

# OK-Net: An Oxygen Kiosk



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## OK-Net on 1st floor



# “Under-the-hood”



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## Kiosk Specs

- **Touch Screen Monitor**
  - no stylus, yes finger
  - 3M 17" Monitor with build-in speakers
  - microphone array on top
- **Small Computer (contained within kiosk)**
  - Slimpro 300, Pentium 3, 1.4 GHz, 30 GB 2.5 disk
- **Minimal Infrastructure**
  - WiFi card, bluetooth USB dongle
  - Must be near wifi base station & power outlet
- **Hacker-Hardened**
  - Linux, no console, rebootable at any time
- **Nothing Exposed except power cord**

# Computer behind monitor



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# All fits except power cord



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## Interaction Modes

- **General Public**
  - Information harvested automatically from web, email
  - Similar to browser: point-and-click
- **CSAIL Demonstration Platform**
  - Provides ability to highlight research demonstrations
  - Add peripherals as needed
  - Open to others via VNC on Kiosk (revert to Skinny when idle)
- **Adapt to user**
  - Kiosk is an extension of user's digital world
  - Kiosk is an extension of user's mobile devices

# Finger as mouse



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# Bluetooth device as mouse



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# Interaction

- **User input**
  - touch & speech
  - phone and pda as remote finger
    - *supports multiple users at once*
- **Information Transfer**
  - sms and email (requires user id)
  - bluetooth connection-less (OBEX push)
  - bluetooth connection (requires authentication & authorization)



# Why bluetooth?

- **Short range, wireless communication**
- **Stable, inexpensive, mature**
- **Other choices:**
  - IrDA: directional, line of sight
  - 802.11: too coarse grained
  - RFID: expensive readers
  - RF/US: more precise, too expensive



# Device Groups



- **User must authenticate device with kiosk**
  - usually done via pin
- **One authentication should suffice**
  - pairing with one kiosk should enable pairing with any OK-Net kiosk
- **Want all my BT devs to belong to a group**
  - pairing with any one device, should allow pairing with any other
- **Group is a key pair (public,private)**
  - all group devices in group share the private key
  - device initial pairing returns BT address signed by this private key
  - this is used by device to pair with other group members



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# Device Groups

- **Group G --**
  - private key: used to join members
  - public key: used to verify members
  - proof of group membership: Bluetooth Address signed by G
- **How to join a group**
  - device A joins; it gets (A signed by G), (Public G)
  - device A wants to prove to B that it is a member:
  - B has public G, can decode A



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# Guidance through building

- **State is hard for a visitor to navigate**
- **Kiosk provides several guide modes**
- **Passive:**
  - show & push map to bluetooth-enabled device
- **Active:**
  - guide user along the way
  - user must be identified along the way (face, rfid, cricket, bluetooth)



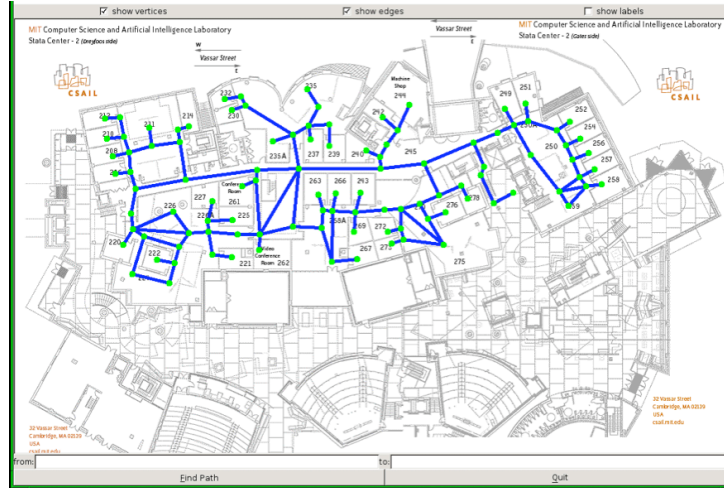
# Phone or PDA gets applet





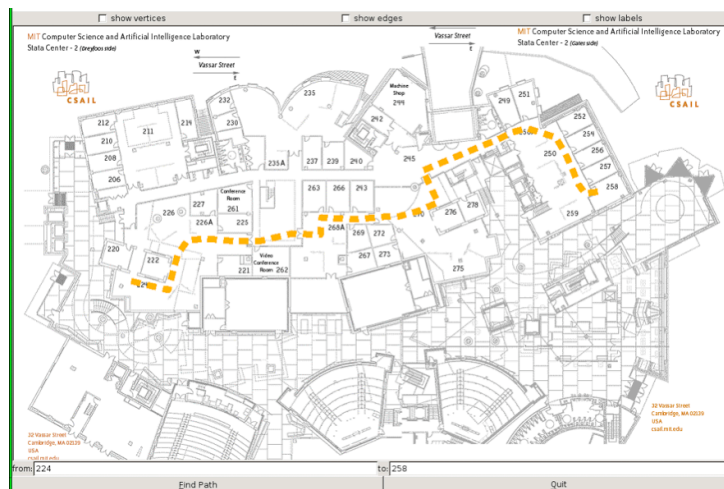
# Create graph for each floor

## Nodes: junctions or destinations



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# Compute path



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## Not always easy to follow the map (especially in Stata) Stata can follow you!



- **Bluetooth phone can be tracked**
  - kiosks and embedded microprocessors communicate and all scan for user's device
  - when found, they send update to device
- **Bluetooth phones in discover mode can be hacked**
  - "spamming" and "toothing"
- **Cricket has taught that**  
**"It is better to receive than to give"**



## Trivial Deployment

- **Identified 30 neighborhoods in Stata Center**
- **Every neighborhood contains computers**
  - does not matter if Windows, Linux, or Mac
- **Place bluetooth in a machine/neighborhood**
- **Name according to location, eg. "OKN-G868"**
- **Database learns name for each BT#**
  - Devices discover new BT#'s and update DB



# Trivial Deployment

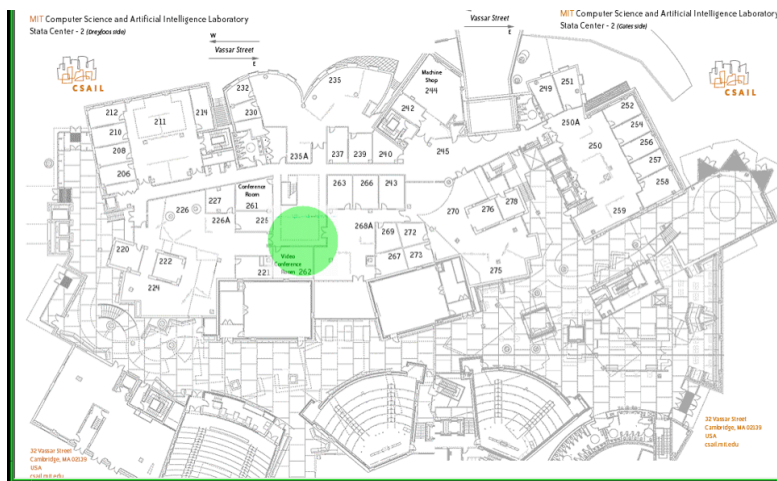
- **Dongle is discoverable**
  - no connection need actually be made
  - very simple deployment issues
- **Device scans and updates location**
  - first device heard is location, additional ones ignored.
  - after first device is silent for 15 seconds, start over



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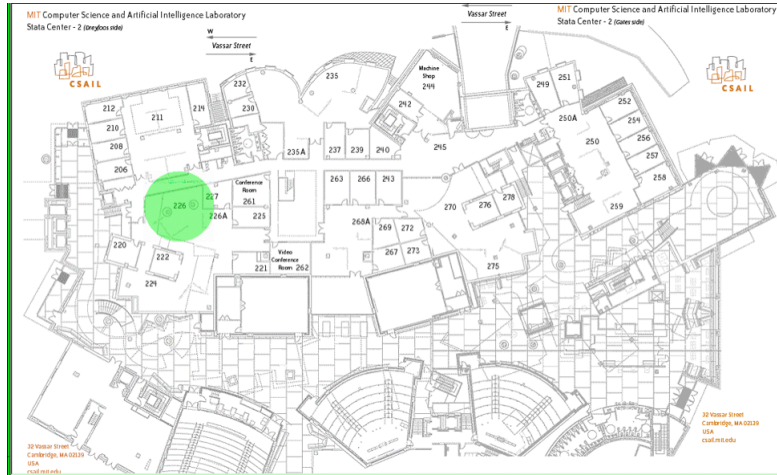
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## When hear BT dongle, update map loc



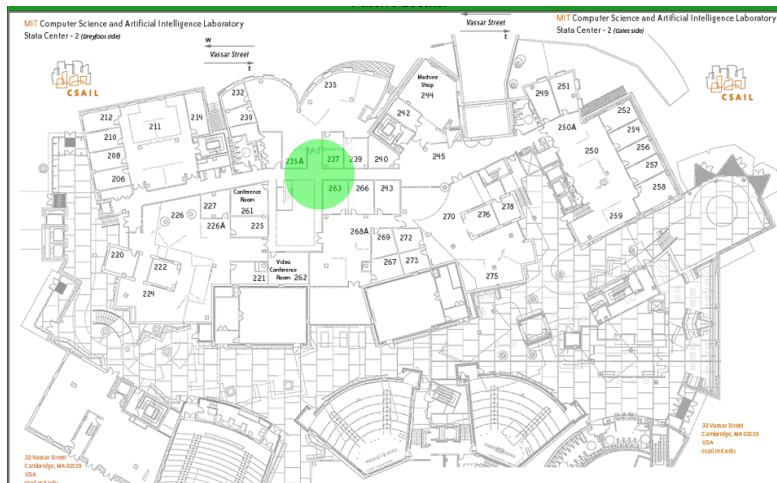
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# When hear BT dongle, update map loc



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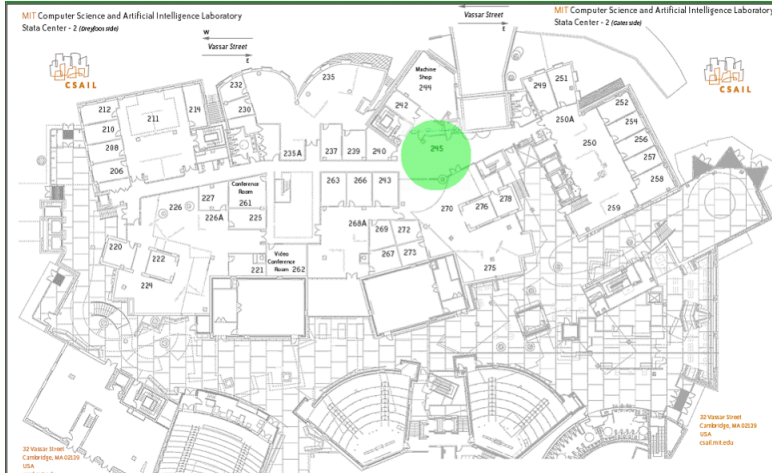
# When hear BT dongle, update map loc



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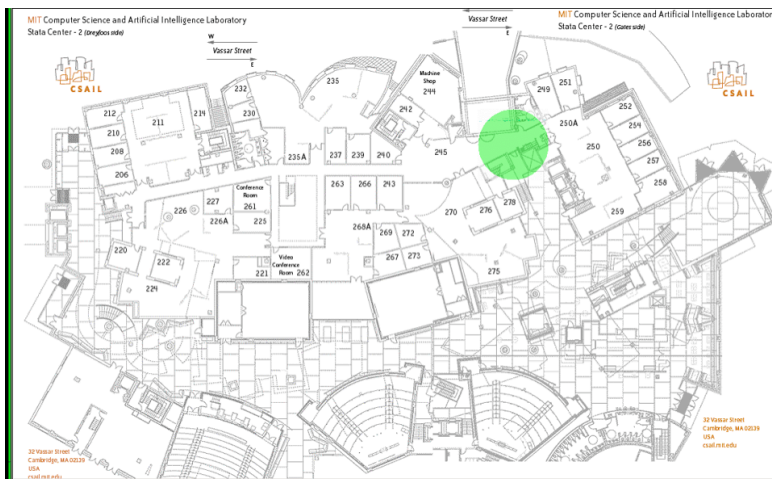


# When hear BT dongle, update map loc



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# When hear BT dongle, update map loc

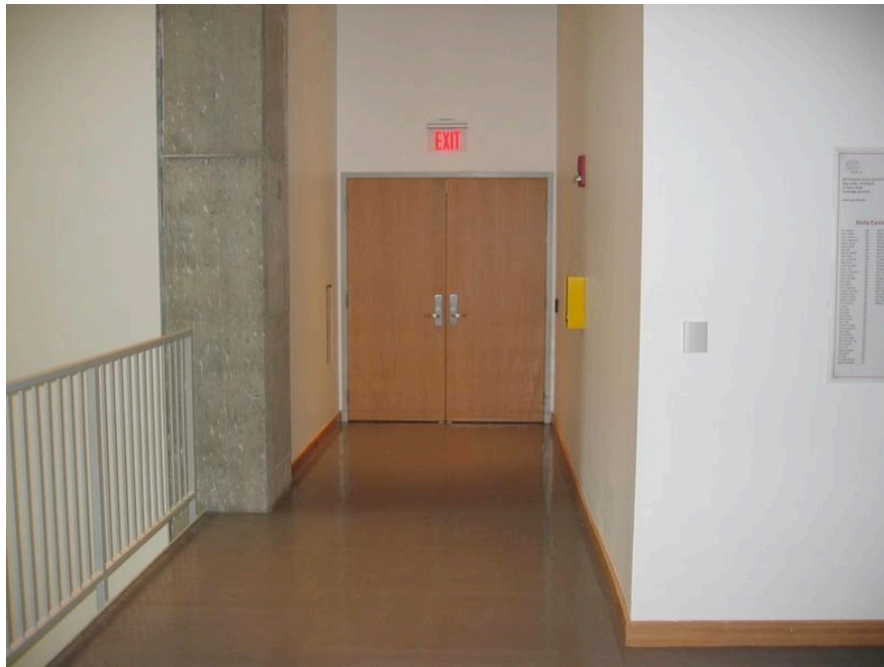


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# Some people cannot

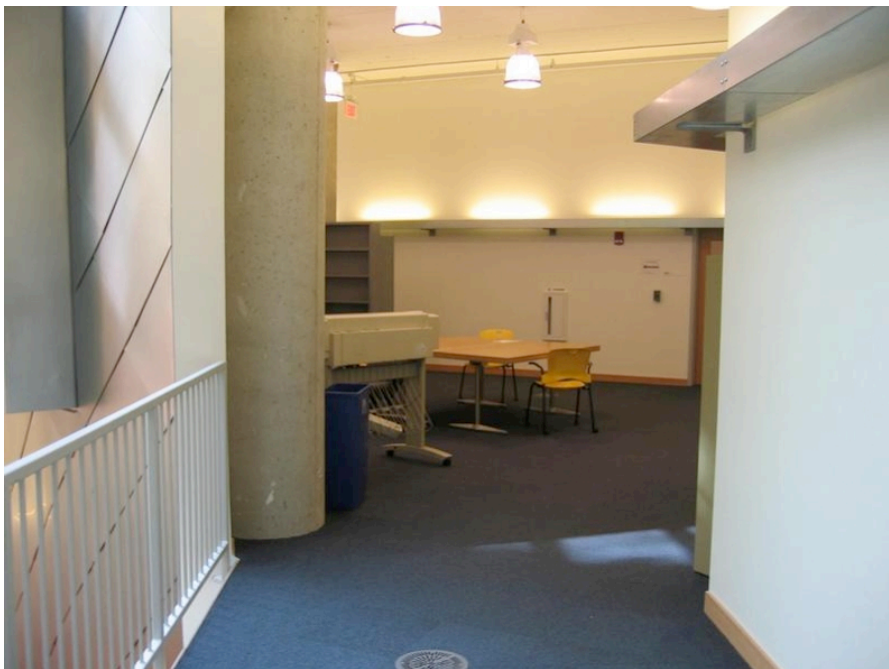
- A “human-centric” navigation guide
  - without sound
  - without abstraction
- Picture reality
  - use graph
  - at each junction node, record pictures of path
  - user looks for the reality that matches image







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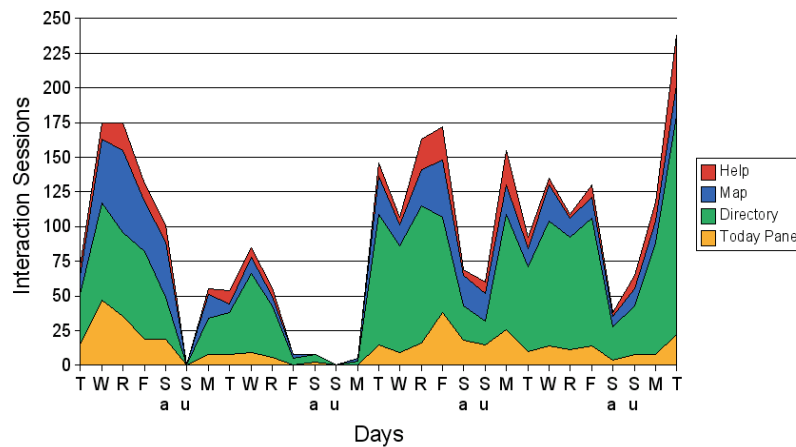
# Conclusion

- **Kiosks: new interaction model?**
  - are they just glorified web browsers?
  - interaction with hand-held devices
  - proximity provides simple, everyday protection



## One month of usage, even on weekends

Daily Pane Usage



# One day of usage,

