



A Smarter Chair Customizable Personal Environments

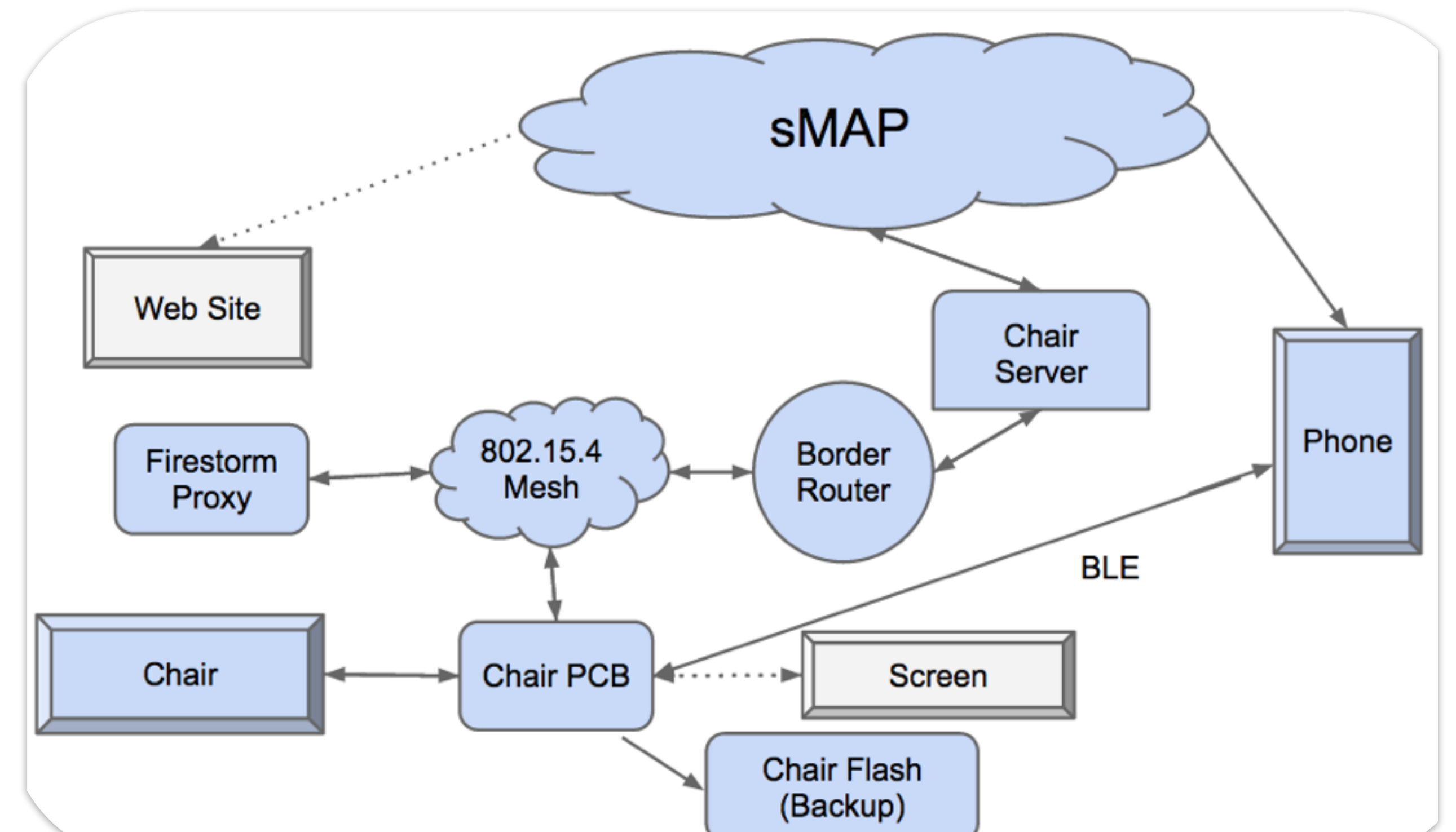


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Goals

- Learn about user behavior with respect to thermal environments
 - Log this information on 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 automatically shuts off heaters and fans when users are not in the chair
 - Chair remembers users' last settings and restores them upon return

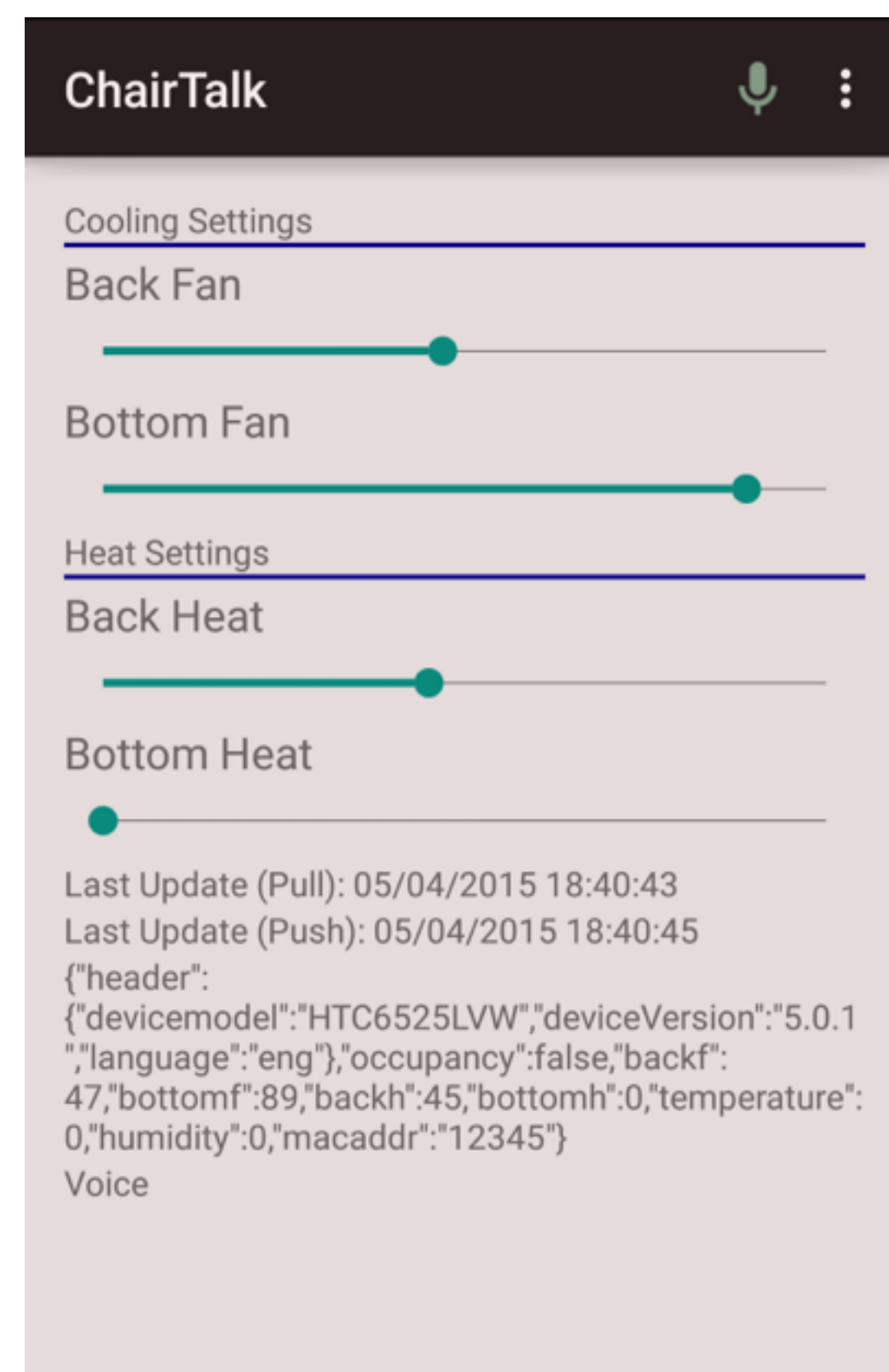
Architecture



Reliable Delivery, Communication and Logging

User Interaction

- Users control the chair via a phone app, which connects to the chair via both Bluetooth and Wifi
 - Both Android and iOS implementations
- 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 warns user of sitting in chair for an extended period of time

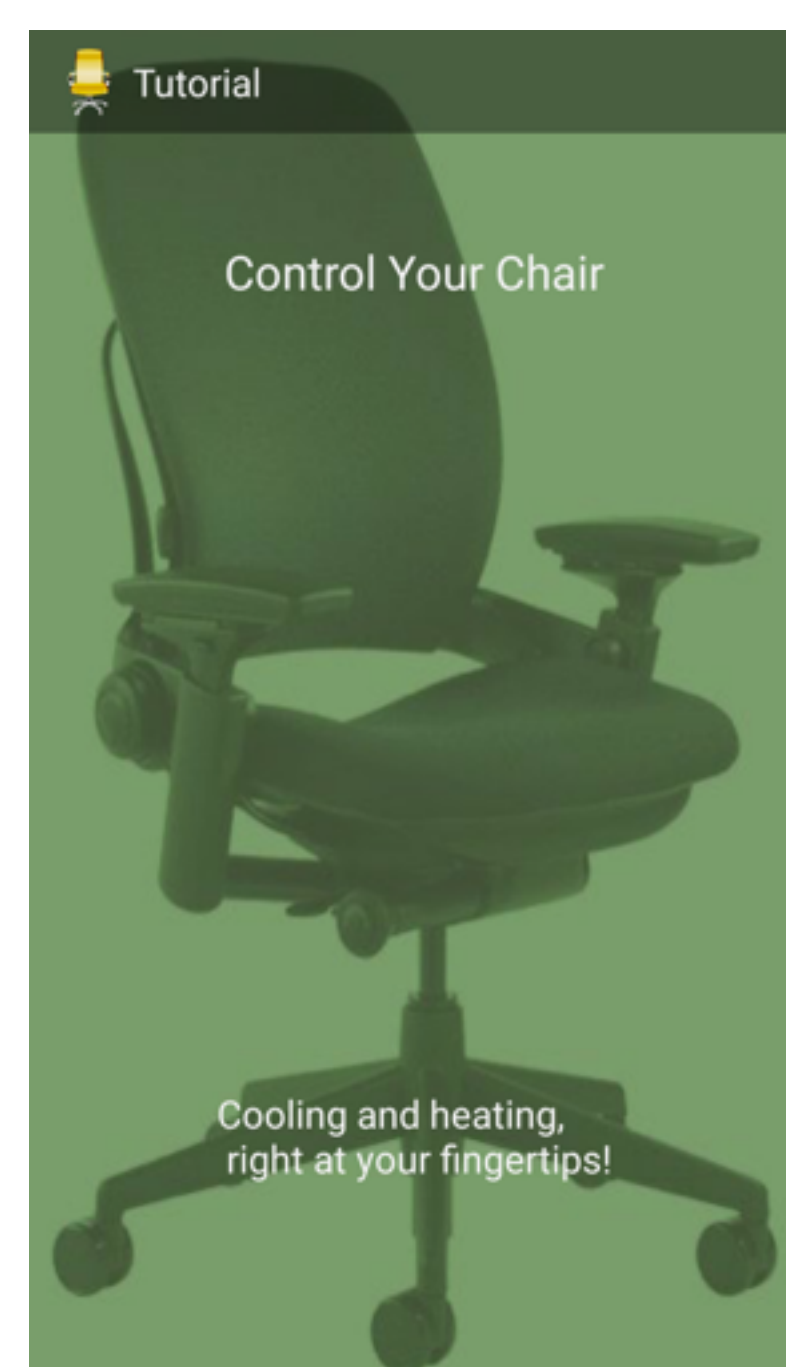


Data Flow

- Chair periodically logs current state (occupancy, fan state, heater state, temperature)
 - Chair stores this in flash (persistent storage) for recovery in case of failure
 - State in flash is flushed to remote servers
- Chair sends logged data to sMAP over 15.4 via a Firestorm Proxy implementing a reliable network queue
- Phone app also relays data should a link in the Wifi connection fail
- Phone app relays current time to chair for chair maintain timestamps for logging in flash storage

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 again 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