

Elderly Medication Adherence Monitoring with IoT

SHINESeniors aims to improve the well-being of senior Singaporeans and enable them to age-in-place, through sensor-enabled homes that provide various ADL monitoring – such as medication adherence.

Prevalence of age-related chronic illnesses among elderly

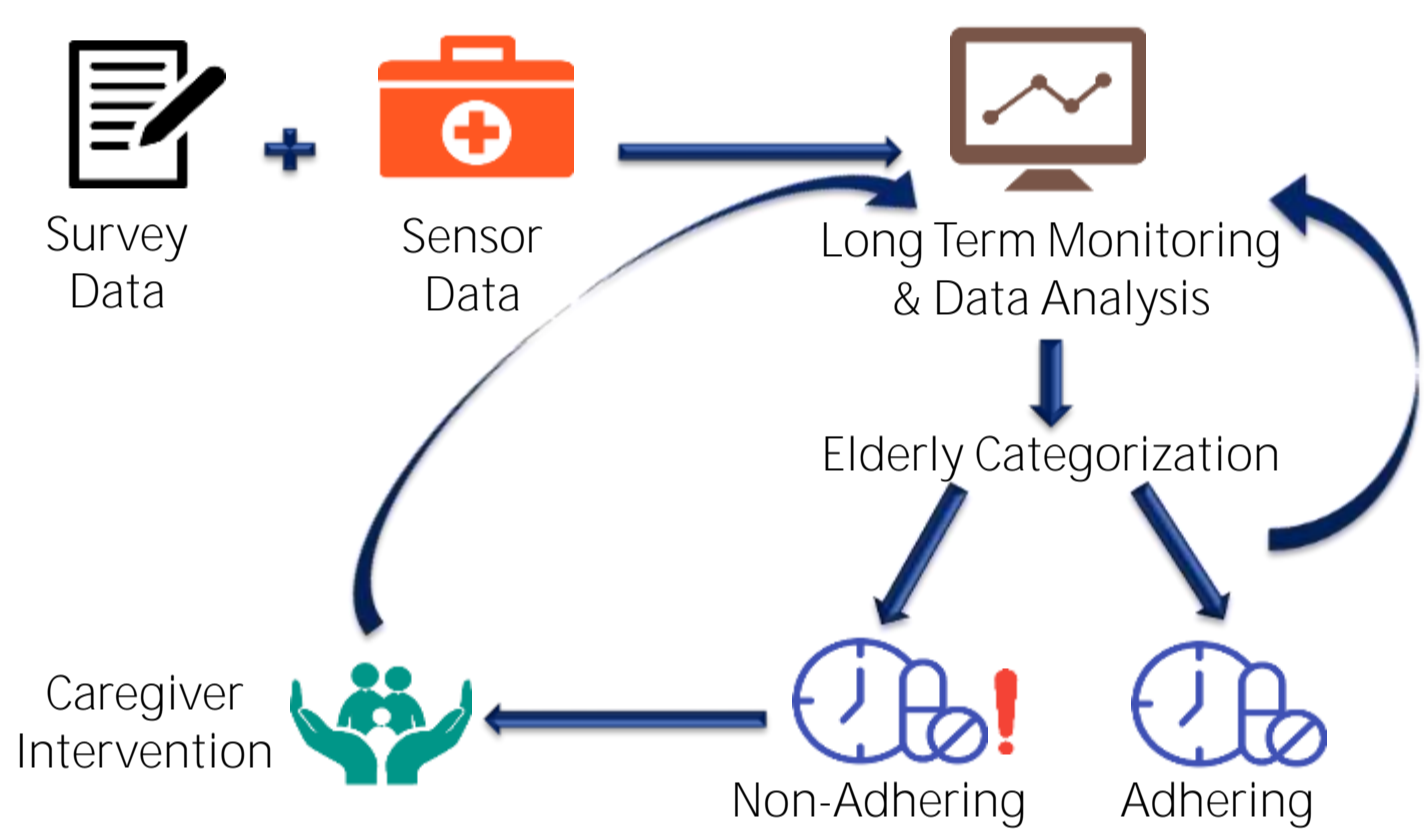
Medication non-adherence leads to adverse health complications

Existing solutions are inflexible, expensive and not widely adopted by elderly

Sensors monitor medication adherence, allowing for personalized caregiver intervention

Data analytics detect anomalies or changes in elderly's medication consumption over time

Medication Adherence Care Model



Sensor-Enabled Medication Boxes

- 10 elderly participants deployed since Jul 2015
- 69 to 81 years old
- 4 to 10 medication types
- 3 to 8 chronic illnesses

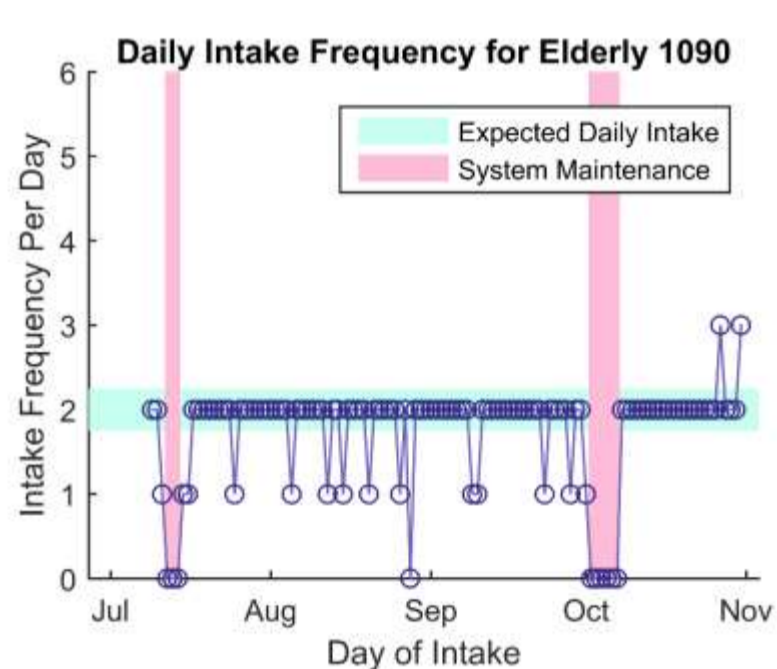


Customizable medication box configurations

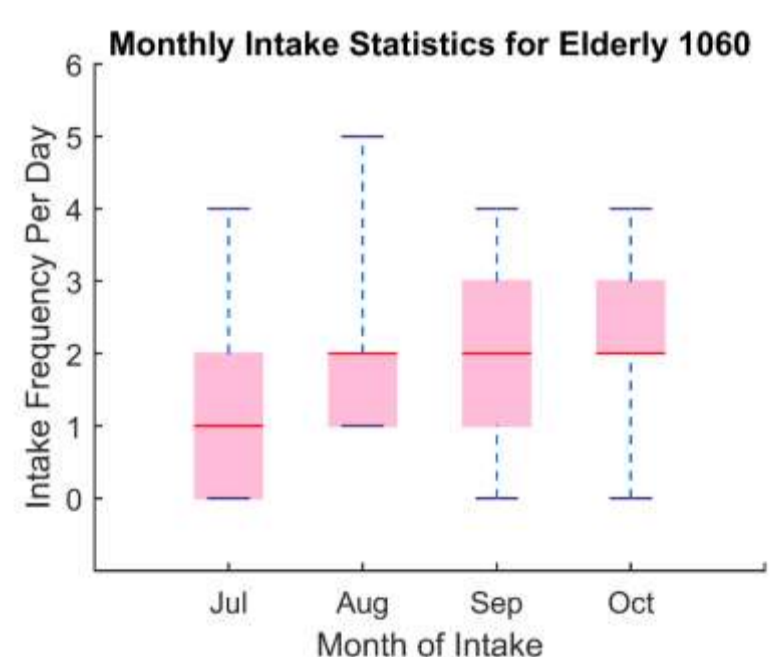
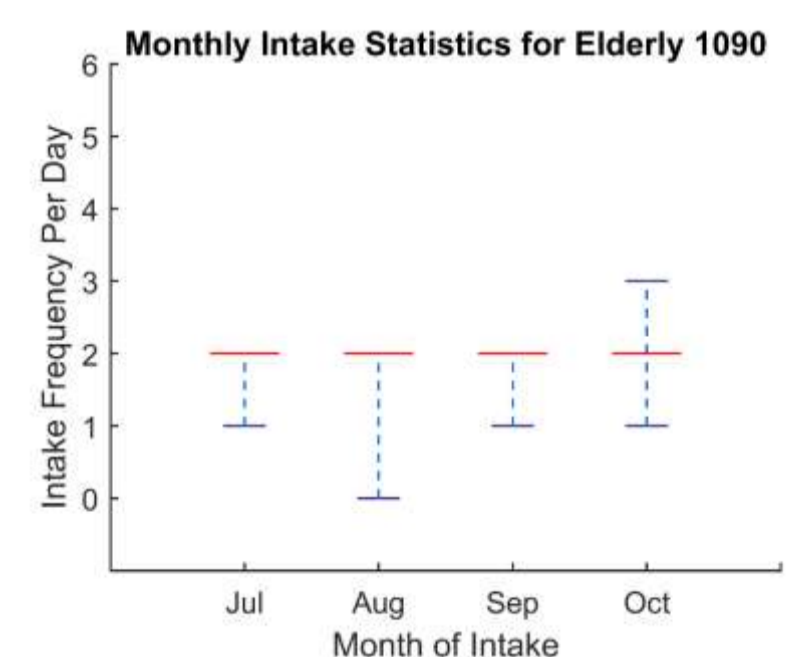
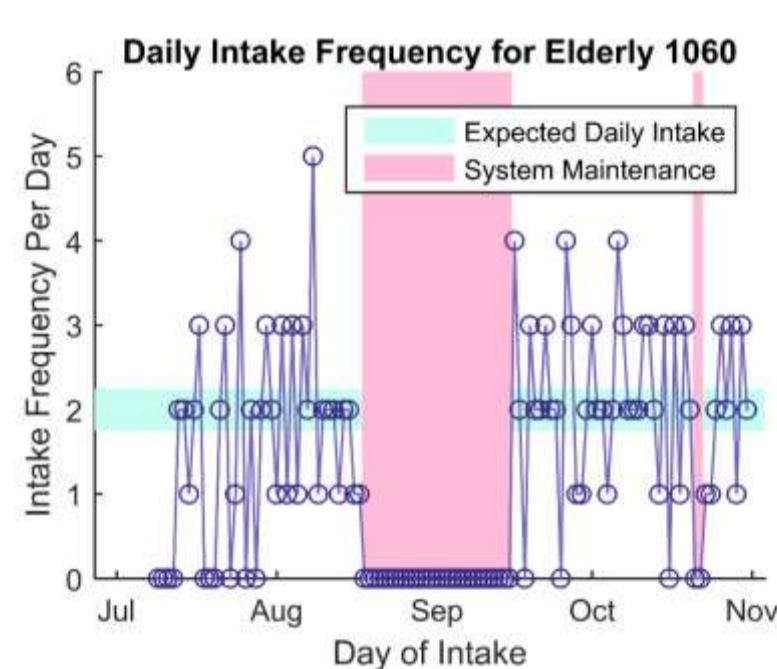
Preliminary Findings

1 Monthly-based aggregate statistics on medication intake frequency are sufficient to classify elderly into two categories.

medication adhering

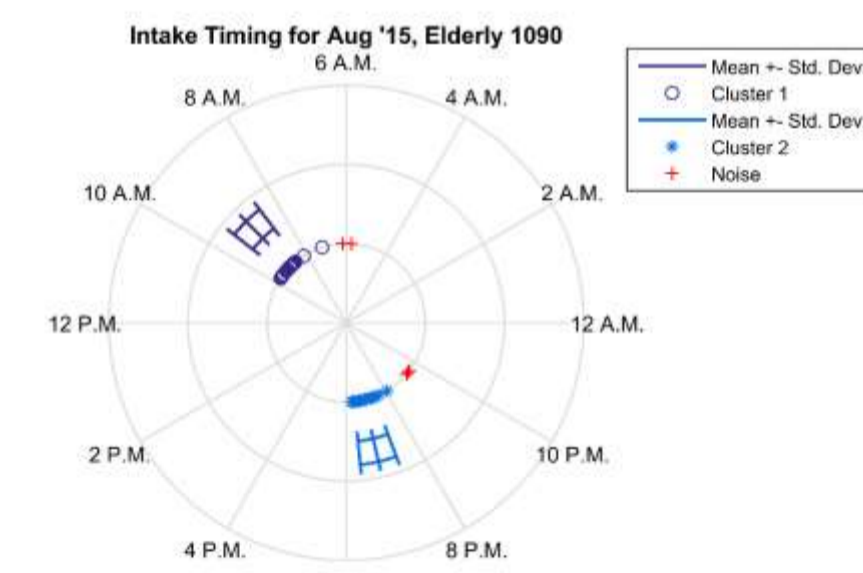


medication non-adhering

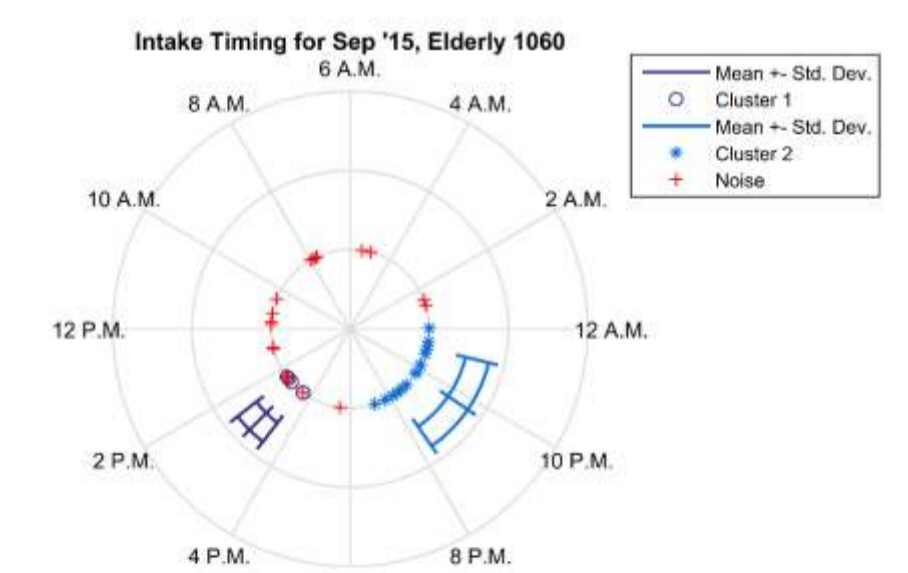
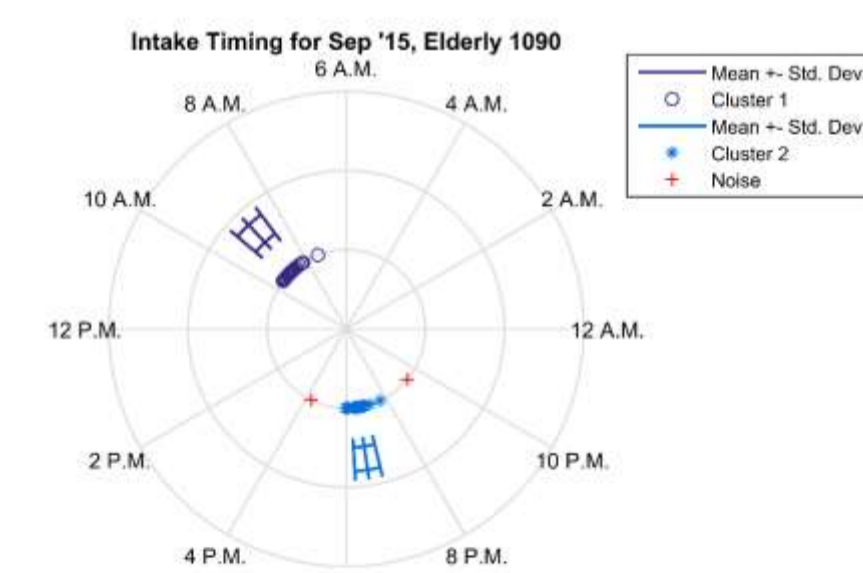
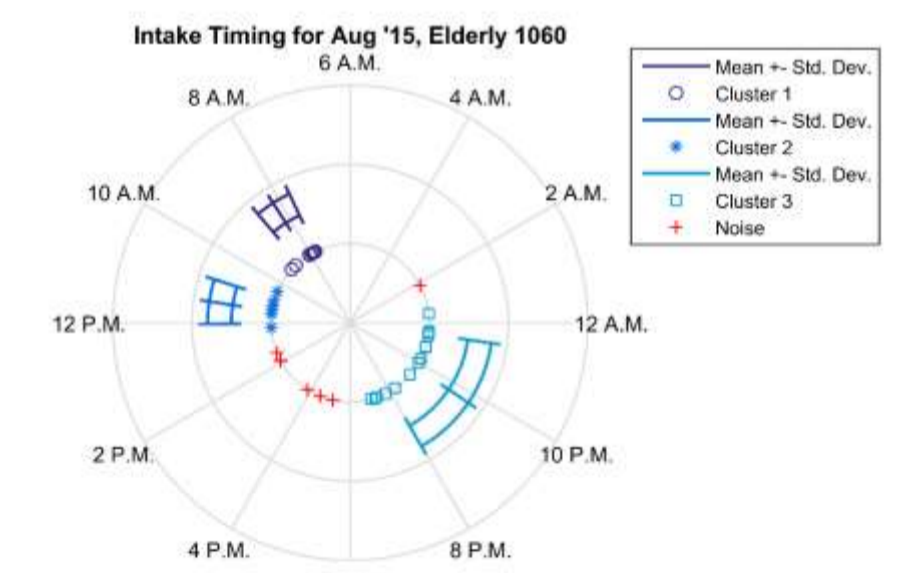


2 Density-Based Spatial Clustering of Applications with Noise (DBSCAN) with parameters: (i) $\epsilon = 1 \text{ hr}$; and (ii) $\text{minPts} = 5$, can accurately cluster monthly medication intake timings.

medication adhering



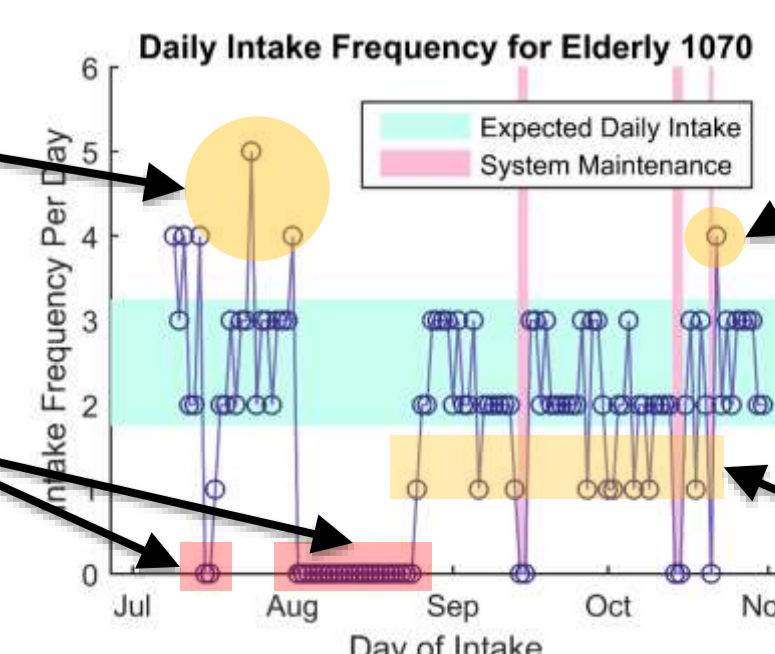
medication non-adhering



3 Sensor data and conversations between elderly and caregivers are required to draw meaningful insights on elderly's medication habits, for appropriate intervention.

higher intake before hospitalization

hospitalization



reported not feeling well

away from home for more than 10 hrs (usually on Sun)

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