Location aware smart watch to support aging in place

W.D. KEARNS, J.L. FOZARD, P. WEBSTER, J. JASIEWICZ. ***Location aware smart watch to support aging in place.*** *Gerontechnology 2014;13(2):223;* doi:10.4017/gt.2014.13.02.026.00 **Purpose** Aging people with cognitive impairment often require automated prompting of daily activities[1]. There are usually given based upon a schedule and do not take into account the location of the user. Schedule based ADL prompting can be inefficient if the recipient is not near the location where the action is performed, since the prompt may be forgotten before the user reaches the location. Smartwatches have been popularized by their ability to pervasively prompt users. Yet their ability to prompt indoors based on location has not been fully actualized[2]. In this paper, we present the Ubiwatch, which resolves the user's indoor location to 20cm in 3 dimensions using Ultra-wideband (UWB) radio and enables two-way communication while prompting using audio, vibratory, colored display and short text strings contingent on schedule and/or location. **Method** Ubiwatch is shown in *Figure 1* with PCB presented in *Figure 2*. Ubiwatch contains an active radio transponder designed to work with Ubisense sensors that derive coordinate data from monitored indoor spaces. The 2.4GHz radio allows the wearer to be located outdoors or beyond the range of the UWB infrastructure and allows the wearer to send a distress message. Two volunteers wore Ubiwatch and a standard Ubisense 'compact tag' for X and Y calibration, generating 3,770 and 12,338 pairs of observations over 5 hours. **Results & Discussion** Correlation coefficients computed between the devices ranged from 0.92 to 0.99 for X and 0.99 to 0.99 for Y and mean positional disagreements for each system ranged from 7-9cm for X and 3-4cm for Y. *Figure 3* presents tracking data obtained by a subject wearing Ubiwatch. The tracking data gathered from Ubiwatch can be used to estimate fall risk[3] on a walking path. Ubiwatch's ability to measure altitude (Z) may be useful in detecting falls[4] and notifying caregivers. A video of Ubiwatch is available[5]. Data is currently being collected on Ubiwatch's ability to prompt behavior. However none are available at the time of publication.

References

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Figure 1. Ubiwatch ordinarily displays time and day of the week; A programmable display shows four-character strings such as PILL or APPT; Pressing the display face requests help

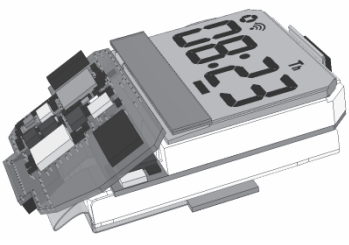

Figure 2. Diagram displaying circuitry in Ubiwatch; The UWB radio required specialist high-frequency PCB dielectrics, combined with a flex-rigid design allowing a 2D printed circuit board (PCB) to fold into a compact 3D structure within the watch

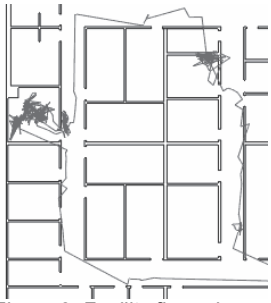

Figure 3. Facility floor plan revealing tracking data from Ubiwatch; Area represents approximately 30m x 21m