Smart Homes to Support Independent Aging

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Smart home

- a residence equipped with technology that enhances safety and well-being of patients at home and monitors their health condition.
Background

• Older adults vary in the development and progression of chronic disease and decline at varying rates in areas of well-being.
• Efforts to date have addressed a single aspect of older adults' wellness.
• Holistic approach to wellness is needed.
• Smart homes have the potential to introduce tools that enable non-obtrusive monitoring and assessment wellness.
Theoretical Framework: Wellness

- Social support and network, perception of isolation
- Physiological/functional well-being
- Mental/cognitive well-being
- Spiritual well-being

- Vital signs, quality of life, instrumental activities of daily living, gait characteristics
- Mood, quality of life, response time, working memory, task shifting, planning

- Spiritual behaviors and beliefs, views on guidance and meaning
Demonstration project

• Independent retirement community in Seattle
• Eligibility criteria included:
  – age of 62 years or older
  – residents of an independent retirement community
  – independent in activities of daily living (ADL)
  – able to provide written informed consent
Sensors

- Stove sensor
- Sensor mat
- Motion sensors
Shared Decision Making

Education  Tailored Interventions  Transitions in Care

Synthesis and Visualization

Personal Health Records

Data Analysis Techniques
(e.g., data mining, pattern recognition, activity analysis, behavior reasoning, inference algorithms)

Data Capture

SHAAL Applications

Knowledge

Data
Privacy
## Belotti and Sellen Framework

<table>
<thead>
<tr>
<th></th>
<th>Feedback About</th>
<th>Control Over</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capture</strong></td>
<td>When and what information about me gets into the system.</td>
<td>When and when not to give out what information. I can enforce my own preferences for system behaviours with respect to each type of information I convey.</td>
</tr>
<tr>
<td><strong>Construction</strong></td>
<td>What happens to information about me once it gets inside the system.</td>
<td>What happens to information about me. I can set automatic default behaviours and permissions.</td>
</tr>
<tr>
<td><strong>Accessibility</strong></td>
<td>Which people and what software (e.g., daemons or servers) have access to information about me and what information they see or use.</td>
<td>Who and what has access to what information about me. I can set automatic default behaviours and permissions.</td>
</tr>
<tr>
<td><strong>Purposes</strong></td>
<td>What people want information about me for. Since this is outside of the system, it may only be possible to infer purpose from construction and access behaviours.</td>
<td>It is infeasible for me to have technical control over purposes. With appropriate feedback, however, I can exercise social control to restrict intrusion, unethical, and illegal usage.</td>
</tr>
</tbody>
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Obtrusiveness Framework

Discussion

• Smart home technology has the potential to support independence and aging in place.
• Technical, organizational, ethical and policy challenges
• Promoting dependency rather than supporting independence
  – Reduction of social contact
  – Substitute personal forms of care and support
  – Over-reliance on automation
Contact

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