

# Tracking Mobile Phones on Interactive Tabletops

Dipl.-Inf. Florian Echtler, Prof. Gudrun Klinker

<[echtler@in.tum.de](mailto:echtler@in.tum.de)> <[klinker@in.tum.de](mailto:klinker@in.tum.de)>

Technische Universität München

Fakultät für Informatik - I16

Fachgebiet Augmented Reality

# Introduction

## TISCH – Tangible Interaction Surface for Collaboration between Humans

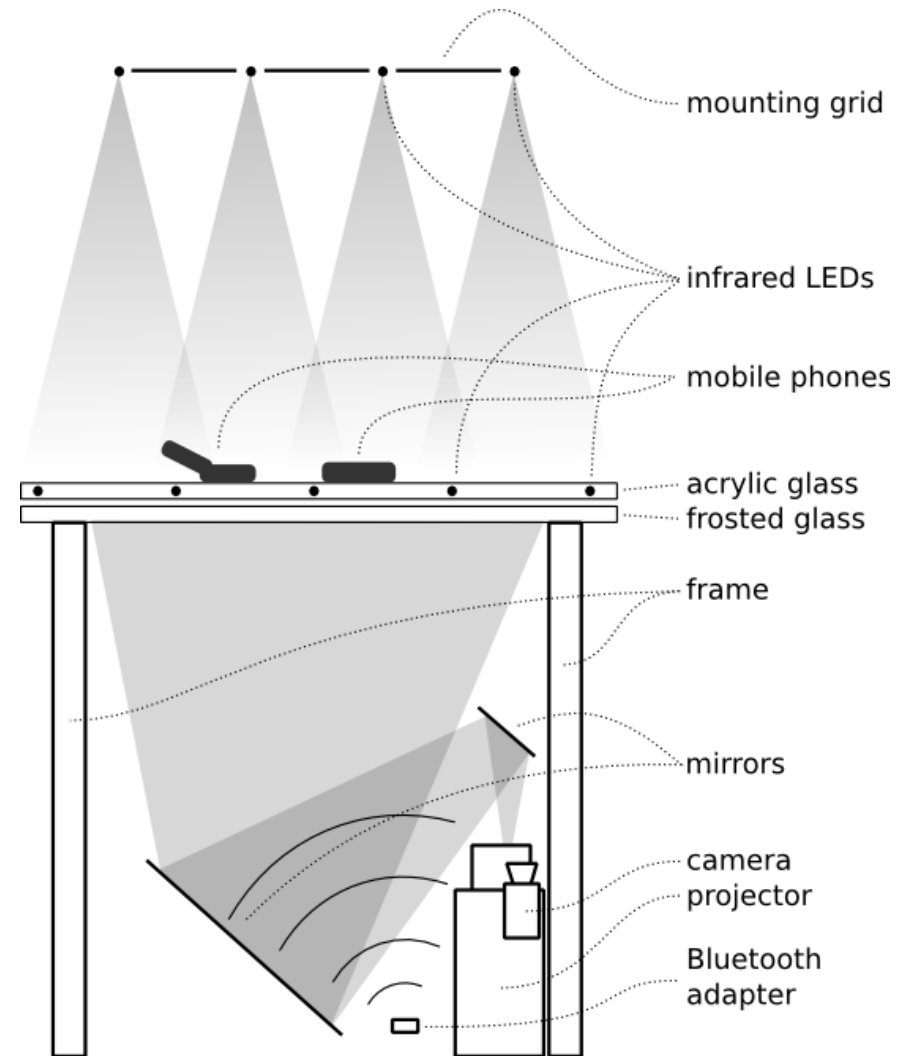
- „classical“ FTIR-based multitouch tabletop interface, based on Jeff Han's work
- projection screen: Ikea frosted-glass table
- Firewire camera with 60 FPS
- 70 pulsed & synchronized IR LEDs
- layered software framework



# Hardware Setup

## FTIR + Shadow Tracker

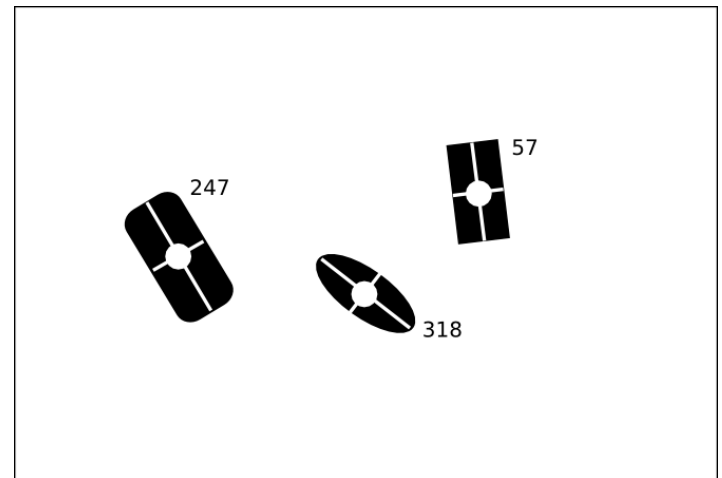
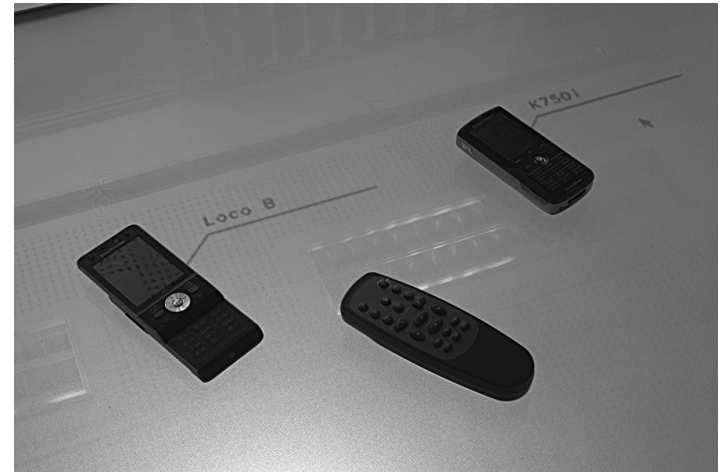
- in addition to touch points:  
also track shadows
- 35 narrow-beam IR LEDs  
mounted above the table  
create distinct shadows
- both light sources switched  
between odd & even frames
- „hard“ objects, e.g. mobile devices,  
create no FTIR response, but a  
shadow
- detect proximity via Bluetooth



# Identification of Mobile Devices

Is that really a phone?

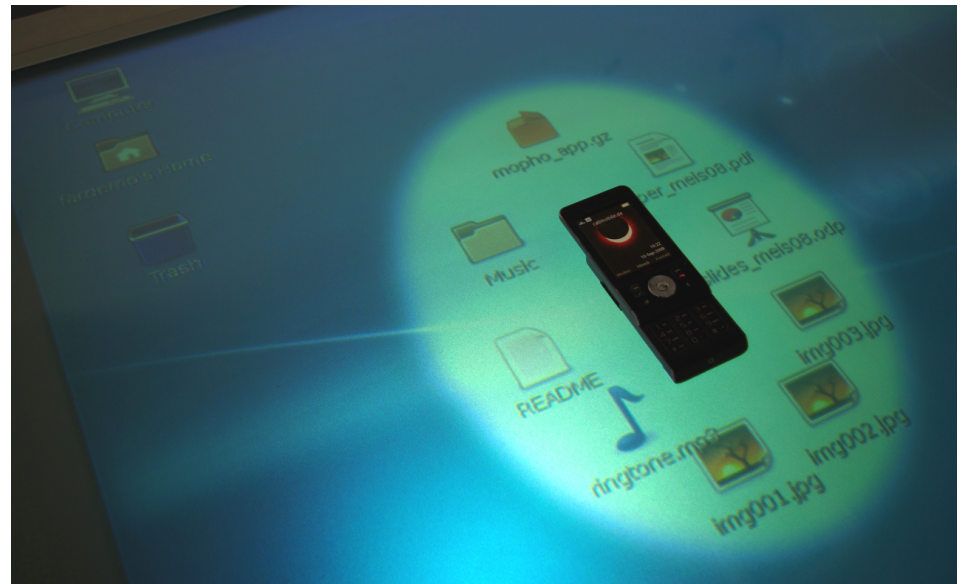
- tracking layer: delivers centroid, size, principal axes and unique ID
- implicit information: equivalent ellipse, roundness
- when a new blob appears:
  - compare with blob list – if empty:
  - check Bluetooth discovery data
- if unassigned BT address in close range ( $> -60$  dBm): assign to blob, store geometrical properties



# Potential Applications

Things to do with phone positions

- phone-sensitive areas on table surface
- e.g. „Join“ area in tabletop game: put device down, wait some seconds, take device back and start playing
- drag-and-drop media browser
- „media halo“ around the phone
- tight integration with desktop environment, e.g. Gnome





# Outlook

## Future Work

- use multiple Bluetooth adapters
- rudimentary triangulation  $\Rightarrow$  handle several devices at once
  
- remove the overhead frame
- use ambient light or..
- use infrared backlight („direct illumination“)
  
- create more applications using our TISCH framework
- for more information, visit <http://tisch.sourceforge.net/>

### References:

- *Shadow Tracking on Multitouch Tables*. F.Echtler, M.Huber, G.Klinker. ACM AVI 2008, Naples.
- *Collaborative Problem Solving on Mobile Hand-Held Devices and Stationary Multitouch Interfaces*. S.Nestler, F.Echtler, A.Dippon, G.Klinker. PPD Workshop 2008, Naples.

**Thank you for your attention!**

**Questions & comments?**

