Introduction

Our research group, Assisted Independence, used the research we have conducted to design and create a technological device that will assist our subject in being independent. Our research question is as follows: “What technologies could help a dependent elderly woman become more independent?” Our subject family consists of an elderly woman, our primary participant, and her two daughters, who serve as her caregiver and are our secondary participants. The mother depends on her daughters to bring things to her, fill her pill boxes, and take her places outside of the home. However, both the mother and her daughters are looking for a way to allow the mother to be more independent. This pursuit of independence is a very important issue to almost everyone as they age. We go through most of our lives being independent and doing things for ourselves, but that decreases as we age and endure disabilities. Our team realizes this as not only an issue for the elderly and disabled, but also an opportunity to design and create a technological device to meet the unique needs of our participant. Fortunately, the technologies capable of prolonging our independence are available and feasible with simple designs. During the design phase of our project, collaboration among our team produced an effective design, using elements from all of our ideas. Impacts from this project’s success could be very beneficial, not only for the mother, but it could also turn out to serve as something useful for other older adults struggling with their independence.

Background
Our team looked into some of the symptoms of dementia and some technologies that are helping sufferers. We found that dementia is a syndrome that can affect memory, thinking, behavior and ability to perform everyday activities. According to the World Health Organization, 35.6 million people suffer from dementia worldwide and this number is supposed to double by 2030 and more than triple by 2050. This being said our group realized any research done could have a great impact on many individuals. We also researched and discovered several different types of technology, mainly different Pill Alerting Systems, which helped dementia patients. The Ethos House at Indiana University also works with similar technologies that help with older adults living independently longer. Our team took a tour of the Ethos House to see what was being designed and what kind of technologies were working behind the scenes to make current designs work.

Methods

Our team started our research with a thorough literary analysis where found out more information on dementia and some of the technologies that already existed. To expand our knowledge on existing technologies we also took a tour of the Ethos House at Indiana University. Once we had an idea of symptoms and technologies that existed we were able to come up with a primary interview script that would help us answer a more focused research question, how technologies can help our participant become more independent. We took this interview script and conducted an in-home interview with our three participants. After analyzing the results from our first interview we still had some loose ends that needed to be tied up. We then formed a second interview script for the secondary participants. This
Interview was conducted via email. After having the information we needed our team found our design requirements and developed several different paper prototypes, each one improving on the previous. We decided on a final paper prototype (figure 1), one we thought most affectively hit all of the design requirements, and turned it into a 3D Prototype using Autodesk Inventor 2014 (figure 2).

![Figure 1](image1.png)

![Figure 2](image2.png)
Results

In our interview we found that our primary participant, the elderly lady, takes a different set of pills twice a day. Her pills are kept in two different pill boxes, one for the morning and one for the evening, which are refilled every two weeks by our secondary participants, the daughters. We found that the biggest struggle for our primary participant is remembering what day it is and to take her medication. The secondary participant’s biggest concern was whether or not their mother had taken her medication. They said they had tried Pill Alerting Systems before, but the problem with was our primary participant did not like be startled by the loud noise. Our primary participant had about a 4 hour gap to take her medication, so if the reminder went off and she was in the middle a task she would just ignore the reminder.

Discussion

These results did not directly answer the research question, but they did give us a list of design requirements that would help us solve for the research question. We used these results to
make a list of design requirements for a prototype would help our participant live more independently. They are as followed:

- A noiseless alert
- A reminder of the day
- A reminder of morning/evening
- Notify distant caregivers
- Keeping a log of when pills were taken/not taken

These design requirements helped us build a 3D Prototype. The 3D Prototype will help remind our primary participant what day it is and remind her to take her medication with the first part of our design. The first part of our design is a wall mounted display that displays the day of the week in a color that corresponds to the morning and evening mats that her pill containers sit on. As her 4 hour gap closes and she has not taken her medication the display will get brighter and brighter to catch her attention. The second part of our prototype notifies the daughters and updates a log when she has taken or when she is about to miss her medication. This is done by connecting a circuit when the pill containers are set back down on their mats.

Conclusion

We were able to answer our research question of how to help our participant live more independently. By reminding her when to take her medication and notifying her daughters/caregivers when she did, we cut back on some of the work that her caregivers did and also leave her daughters with a peace of mind without constantly calling to check up on her.
In our future work we plan to build a working prototype and give it to our participant to use.

We will then be able to test it in situ with our three participants. We will study to see if it has any effect on her remembering to take her medication and overall lifestyle. We will eventually want to build more devices and continue our study on a larger scale.

Video

Website

Mypage.iu.edu/~robkelle/i399/index.html

Interview script

-tell us about your typical routine?
-tell us about a typical routine when visiting with your mother?
-what type of tasks do you often have to help your mother with?
-what do you find the hardest to do in a given day?

-are there any challenges that arise while caring for your mother.
-what are the greatest challenges that you/she face(s) living in your home?
-what do you see as a big challenge coming in the near future?

-do you live close to each other?
-how often do you visit with your mother?
-how do you care for your mother when you are not in the area? (e.g. ask sister for help, call frequently, use technology, employ a caregiver, etc.)
-what are your biggest concerns for your mother when you are not around or when she is on her own?
-what would you like to be able to monitor?

-could you provide us with some information on dementia from someone who is directly affected by it?
-how technologically savvy are you?
-have you looked into using technology to help with certain symptoms? If so, which technologies?

References


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**Assisted living**


**Symptoms of Dementia**


http://www.who.int/features/factfiles/dementia/en/

http://www.medelert.net/