Interactive Surfaces

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Further more..

- **Challenge**
- **Project Examples**
- **Existing Products**
- **Outlook**

Challenge

1. **Correctness:** Correctness under non-optimal condition

2. **Efficiency:** reasonable latency

3. **Debris tolerant:** Objects left on the surface do not interfere with normal operation

4. **Hardware Robustness:** Able to withstand normal use without frequent repair or re-calibration

Challenge

5. **Unencumbering:** No additional devices should be required for use

6. **"Come as they are":** user can interact directly with the system

7. **Inexpensive to manufacture**

More Projects

- **DiamondTouch:**

    A Multi-User Multi-Touch Technology

- **Visual Tracking of Bare Fingers**

    Vision-Based Finger Tracking

DiamondTouch

- **Multipoint:**
  Detects multiple, simultaneous touches

- **Identifying:**
 Detects which user is touching where

FOR MORE INFO...

MITSUBISHI ELECTRIC RESEARCH LABORATORIES
**www.merl.com/projects/**

DiamondTouch

- **Tracking fingers *with surface equipment***
  - **Embedded antennas in the table surface**
  - **A transmitter unit drives each antenna with a unique signal**
  - **User capacitively coupled to their receiver through their chairs, and receivers are connected back to the transmitter**
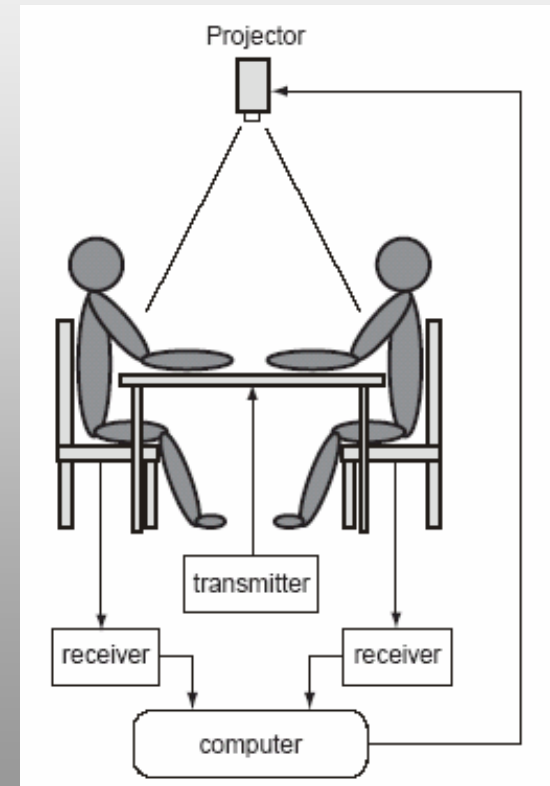
DiamondTouch

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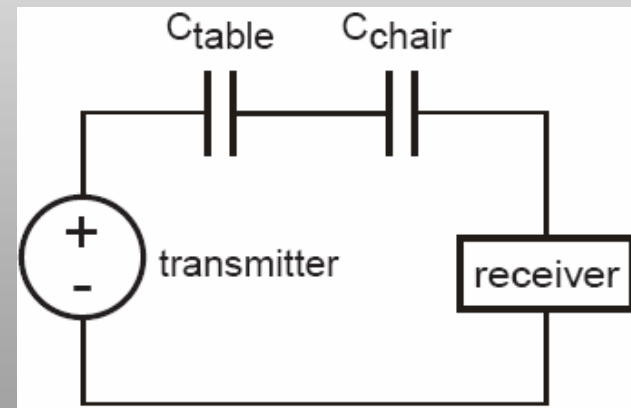
DiamondTouch

- **Result:**
  - It can identify the simultaneous movements of multi-users
  - The tracking is stable, with very low latency

DEMO

(http://www.merl.com/projects/DiamondTouch/DiamondTouch.mov)

Visual Tracking Of Bare Fingers

- **Tracking fingers *from a standard camera view***
  - **Pixel-oriented methods**
- **Affordable & portable hardware**
  - **Digital video camera**
  - **Small Projector**
  - **laptop**

FOR MORE INFO...

http://www.mezis.net/papers/papers.html
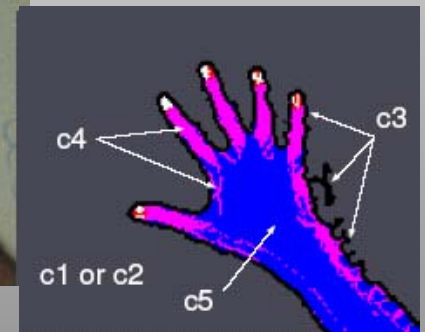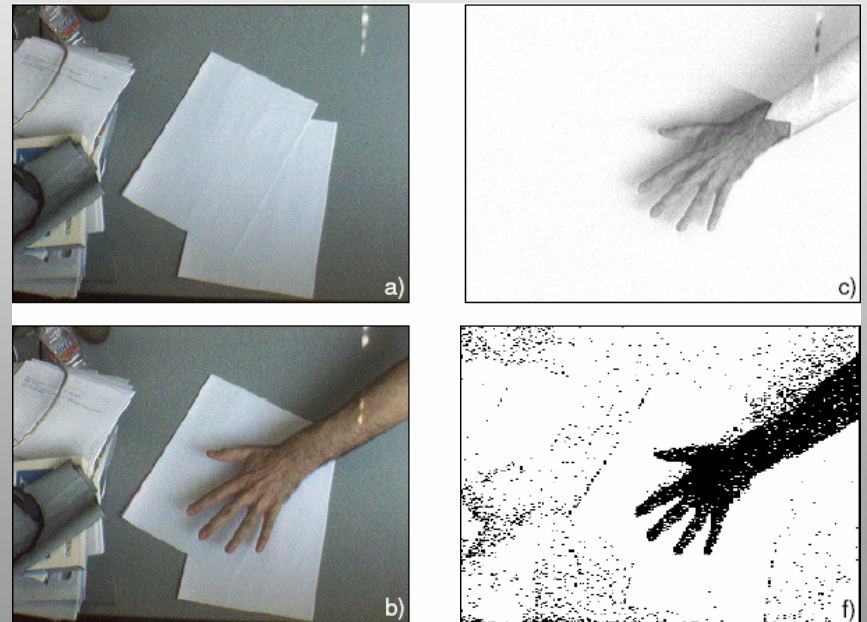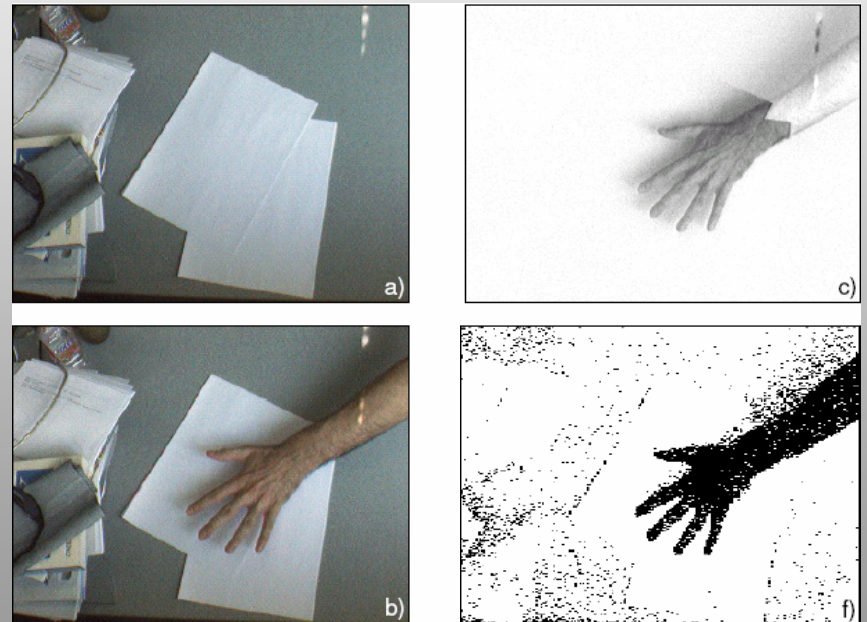
Visual Tracking Of Bare Fingers

- **Image Differencing Segmentation**

1. **Foreground extraction using IDS**

2. **Automatic thresholding**

3. **Shape filtering**

4. **Association generates high-level events for the client application**

Visual Tracking Of Bare Fingers

- **Result**

  - **Reliable Detection**

  - **Reasonable Latency**

  - **Problem with stimulatingly multi-user using**

More Projects

- **DiamondTouch:**

  A Multi-User Multi-Touch Technology

- **Visual Tracking of Bare Fingers**

  Vision-Based Finger Tracking

- **UbiTable:**

  A Face-To-Face Collaboration on Horizontal Interactive Surfaces

UbiTable

- *"face-to-face collaboration on horizontal surfaces"*
  - **Share scrap display**
  - **Separation of privacy from visibility**

FOR MORE INFO...

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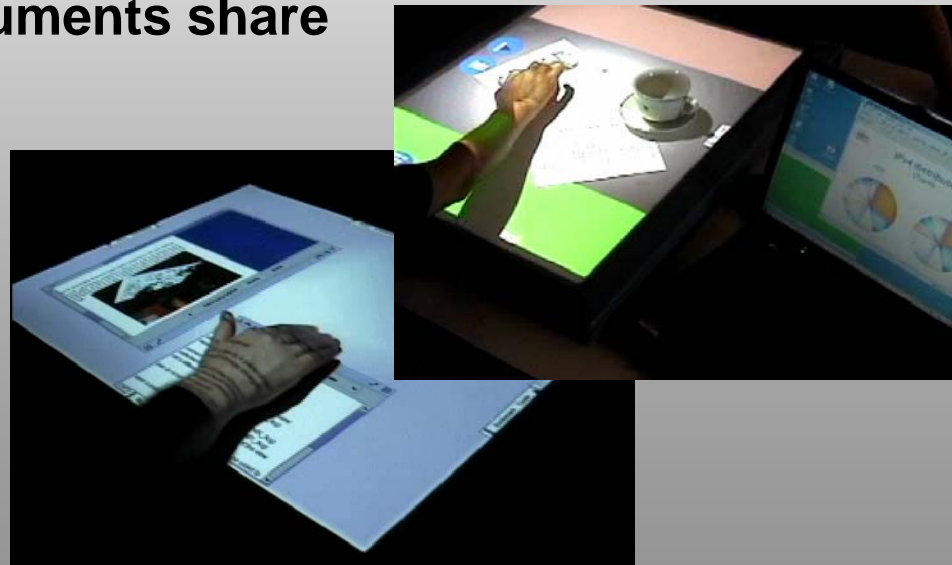
www.merl.com/projects/

UbiTable

- ## Usage Scenario

  - ### Meeting in an airport with laptops

    - **Privacy: Public, Personal, Private Area**
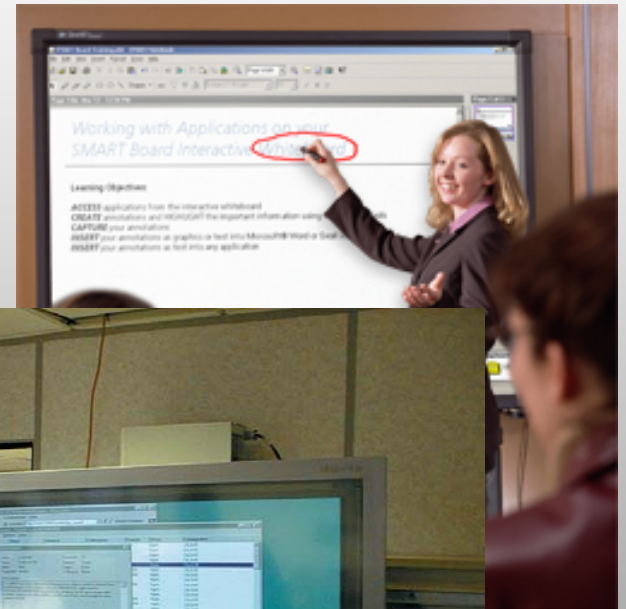   - **Electrical Documents share**
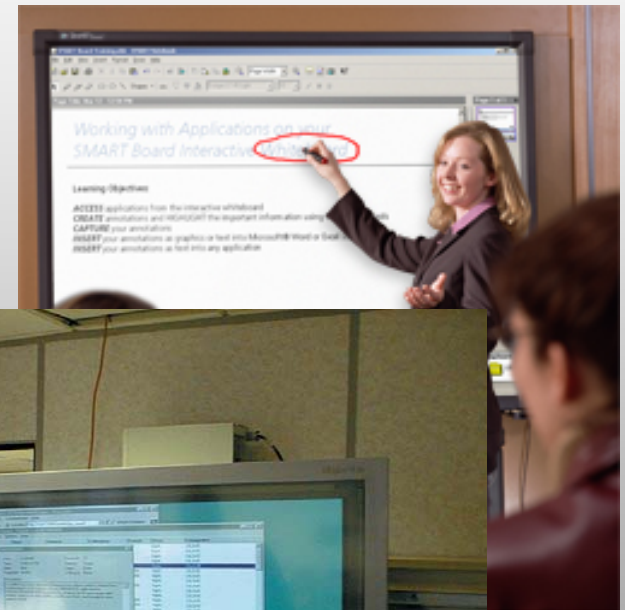
- ## Technology

  - ### DiamondSpin

Snap back to reality

- **Existing products since 10+ years**
  - **Touch Screens**
  - **Smart Board**
    - **Interactive Whiteboard**

Snap back to reality

- **Benefits & Limitations**
  - **Sensible Materials**
  - **Multi-user using**
  - **Unnatural**
  - **Under Non-optimal Conditions**
  - **Price**

Outlook

- ? **Information Everywhere**
  - ? **Outdoor**
  - ? **Play without Plug**
- ? **Special Applications**
  - ? **For disabled person**
  - ? **For children**
- ? **Combine With Other Technology**
  - ? **With wearable devices**
  - ? **Voice Detection**
- ? **… ???**

Conclusion

- **In the technical aspect, we still need to face some vital challenges**

- **Many projects were developed with different methods**

- **Also already exist many products, but still had to continue to improve**

END