

The Development of a User-Centered Digital Memory Notebook



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Introduction

- Prior research has suggested that pen and paper Memory Notebooks can reduce the memory load of individuals with memory impairments
 - Record of past activities aids retrospective memory
 - Schedule of future events aids prospective memory
- Paper Memory Notebooks are limited by how much their user remembers to utilize them
- Study goal: Develop a tablet-based Digital Memory Notebook that will:
 - Increase the frequency of usability and efficacy of the memory notebook
 - Assist in scheduling, completion, and logging of activities of daily living
 - Incorporate smart environment technology to enhance prompting utility
 - Ameliorate declines in cognition

Methods

Participants

- 4 older adults (Age: $M = 74.25$, range: 62-94)
 - 2 with histories of Traumatic Brain Injury (TBI)
 - 1 with Mild Cognitive Impairment (MCI)
 - 1 caregiver of a spouse with dementia
 - 3 females, 1 male
 - Education: 20 years for all participants

Materials and Procedures

- Following paper mock ups, iteration 1 of a user-friendly DMN was tested with healthy older adults (see Figure 1) and improvements were made from their feedback (see Figure 2)
- Iteration 2 of the DMN was tested in this study with a caregiver or individuals reporting memory difficulties
- Demographic information (i.e., age, education, medical history) was collected
- After a brief tutorial, participants completed several tasks using the DMN (e.g., add new event to to-do list, fill in profile page)
- Measures:
 - Technology Use and Comfort Questionnaire
 - Administered prior to interacting with the DMN app
 - Scheduling Tool Use Questionnaire
 - Post-Study System Usability Questionnaire (PSSUQ)
 - After Scenario Questionnaire (ASQ)
 - Participants provided satisfaction ratings for ease of use, time to task completion, and available support information following each task scenario
 - Open-ended prompts
 - Feedback on current color scheme, additional changes to future app etc.

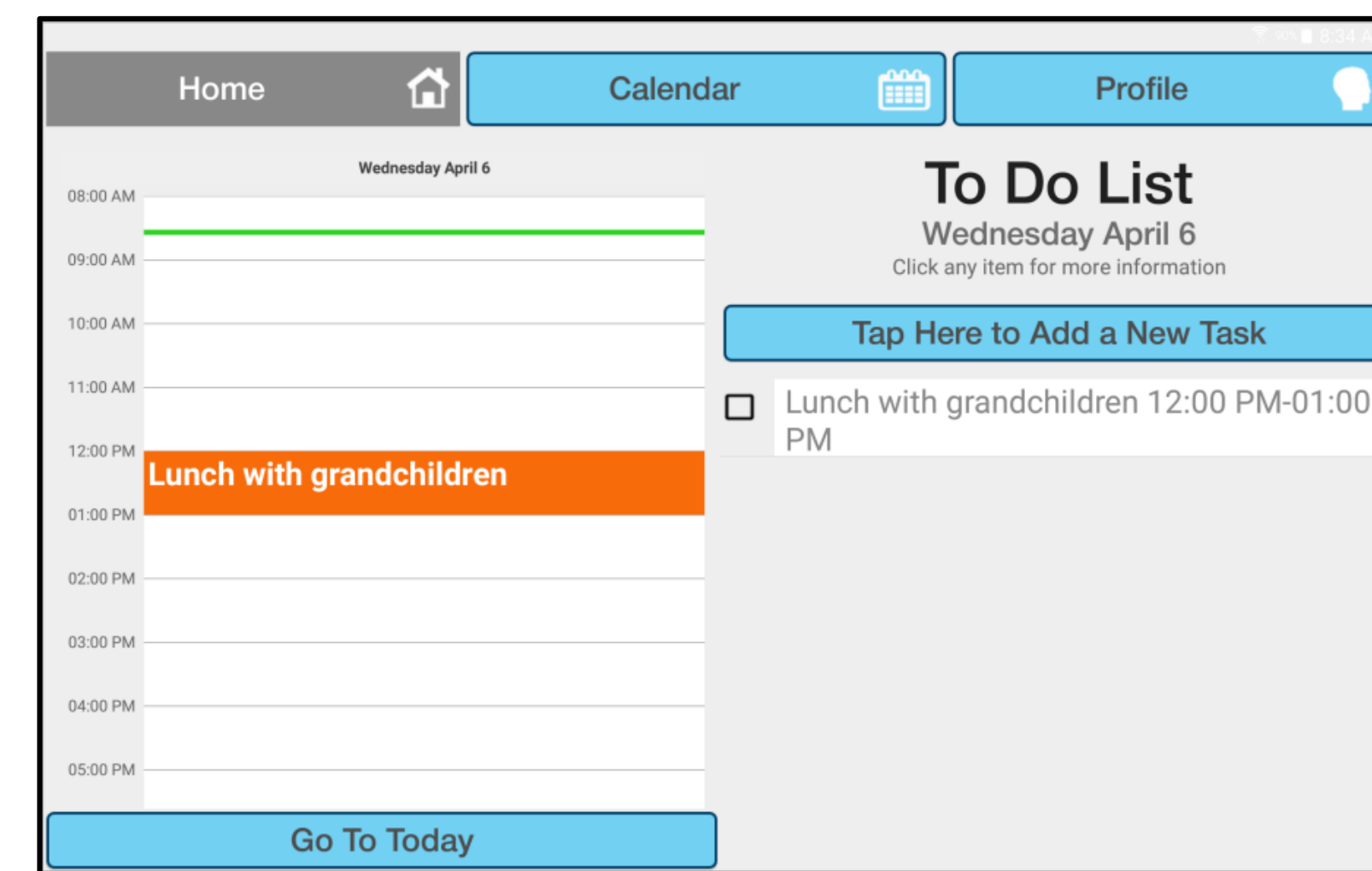


Figure 1. Iteration 1 Home Page view

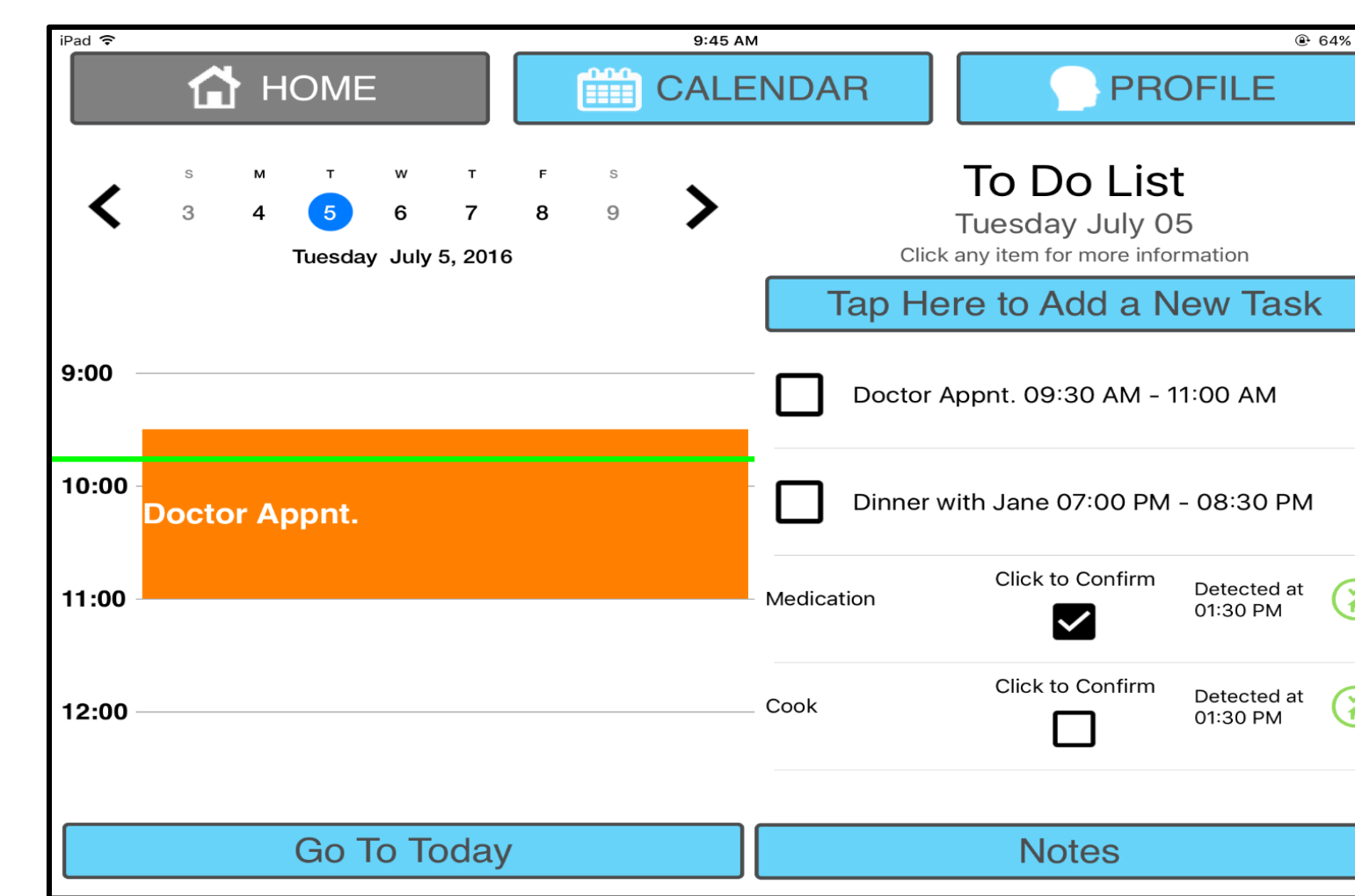


Figure 2. Iteration 2 Home Page view

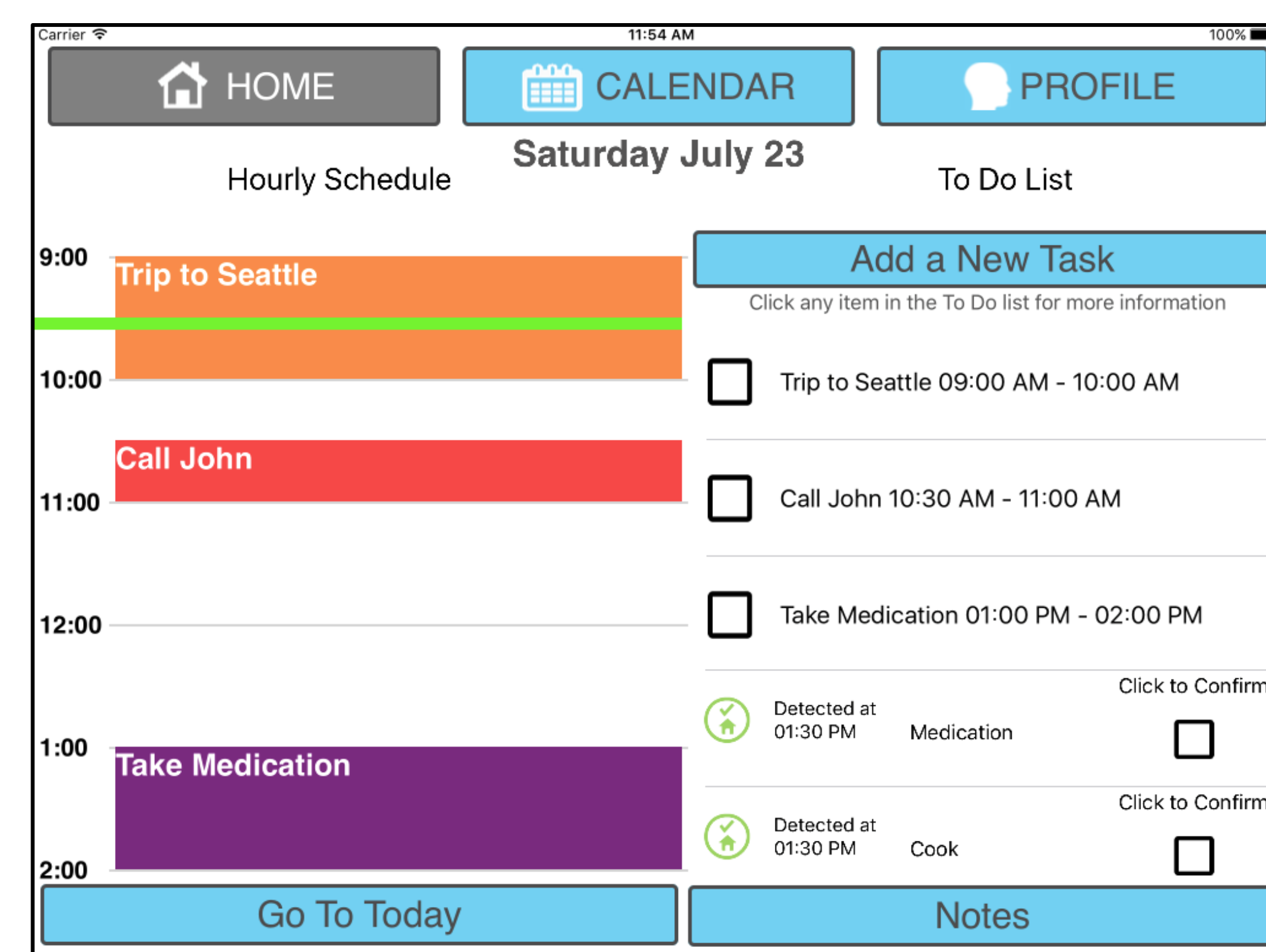


Figure 3. Future design for Iteration 3 Home Page Design

User-Interface Design Considerations

- Font size and type
- Intuitiveness
- Color schemes
- Date and time selection interface
- Button labels and sizes

Results

- All participants self-reported using technology or a paper and pencil scheduling tool 3-5 days a week
- 50% of participants reported using a touch screen tablet less than once per month; 50% self-reported using a tablet at least 5 days per week

	Strongly Satisfied	1	2	3	4	5	6	Strongly Dissatisfied
Adding Event	2				1		1	
Checking for Event	2				1		1	
Adding to Profile	2				1		1	
Responding to Reminder	2		1		1			
Adding Note	2		1		1			

Table 1. Frequency of responses by number to questions about ease of task completion on a Likert scale from 1 (Strongly Satisfied) to 7 (Strongly Dissatisfied) from the After Scenario Questionnaire (ASQ)

	Strongly Agree	1	2	3	4	5	6	Strongly Disagree
Overall, I am satisfied with how easy it is to use this system	2				1			1
It was simple to use this system	1		1			1	1	
It was easy to learn to use this system	1		1		2			
Whenever I made a mistake, I could recover easily and quickly	1				1			1
I believe I could become productive quickly by using this system	2			1		1		

Table 2. Frequency of responses by number to statements about overall experience with the app on a Likert scale from 1 (Strongly Agree) to 7 (Strongly Disagree) from the Post-Study System Usability Questionnaire (PSSUQ)

- 50% of participants were strongly satisfied with the ease of completing each of the tasks on the app
- 47% of participants mostly to strongly agreed that the app interface was simple, easy to learn and use, and would increase their productivity
 - The participant that disagreed to strongly disagreed with statements about ease of use had no previous experience with a touch screen tablet
- All participants said they would use the app if it was available

Feedback

- Based on open-ended feedback after interactions with the DMN app, the following changes were recommended for the third iteration (See Figure 3):
 - Including an instructional brochure
 - Adding a high priority indication option for tasks
 - Develop a camera upload feature to record pictures on the app (e.g., medication lists, journaling)
 - Incorporate notification when adding tasks for schedule conflicts
 - Create a mobile version of the app
 - Interpolate customizable color schemes
 - Streamline the app interface
 - Integrating options to make tasks automatically re-generate (e.g., medication reminders that occur every day at the same time)
 - Multiple prompts and alarms for tasks
 - Reminders for tasks that were never completed
 - Introduce a modifiable safety checklist
 - Append a weekly meal planning feature with a shopping list

Conclusions

- Overall, participants were satisfied with the DMN
 - Participants with more touch screen tablet experience reported more ease of use with the app interface
 - As participants became more familiar with the app, satisfaction ratings increased
- After interacting with the DMN app, all participants said they would be interested in using the app when it became available
- Feedback from potential users provided valuable insight for improving and creating an optimum user-interface experience
- Future advancements for the DMN include:
 - The integration of instructions to aid in gaining familiarity with tablet interface
 - Integration into smart environments to utilize sensors to track and assist with activities of daily living
 - The development of a mobile version of the app
 - Distribution of the app in iOS and Android stores for the benefit of individuals experiencing cognitive deficits

Acknowledgements

This work was supported by the National Institute of Aging grant R25AG046114