

G. ALEXANDER, C. GALAMBOS, M. SKUBIC, S. WANG. *Density map visualization as a tool to monitor activity levels of older adults. Gerontechnology 2010;9(2):186;*

doi:10.4017/gt.2010.09.02.287.00 **Purpose** This paper examines the use of a specific in-home monitoring system to enhance aging-in-place. Functional declines often herald episodes of acute illness or exacerbation of chronic illness<sup>1</sup>. Delay in recognizing such events leads to delayed treatment, delayed recovery, and a higher risk of morbidity and mortality<sup>2</sup>. The key to continued function and independence is to identify health problems while they are small, before they become big problems, and offer timely interventions designed to change the trajectory in functional decline. Our early illness detection model was used as the conceptual framework for this study<sup>3</sup>. This paper describes on-going work capturing and analyzing sensor data from sensor networks deployed in the homes of older adults at a seniors living facility. The sensor data we are reporting on is the use of activity density maps which tracks activity including time away from home. Various colors are used to represent different levels of density in motion sensors. Activity levels of older adults can be observed from these density maps, ranging from sedentary lifestyles to active lifestyles. Changes in activity level can be linked to physical and mental health declines (*Figure 1*). These density maps can be used as an early illness detection tool which could potentially be used by formal and informal care providers.

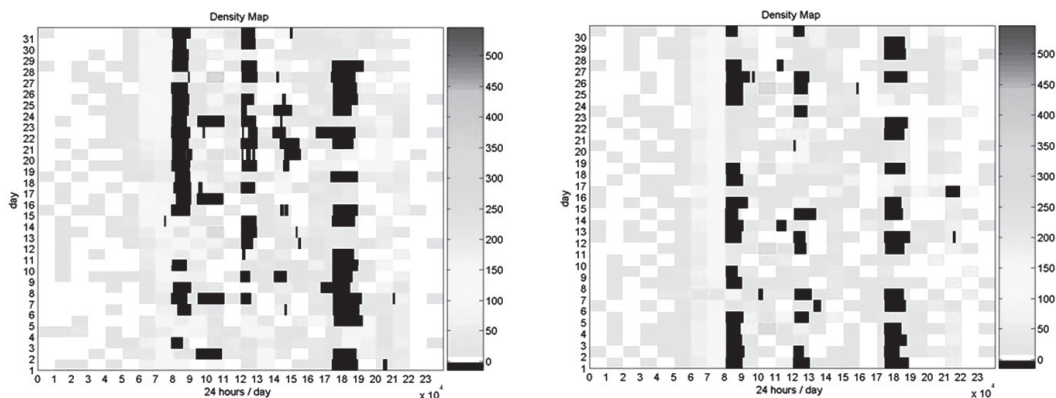
**Method** Motion sensors were placed throughout the apartments of 17 residents living in an independent care facility. Density maps were produced which depicted the level and intensity of movement and activity. Graphic representations of movement, including location and intensity of the movement and a time recording of when the movement occurred were captured with this system. Through retrospective analysis of the data, and using the early illness detection model, activity pattern changes were identified in residents who experienced physical and mental health problems. Behaviour changes were also depicted, including changes in patterns of bathroom activity. **Results & Discussion** Through the utilization of a case study method, results indicated that these density maps can be used to accurately depict changes in activity level patterns over time<sup>4</sup>. In this pilot study, it was demonstrated that density maps can be used as a tool for early illness detection. As we continue to study this method, we plan to employ a larger sample size and both prospective and retrospective analyses.

## References

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*Figure 1: Monthly activity density maps generated using motion sensors for a resident showing a decline in health status over time*