E. Stone, M. Skubic. ***Capturing in-home gait parameters using vision-based sensing.*** *Gerontechnology 2012;11(2):260;* doi:10.4017/gt.2012.11.02.648.00 **Purpose** Research has shown the importance of measuring a person's gait[1], including findings that certain gait parameters may be predictive of future falls[2,3], and that walking speed may slow prior to cognitive impairment[4]. Despite the evidence suggesting this importance, current technologies for gait assessment often lead to infrequent assessments in clinical settings or performance labs[5]. Inexpensive systems which could unobtrusively measure a person's gait on a continuous, daily basis would greatly aid the use of gait measurements in clinical care as well as provide a more detailed picture of daily physical function for other purposes. In this study, two in-home, vision-based gait measurement systems, previously validated in a lab setting[6], are tested in apartments with older adult residents. One system uses a pair of web-cameras; the second uses Microsoft Kinect depth images. **Method** Thirteen older adults living in ten apartments were recruited to participate in a two-year study investigating the consistency and practicality of two in-home, vision-based gait monitoring systems. Participant ages range from 75 to 97; five are male and eight are female. The gait of the participants is monitored in their homes without requiring the residents to wear anything or do anything outside of their normal daily activities. Walking sequences in each apartment are identified and gait parameters including walking speed, stride time, and stride length are computed automatically for the walking sequences, along with height. A modified mean shift algorithm is used to estimate the mode of a selected time period for each resident, which appears as a cluster in the 4D-feature space. Thus, the approach captures gait for multiple residents in the apartment *(Figure 1)*. **Results & Discussion** Summaries of the habitual, in-home walking speed, stride time, and stride length are generated independently by each of the systems. Cluster results are shown for both the webcam and Kinect gait systems for a group of participants, which includes both single and multiple resident apartments. In addition, density plots of the walking paths in the apartments are presented. Results from the two systems are compared as means of evaluating the consistency of gait measurements. Finally, a discussion is presented on the challenges and practicality of in-home gait measurement systems with comments on how these systems could be used for longitudinal monitoring.

References

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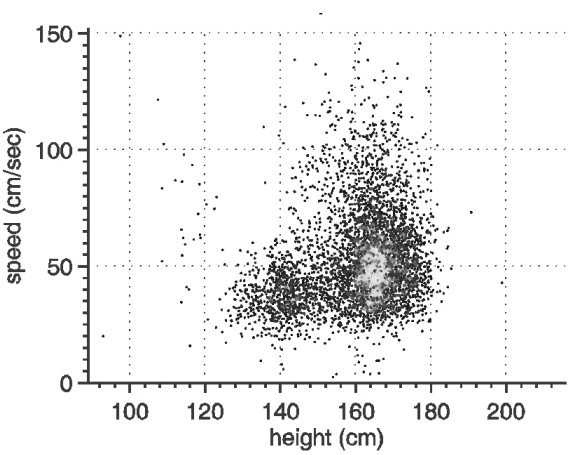

Figure 1. Density plot of walking speed vs. height for one of the ten apartments; Each dot represents a walk in the apartment during the period from Jan.1, 2012 thru Jan. 21, 2012; The apartment contains two residents. The data was captured using the Kinect system