

Smart Homes

Session Co-Chairs: Stephen Intille, Northeastern University, and Olivier Hersent, Actility SA

The so-called “smart home” has been a recurring theme for over 50 years in science fiction books, movies, television shows, and popular press articles. Visions of the smart home have ranged from robots that handle our every need, to interactive lighting systems that save energy, to homes that help us stay safe and healthy. Will smart homes will take over the mundane chores of day-to-day life and allow people to spend time at home engaged in more leisure activities, as some writers have proposed? Could homes that understand what we are doing in them reduce our energy conservation, improve our health and safety, and increase our overall quality of life?

Recent developments in miniature sensors, wireless sensors, and mobile computing create new opportunities to instrument homes with systems that understand human behavior and use that information and mobile and ubiquitous computing to support meaningful improvements in everyday life. Engineers finally have the tools they need to seriously explore the utility of the smart home and experiment with new applications and services. In this session, four speakers will describe emerging smart home technologies and provide their perspectives on how these technologies could transform our homes from passive living spaces to interactive, supportive environments.

The speakers will discuss three key requirements to creating a “smart” home: sensing, inference, and meaningful applications. Homes and environments must have sufficiently rich sensing so that they can determine the behavior of the occupants and react accordingly. Strategies for embedding sensing within the home’s infrastructure are now making it possible to gather data that could support smart home interventions in practical, unobtrusive ways. Additionally, advances in wireless sensing and protocols will enable an “internet of things,” where tens or hundreds of objects in and outside of the home may be able to gather and share data with other sensing devices using low power radio communication. As a result, as people live in their spaces, pattern recognition algorithms can interpret the sensor data to infer information on the behavior of the home occupants. These inferences can then be used by computing systems to help people meaningfully improve their everyday lives and transform homes and communities into more helpful or efficient places. Domains where advances in such technologies may be particularly impactful will be discussed, such as supporting healthy aging using smart home technologies or lowering a person’s carbon footprint using smart grids and distributed control of energy-generation and storage devices.

Speakers:

Nicolas Sornin: Towards Ubiquitous Connected Objects that also Connect Outside the Home

Shwetak Patel: New Approaches to Sensing in the Home

Aaron Crandall: Smart Environment Technologies for Gerontology and Caregiver Decision Support

Mihai Petcu: Contributing to a Carbon-Free Economy with Smarter Homes