

# SureLock: Intention-based BLE Locking Scheme

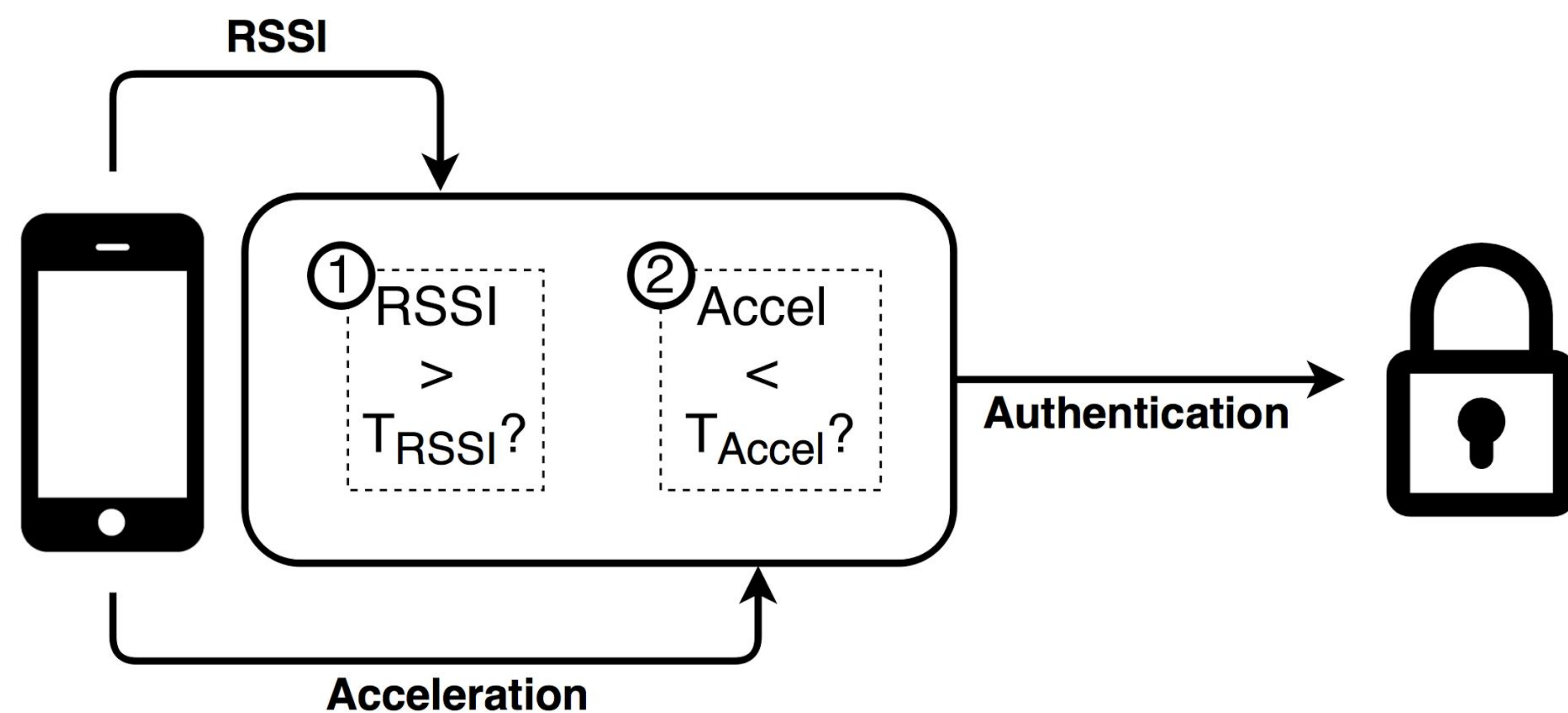


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*The vast majority of current door lock systems involve some sort of physical interaction with the lock. We developed a system using Bluetooth Smart 4.2 and a sensor model using acceleration magnitude and RSSI data to detect a user's intentions to unlock a door.*

## DEVELOPING A MODEL

- 1) RSSI used to detect when near a door
- 2) Acceleration magnitude used to detect when stopping

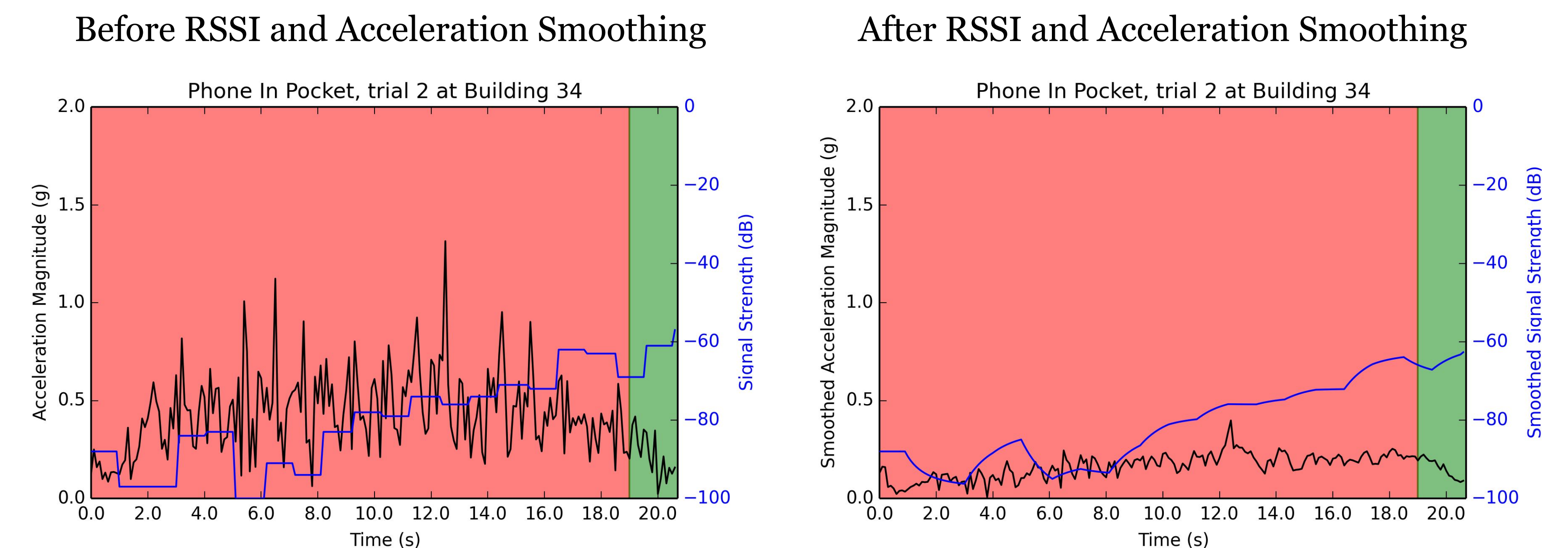


## REFINING AND EVALUATING MODEL

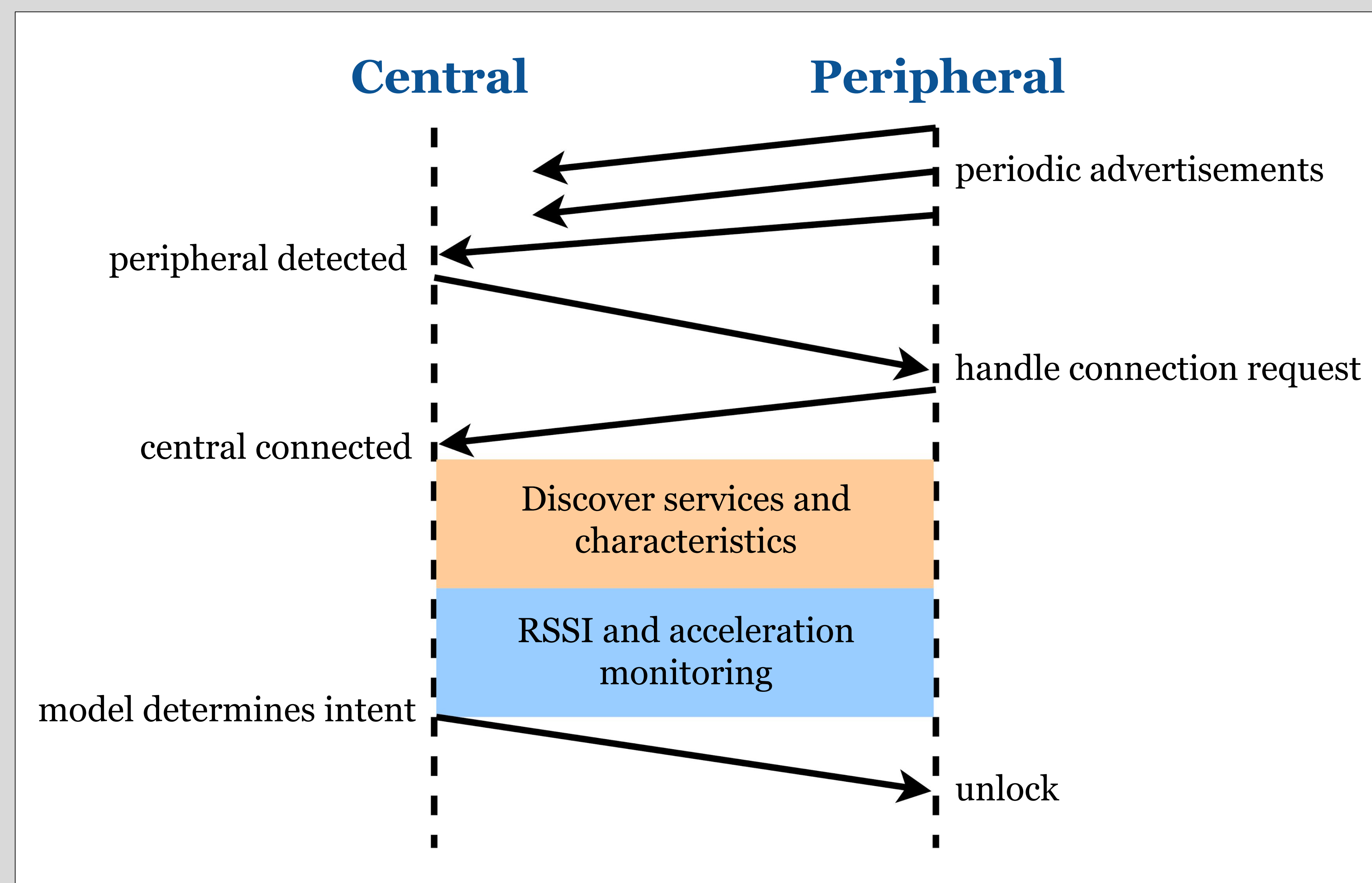
Noisy RSSI and acceleration data - spurious unlocks occurring

Apply EWMA with 2 second window

Reduced false positive rate from 11.1% to 0% over test runs



## SYSTEM ARCHITECTURE



## RELEARNING THRESHOLDS

$T_{RSSI}$  is dependent on **location**

- Environment
- Location/Orientation
- Traffic

### Peripheral Threshold Training

<b>True +</b>	Door unlocks and opens Reinforce current $T_{RSSI}$	<b>False +</b>	Door unlocks and remains closed Raise $T_{RSSI}$
<b>True -</b>	Door remains locked and doesn't open No retraining (difficult)	<b>False -</b>	Door remains locked and user requests open in app Lower $T_{RSSI}$