Toward safe, private, and secure home automation: from formal modeling to user evaluation

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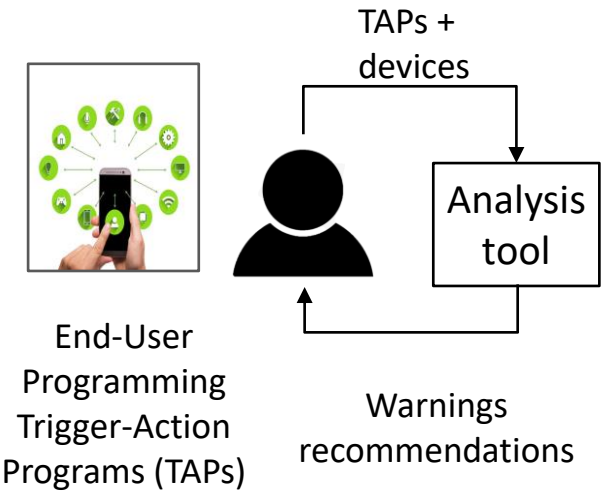
Challenge:

- Platforms and applications that connect these devices and online services (e.g., IFTTT, Zapier) raise security and privacy concerns.
- Existing work is often too coarse-grained to capture the context in which these devices are used.
- Risks and harms to people that are not device owners (e.g., roommates, guests, children) are not well-studied.



Scientific Impact:

- The detailed models and characterizations of risks and harms from home automation platforms will help fill the gap between what existing models and tools can do and users' actual needs.
- Results from our user studies can provide guidance to how to build usable tools and display meaningful warnings to help users understand their TAP systems and stay out of harm's way.
- Results will yield deeper understanding of home automation's impact on users, including incidental users and children, and contribute to reducing risks to these groups.

Solution:

- Build detailed, context-rich models and characterizations of risks and harms customized to individual user's perspective.
- Build usable, context-aware, configurable analyses to calculate attackers' precise knowledge of and influence over the system.
- Design warnings and nudges to help users understand their configurations and avoid potential harm.
- Leverage user studies to identify user needs and to evaluate proposed models and formal analysis tools.

Broader Impact and Broader Participation:

- The proposed work will have substantial impact on raising awareness among users of home automation platforms.
- Results will be broadly disseminated through conference publications, opensource software research artifacts, and a website to access our tools via web-based interfaces.
- Undergraduate and graduate researchers are recruited to participate in designing user studies and building analysis tools.

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