**CONTEXTUAL CO-PRESENCE DETECTION**

SECURING ZERO-INTERACTION AUTHENTICATION

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**Zero-Interaction Authentication**

In ZIA users do not need to do anything to authenticate (login) or de-authenticate (logout).

ZIA makes security easy to use.

BlueProximity++ [1]: open-source ZIA app to lock/unlock PC screen by detecting co-presence via Bluetooth RSSI

**Relay Attack**

When legitimate prover and verifier are far away from each other, attackers can relay messages to fool the verifier.

![Relay attack model for ZIA.](image)

**Contextual Co-Presence Detection**

![Diagram of co-presence detection](image)

ZIA enhanced with Contextual Co-Presence Detection (CCD) [2,3].

**Fusing Multiple Modalities**

![Diagram of sensor modalities](image)

Classification Performance

<table>
<thead>
<tr>
<th>Sensor Modalities</th>
<th>Classification Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>WiFi and other sensors</td>
<td>1.00</td>
</tr>
<tr>
<td>WiFi and Bluetooth</td>
<td>0.80</td>
</tr>
<tr>
<td>WiFi and GPS</td>
<td>0.60</td>
</tr>
<tr>
<td>Bluetooth and GPS</td>
<td>0.40</td>
</tr>
<tr>
<td>Bluetooth only</td>
<td>0.20</td>
</tr>
<tr>
<td>GPS only</td>
<td>0.00</td>
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</tbody>
</table>

Conclusions:
1. WiFi outperforms others.
2. Fusing modalities improves performance.

**Application: BlueProximity++**

![Application screenshot](image)

a) Adds co-presence detection via context comparison [3].  

b) Provides UI for user notification of authentication decisions and corrective feedback.

**User Study**

Comparing the two co-presence detection techniques:
- Bluetooth RSSI only
- Context Comparison + Bluetooth RSSI

Result: Z = 0.49, p = 0.63, No significant difference.

Conclusion: Adding CCD may not degrade the usability.

SUS score summary & distribution [3].

References:


![Image of ZIA user study](image)