

Using AI for Fall Prevention Among Older Adults with Cognitive Impairment

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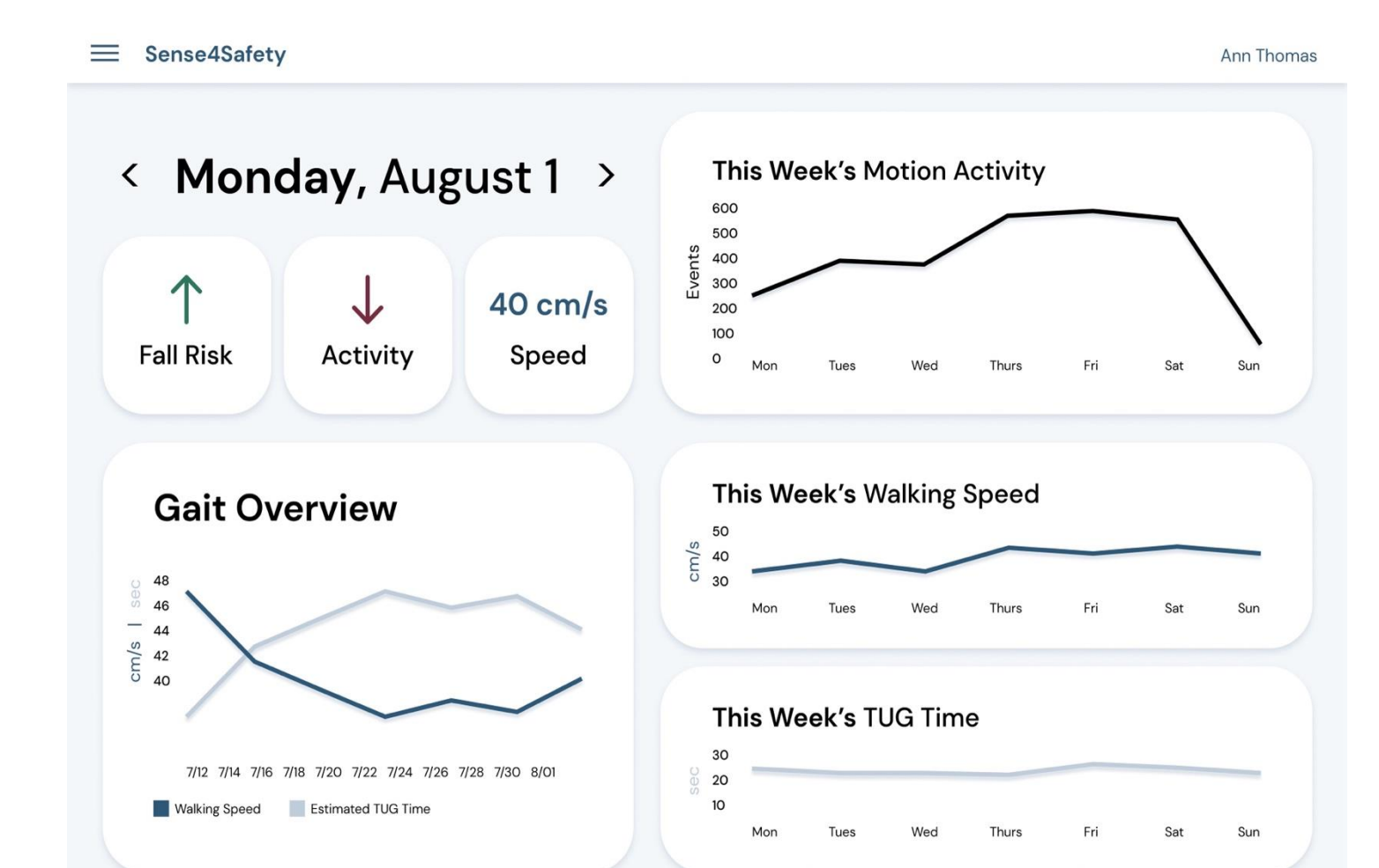
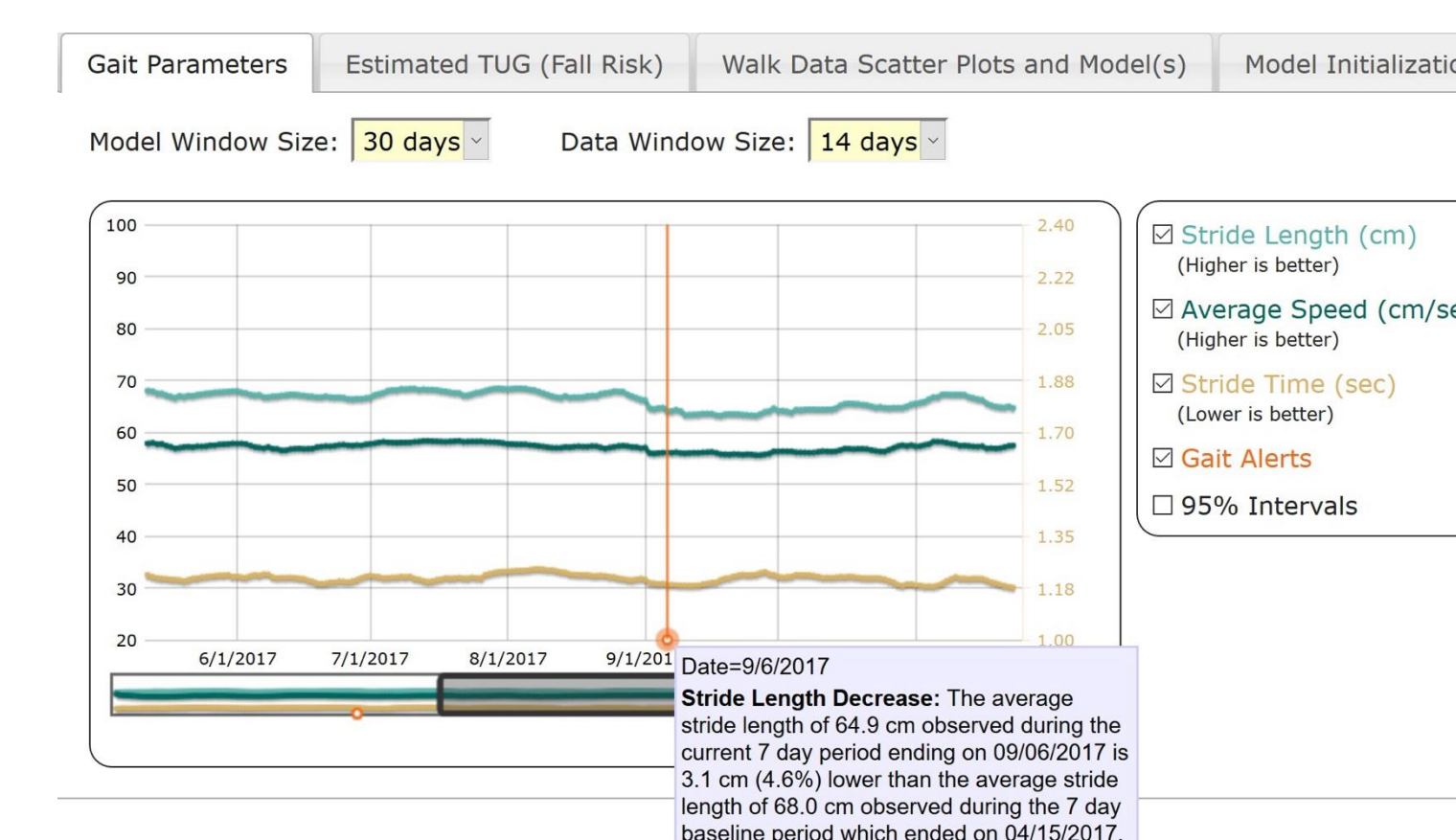
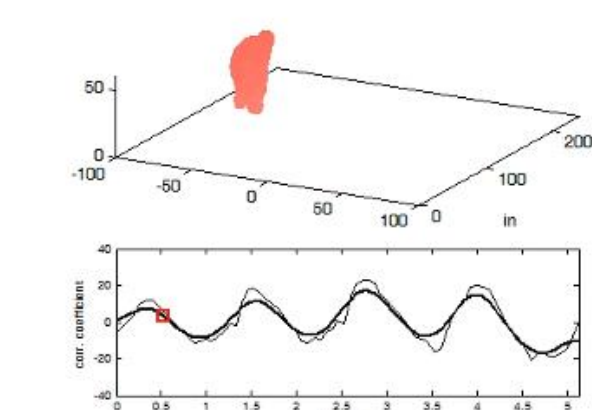
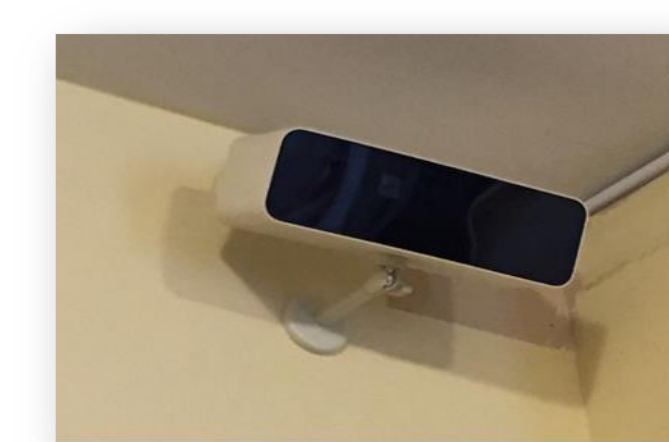
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Background: Falls and fall-related injuries are significant public health issues for older adults, including those with cognitive impairment. The goal of this study was to determine how AI-enabled assessment using in-home sensor-derived changes in functional mobility and gait compares to performance-based clinical assessment in older adults with cognitive impairment.

Methods: We recruited community dwelling older adults over 65 years of age who resided in retirement communities and other senior living communities who met mild cognitive impairment (MCI) criteria. For each participant, a depth sensor was installed in their residence recording in-home movement over the period of a year. Data were processed as depth images that appear as silhouettes. Artificial Intelligence (AI) algorithms using machine learning automatically identified, segmented, and analyzed walking segments within sensor range for gait speed, stride length, and height of the individual walking. We captured the Timed Up and Go Mobility Assessment score (TUG), gait speed, stride length, and stride time both as calculated by the AI system continuously and by a clinical expert at baseline, 3, 6, 9 and 12 months.

Results: Seventy five older adults with MCI enrolled in the study. The correlation between AI-based and performance-based TUG was strong and positive ($r = 0.636$, 95% CI: [0.383, 0.871]). A moderate positive correlation between stride time and clinically assessed TUG was observed ($r = 0.448$, 95% CI: [0.22, 0.75]).

Conclusion: Our study highlights that *use of AI to facilitate home monitoring can capture clinically meaningful indicators of functional mobility among older adults with cognitive impairment. As slowed gait speed and altered stride variability precede cognitive decline and heightened fall risk, a continuous in-home assessment can facilitate proactive interventions.*



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