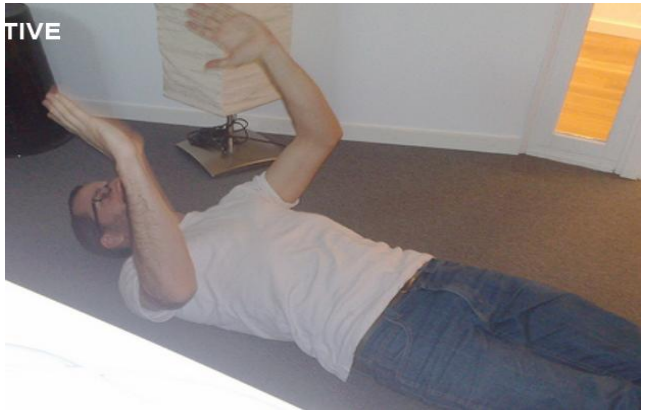
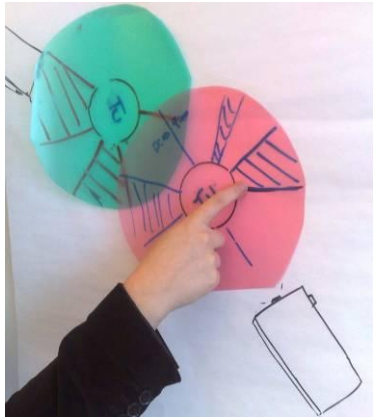
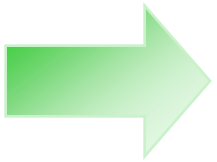
Importance of a clear UI/UX vision: Fast sketching and prototyping, low-fi on device







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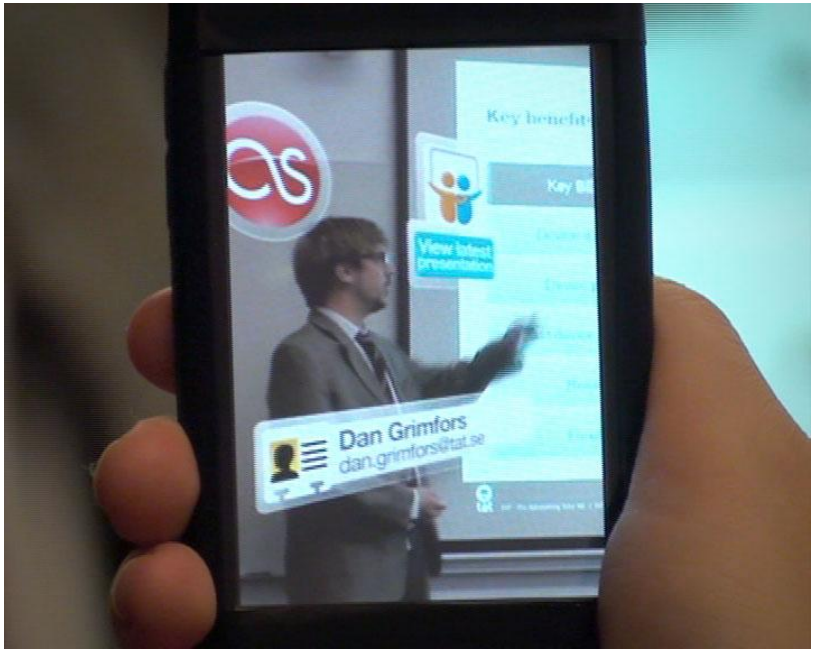
Augmented reality: Visualise the world, in real-time

- Using passive input from GPS, compass and camera feeds
- Digital information is superimposed on images in the real world
- A natural way to “search” things around you e.g. buildings, people and other objects

Looking glass - concept sketches (Mac Funamizu)



TAT Concept demo,Augmented ID
(http://www.youtube.com/watch?v=tb0pMeg1UN0)

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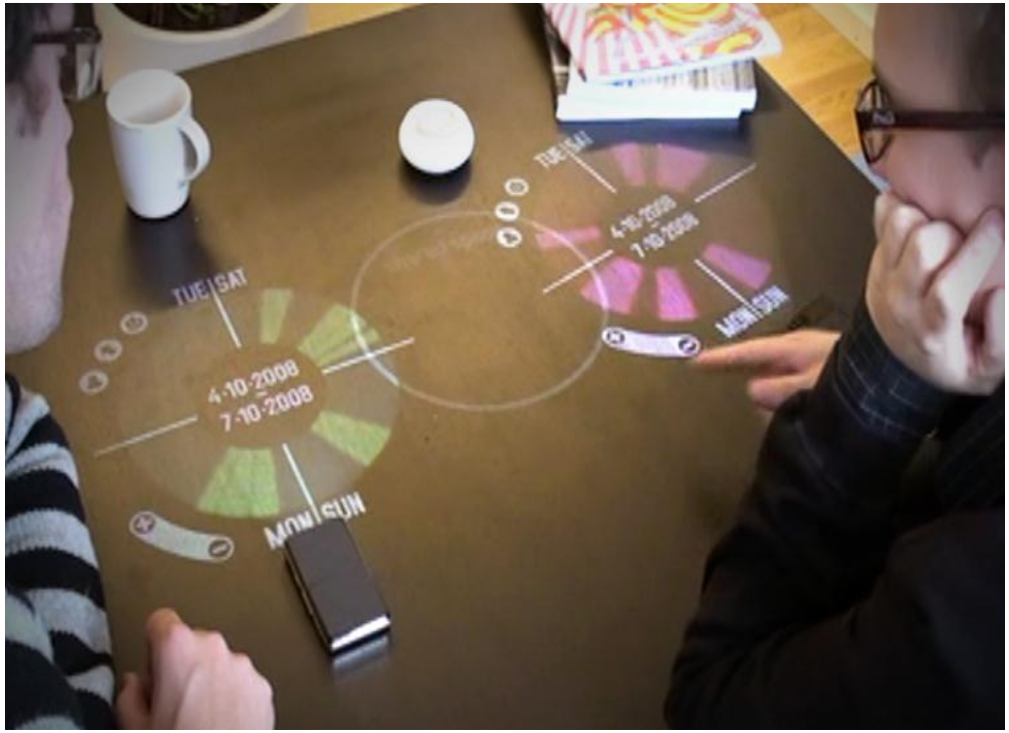
UI projections using pico projectors

- Embedded pico-projectors will provide a whole range of new interaction paradigms beyond simple projection
- The convergence of projector and camera offers the richest interaction
- A projected display will have to adapt to the environment it is shown on



TAT Concept demo, ProjectoUI
(http://www.youtube.com/watch?v=RAJ1SxHCqVc)

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Accelerometers and camera motion tracking

Example: For graphics are altered depending on viewing angle

Intuitive direct manipulation

- It is natural to tilt an object to change viewpoint

Clear spatial metaphors

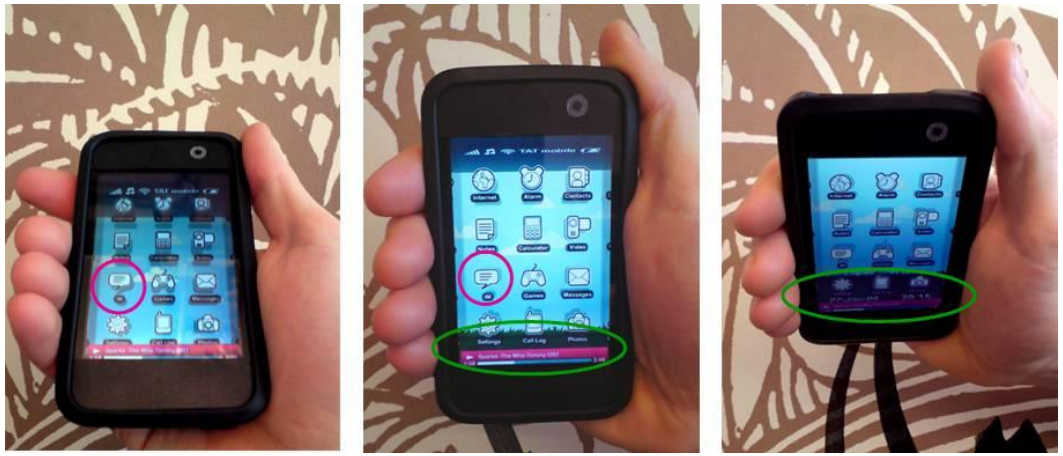
- A comprehensive way to extend screen space by looking under the edges of the screen

High information density.

- With layers in 3D it is possible to look behind objects to access more information. Reduce clutter

Impressive realism

- Illusory ”trompe l’oeil” effects are beautiful and fun



TAT Concept demo, 3D Eyetracking
(http://www.youtube.com/watch?v=7SImOIMcMlk)

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Delivering attractive UIs using hardware accelerated graphics

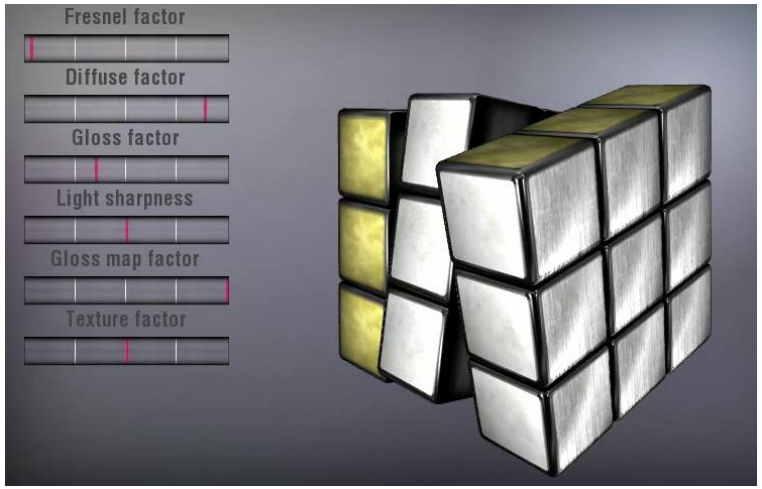
OpenGL ES 1.x and 2.0

Key drivers for GPUs

- Display evolution
  - High resolutions WVGA/720p/1080p
  - Multiple screens
- Responsiveness and quality
- 3D graphics
- Media acceleration

Applied to UIs

- Provides a range of new opportunities to create such more visually compelling UI experiences with 3D, shaders etc.



Different values of 3D in UIs

- Visual Style & Feedback (VSF). The **WOW** factor - a stylistic element
- Flexible Information Visualization (FIV). 3D UIs can be used to create more extensive overviews and exploit various navigational metaphors.
- Naturalized Interaction (NI). Build on human understanding of space and physical materiality of objects

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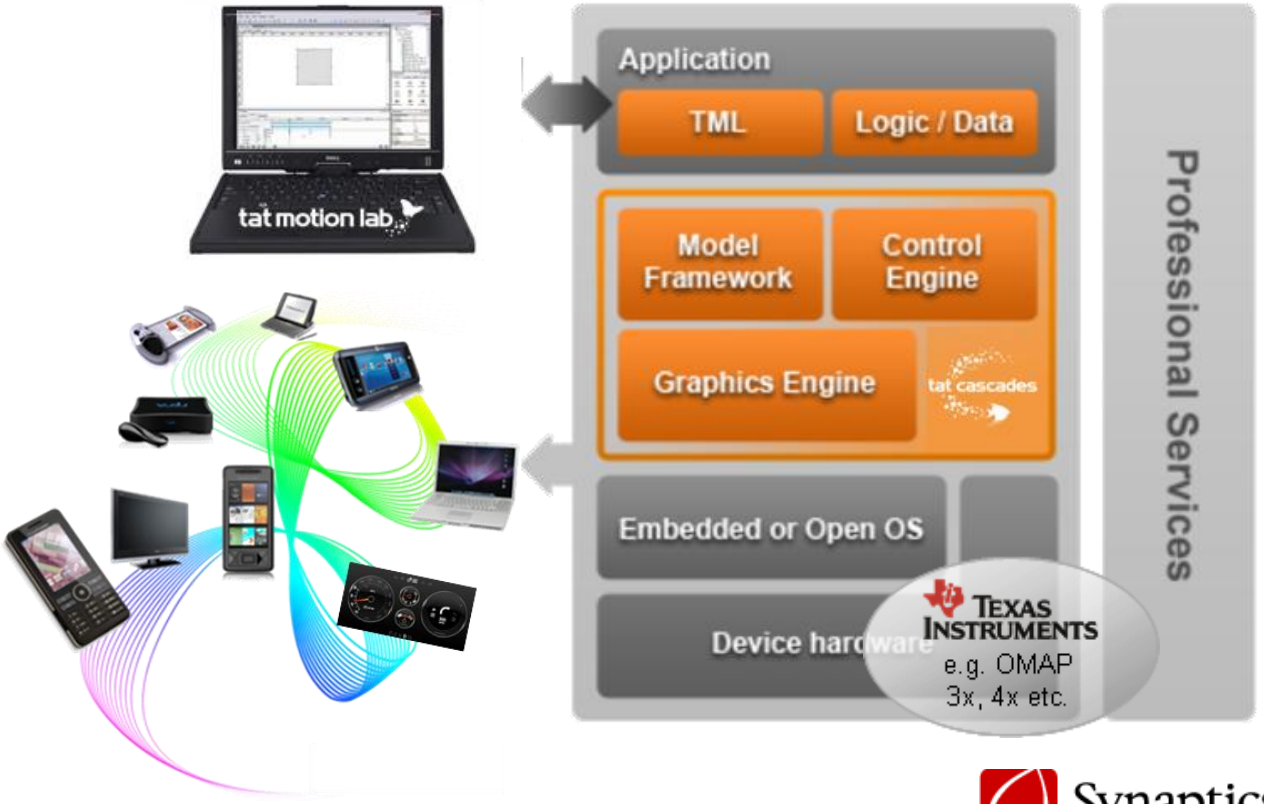
Delivering the future of mobile UIs

- TAT technology in 350 million devices/200+ different models
- In 10% of all mobile phones in 2009
- In more than 20% of all touch phones



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Summary

- Designing solutions for the personal experience
  - User: connectivity between the physical and digital world
  - Carrier: device & service differentiation
- Requirements: a complete solution & ecosystem
  - Processing & graphics performance
  - Interconnect technology
  - Software solutions
  - Intelligent information
- Requirement: multimodal integration for advanced functionality
- Result: UIs will enable and increase the number of future devices

Q & A

- To participate, click on the Ask a Question link on the left side of the interface; enter your question in the box on the screen; hit “Submit.” We’ll answer them during the Q&A session or after the webcast.

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community.ti.com/blogs/mobilemomentum

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