

Nighttime Kitchen Activity Detection

Why it matters: While many individuals remain active during nighttime hours, for older adults, nighttime activity could represent cognitive or safety issues. Nighttime cooking, in particular, may constitute a rising risk of injury or fire. Unfortunately, caregivers – both formal and informal – are often unaware of older adults’ nighttime activity until an incident occurs. Detection of nighttime activity – especially kitchen activity – allows for early intervention that addresses safety risks and supports older adults’ independence.

Background: The Sovrinti system utilizes high temporal, spatial, and device use change detection to autonomously identify and quantify activities of specific individuals in a private residence or senior living facility. The examples shown are from an ongoing (2022-2023) pilot program with a large home care provider where the Sovrinti system is installed in the homes of clients. Goals of the pilot include understanding the value added by the system and how best to integrate it into the home care provider’s workflow. The examples below represent around 3 months of event data from a female client residing alone in a one-bedroom, one-bathroom apartment. The client receives 19 hours per week of assistance from a professional caregiver.

Example Data: Figure 1 shows kitchen event data from 1/25/23 to 4/24/23, with each ring of data representing one day on the face of a 24-hour clock. Inner rings reflect earlier dates progressing to the outermost ring, 4/24/23. As seen by the density of data points between the two blue lines representing 11:30pm and 5am, the client is often active in the kitchen at night, opening the refrigerator/freezer/drawers, turning on the stovetop/oven, and using the microwave. Figure 2 shows only range (stovetop and oven) events. Nearly one quarter (23.6%) of the client’s range usages occur at night when the caregiver is absent, with each event lasting 12.7 minutes, on average.

Figure 3 offers a different representation of the client’s nighttime kitchen activity. This figure depicts total counts of kitchen events grouped on a weekly basis by hour of the day. Here, we clearly see a greater amount of nighttime (specifically, at 2am) kitchen activity the week of April 5, 2023. This could prompt a caregiver to investigate possible explanations for the increase in activity. Did the client have more trouble sleeping or report feeling restless that week? Does the client feel they are not getting enough to eat during the day? Has the client been more active, leading to a boost in appetite? Has the client been more confused recently?

Summary: In these examples, an individualized nighttime kitchen activity pattern is identified for an older adult female client receiving 19 hours of caregiving per week. Event detection data reflects consistent nighttime kitchen activity throughout the course of the client’s participation in the pilot program. This pattern provides relevant information for care providers to address potential health and safety issues, thereby supporting the client’s aging in place.

For Further Analysis: Corresponding ambient light, hot water heater, appliance wattage, and real time location data is available for greater insight into nighttime kitchen activity. Additional analysis might compare the frequency with which the client engages in nighttime food preparation involving cooking (i.e., range or microwave usage) versus nighttime food preparation not involving cooking (i.e., refrigerator, cabinet, utensil drawer openings with no

range or microwave usage). Meanwhile, a more contextual analysis might explore events surrounding the nighttime kitchen activity, such as television, toilet, or lamp events.

Figure 1
All Kitchen Events

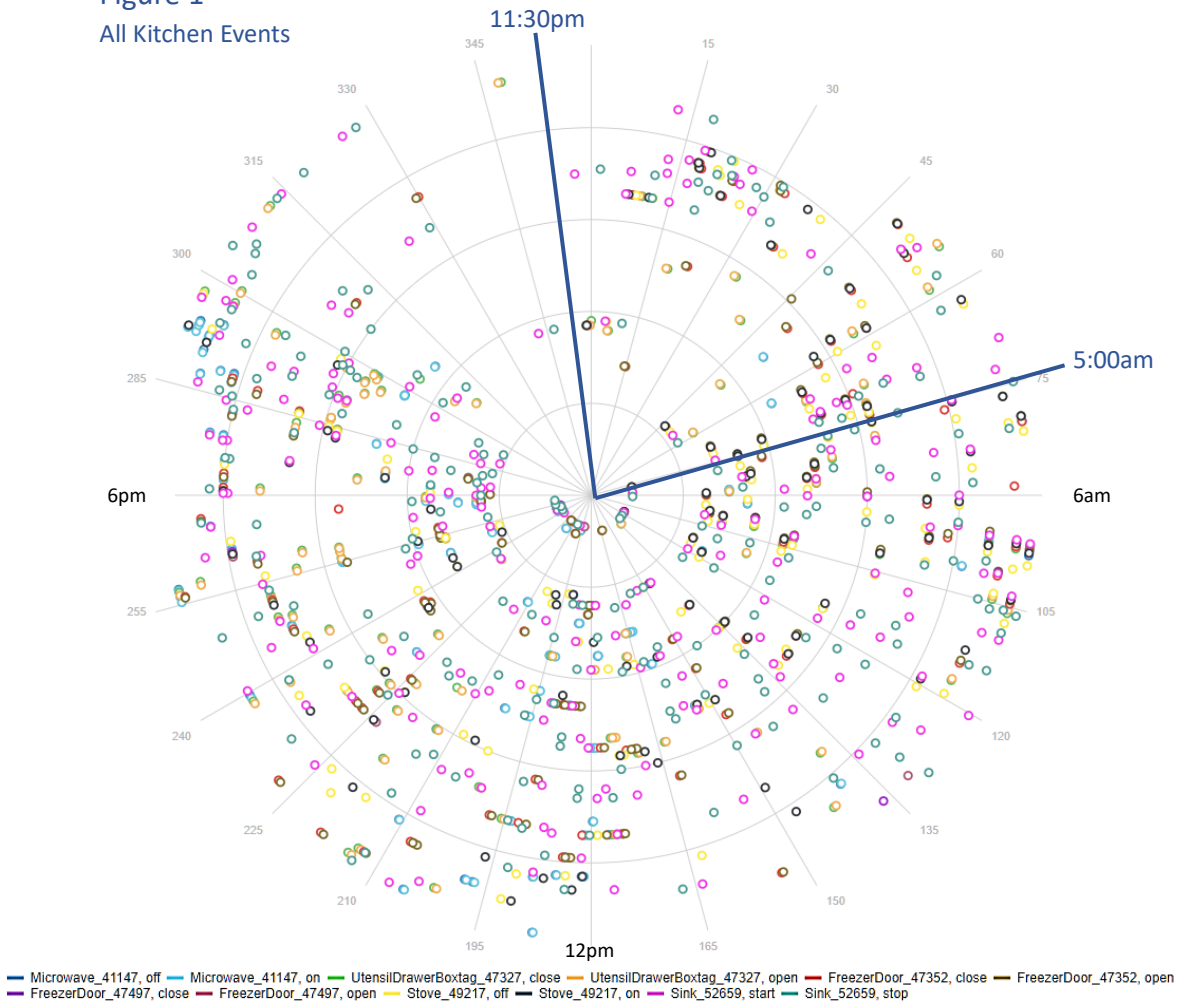


Figure 2
Range Events

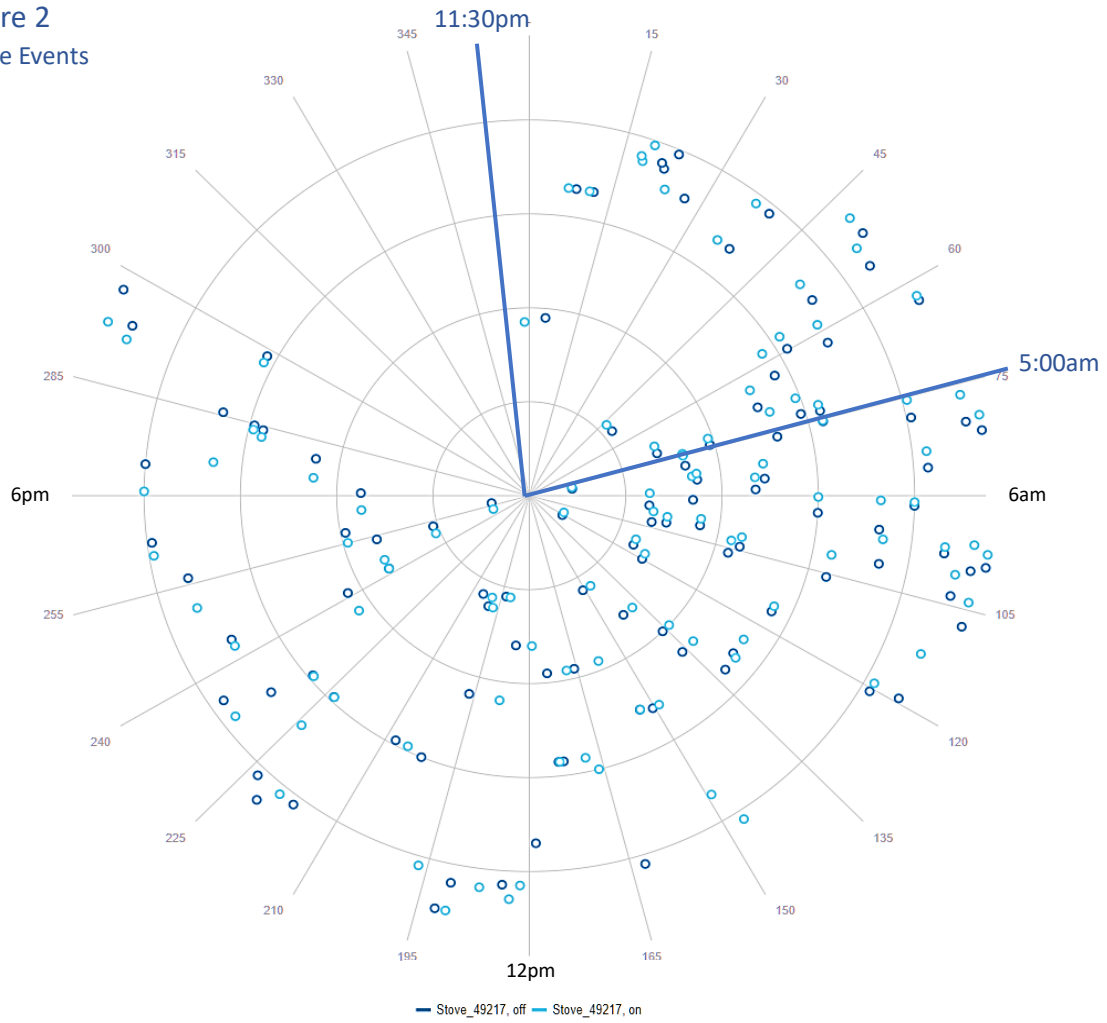


Figure 3
Kitchen Events
(weekly totals)

