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Challenge

Address **assurance** for self-adaptive cyber-physical systems at design-time and run-time in the face of uncertainty via **oracle verification and adaptation**

Solution

- Introduce **adaptation** into software artifacts
- Enable **continuous** verification and validation
- Optimize **functional** and **non-functional** objectives

SmartHome

- Provide a **real-world testbed** for experimentation using heterogeneous devices
- Intended for early-stage Alzheimer's patients, caregivers, and family members
- Modeled as a self-adaptive system
- Enables study of **adaptive requirements traceability, non-functional objective quantification, and power/security/safety optimization**

Publications

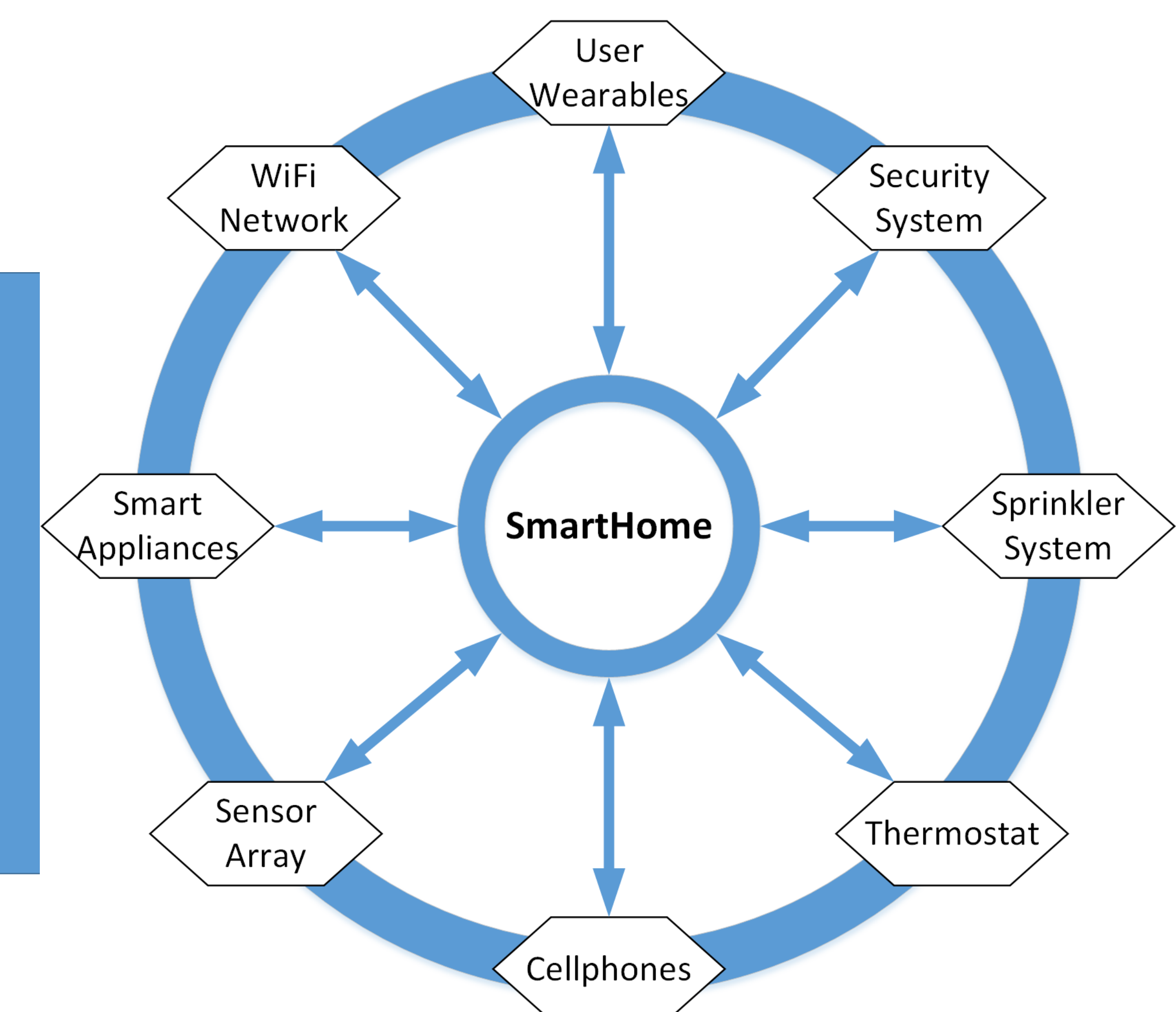
- Albouq, Sami S., and Fredericks, Erik M. "Securing Communication Between Service Providers and Road Side Units in a Connected Vehicle Infrastructure." NCA 2017.
- Albouq, Sami S. and Fredericks, Erik M. "Detection and Avoidance of Wormhole Attacks in Connected Vehicles". DIVANet 2017 (*Best paper nomination*).

Self-Adaptive Systems

- Enable a system to **self-reconfigure** at run time to manage encountered obstacles
- Extend to reconfigure V&V artifacts **online**

Scientific Impact

Mitigation of uncertainty and enhancement of user trust at design time and run time



Broader Impacts

- Adaptive V&V can be applied to many domains
- Disseminate knowledge via graduate coursework (CSCI5900) and K-12 summer camps
 - SmartHome materials will be released via GitHub and CPS-VO