

CAREER: Towards a Secure and Reliable Internet of Things through Automated Model Extraction and Analysis

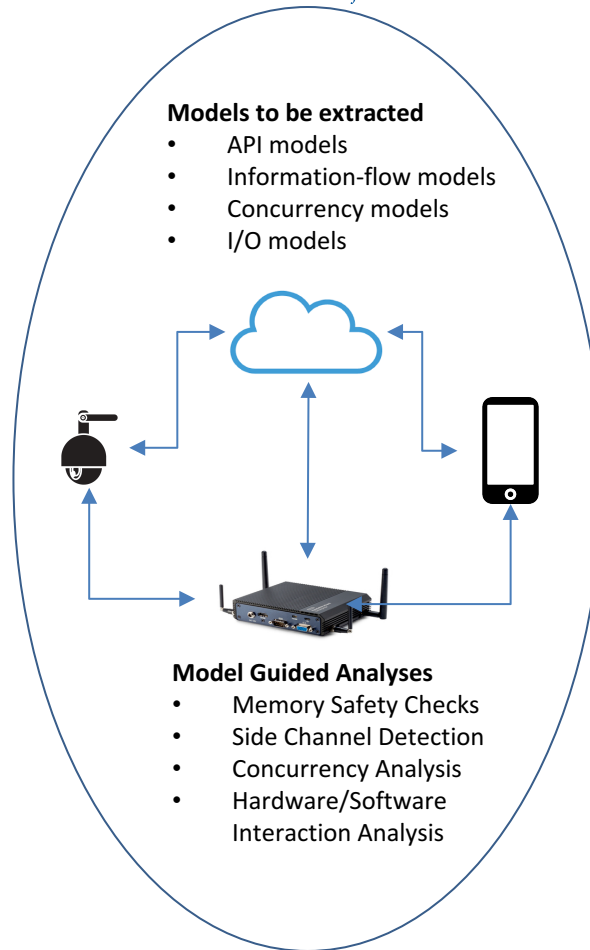
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Challenge:

- Analyzing system code is challenging due to the complexity of the environment and the Application Programming Interfaces (APIs)
- IoT has a wide attack surface

Solution:

- *Automatically extracting various types of models to guide IoT security and privacy analysis*
- ENCIDER: API information-flow model guided side channel analysis (TDSC'22)
- IFLOW: API misuse detection using control-flow sanitization in static taint tracking (CODASPY'22)
- SIFT: Property directed concurrency analysis (ICST'22)
- PROMPT: API model guided component-level analysis (JASE'21)



Scientific Impact:

- More scalable and precise IoT system security and privacy analysis
- More effective assessment of the IoT attack surface
- Science of Secure API Design

Broader Impact and Broader Participation:

- More reliable and secure IoT systems
- Open-sourced the analysis tools, <https://github.com/sysrel>
- Automated Hardware/Software Verification and Advanced Systems Programming courses for growing a workforce that can design and develop secure and reliable systems
- Found vulnerabilities in real-world code including mbedTLS (CVE-2020-16150) and Intel IPP (CVE-2021-0001)

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