A Smarter Chair
Customizable Personal Environments

The Internet of Everyday Things CS194-IoET

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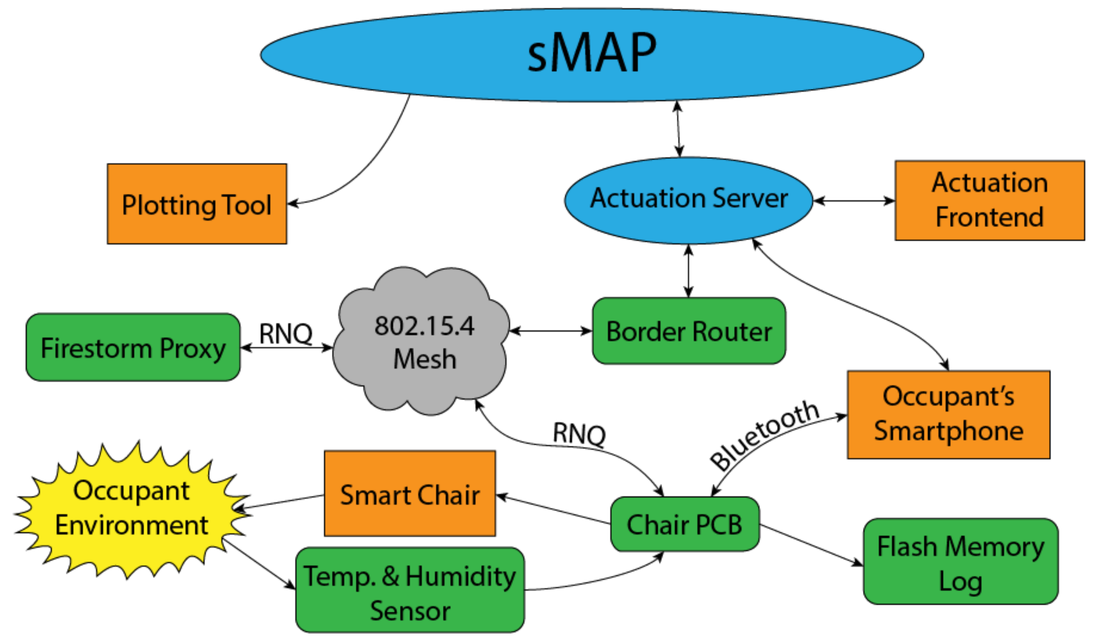
Goals

- Learn about user behavior with respect to thermal environments
  - Log this information server-side
  - Adjust building/personal environments to maximize energy savings
- Provide adjustable personal environments
  - Users can turn on fans and heaters on the chair from their own smartphones
  - Chair detects when it is occupied, and can actuate devices accordingly
  - When user leaves, chair remembers settings and restores them upon return

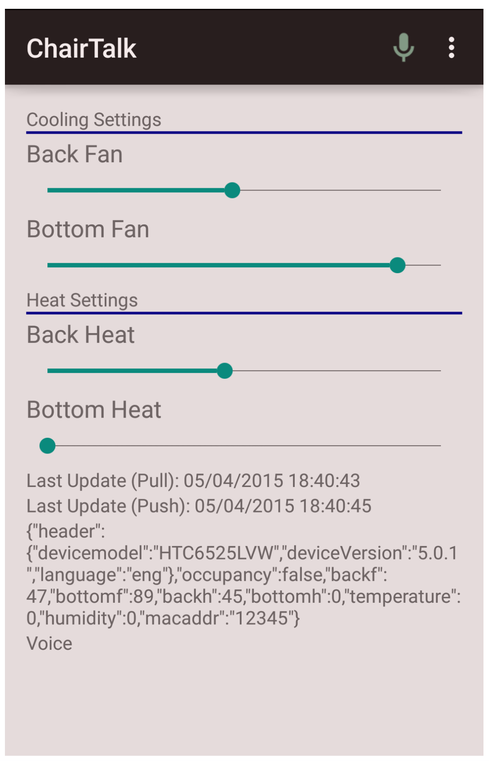
Architecture



Reliable Delivery, Communication and Logging

User Interaction

- Users control the chair via phone apps, which connect to the chair over both Bluetooth and Wifi
  - Both Android and iOS implementations
  - Webapp version too
- Intuitive slider elements for controlling chair
  - User can control fans and heaters on the back and bottom of the chair independently
- (Some) voice command functionality (Android only)
- Application can notify user of sitting in chair for extended periods of time to promote activity

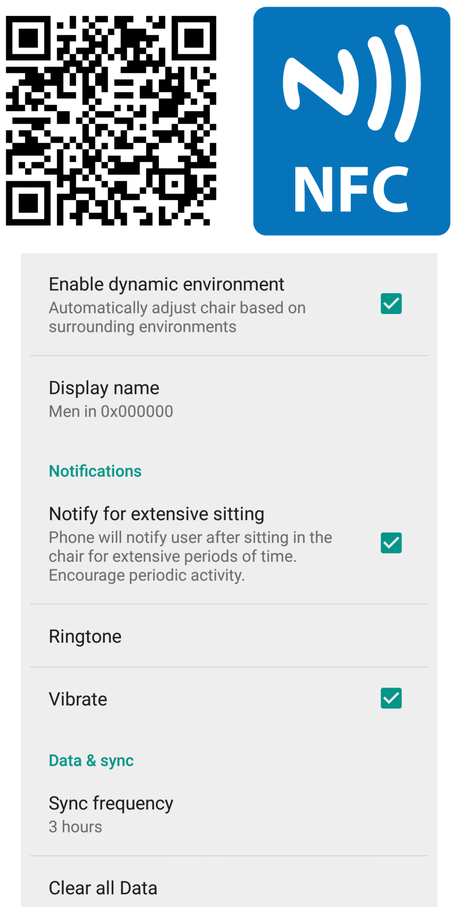


Data Flow

- State of chair environment (occupancy, fan setting, heater setting, temperature, humidity) is archived in sMAP
- Redundant data flow makes system robust to failure
  - Data can travel to sMAP via a Firestorm Proxy using a Reliable Network Queue
  - Data can travel to the user's smartphone, which will then relay that data to sMAP
  - All data is also logged in persistent storage (flash memory) local to the chair
- The chair can be actuated via the internet or via a user's smartphone
  - Redundant data flow also applies to actuation, so apps can connect to the chair over both Bluetooth and Wifi

Initialization/Setup

- User scans QR code or taps NFC tag (NFC on Android only)
- User reaches appropriate location for app download
- In app, user scans QR code or taps NFC tag
- App automatically configures chair communication over Bluetooth and communication with the server



Future Work

- Learn user preferences and adapt personal environments accordingly
- Algorithmically minimize energy usage through adjusting microclimates as well as building HVACs
- Use occupancy to set indicators to let others know if user is in office
- Track total sedentary activity and provide relevant health information
- Automatically set up desk equipment when user sits down (turning on computer, desk lamp, etc.)
- Integrate tightly with building, so building can minimize energy savings when it notices that no chairs are occupied by turning off heaters and lights