Spidey Sense: Wrist-squeeze haptics is more appropriate than a vibrotactile baseline to Improve Awareness of Cybersecurity Warnings

Problem Statement and Goals

Improving end-users’ adherence to important cybersecurity warnings (e.g., when prompted to install a suspicious software) remains a large, outstanding challenge in usable security. With the increasing popularity of smartwatches, we hypothesize that wrist-based haptic feedback affords a promising path forward. To that end, in this project, we provide two concrete contributions: (i) we designed and implemented a novel smartwatch wristband, Spidey Sense, that can produce expressive and repeatable squeezing sensations; (ii) through a series of three initial user studies, with 48 participants in aggregate, we explored the design space of squeezing patterns to attract people’s attention to cybersecurity threats, settling on one particularly effective pattern.

Approach

In evaluating Spidey Sense, we had two high-level objectives: first, to find an effective squeezing pattern, producible by Spidey Sense, to alert users to potential in-the-moment cybersecurity threats; and, second, to comparatively evaluate the effectiveness of Spidey Sense at alerting users to in-the-moment cybersecurity threats vis-a-vis vibrotactile feedback. To explore the design space of squeeze notifications and converge on one that is empirically effective for critical cybersecurity warnings, we introduce a study methodology – “Find-Rank-Verify” - adapted from the “Find-Fix-Verify” methodology that was introduced by and utilized in prior work in HCI and haptics.

Results

- Method: We utilized the “Find-Rank-Verify” methodology to find an optimal wrist-squeeze notification.
- Result: We empirically showed to be more appropriate for our target scenarios than a vibrotactile baseline.
- Future work: (1) In-lab study to evaluate the effectiveness of Spidey Sense compared to vibrotactile feedback in terms of alerting users to potential in-the-moment security threats (2) In-the-wild study to evaluate the effectiveness of Spidey Sense in the real use cases
- Acknowledgement: We thank Georgia Tech GVU Prototyping Lab to support all the equipment to implement the Spidey Sense device.
- References:
  3. Etc.

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