Proposal for the Design of SeniorConnect System

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Executive Summary

Social isolation is becoming a more and more severe problem among seniors in nowadays society. Most elderly often lack the opportunity to communicate with their children and old friends, and they are unable to catch up with the changes in their surroundings. Therefore, special attention should be devoted to help the elderly maintain their existing connections as well as enrich their life.

We, the Gru Family team proposes to develop a social network software, SeniorConnect, for the elderly, in order to satisfy their emotional, social, mental and learning needs and enrich their life. The ultimate goal of this software is to assist elderly people to communicate with each other easily and to get involved in social activities actively, which will lead them to healthier life. In order to understand users' needs and generate satisfactory specifications respectively, the team adopt the top-down approach and spiral approach in requirement analysis and product.

Specifically, SeniorConnect is a social media application which provides a platform to engage the elderly in social life by allowing chatting, sharing and joining events, and to help the elderly manage their life for daily activities. It will be designed and released as a mobile application so that elderly people can access to it anytime and anywhere. Our design emphasizes on convenient voice channel, simple GUI with enlarged fronts, accessible functionalities within 4 steps and security, to provide a reliable and effective social platform for the elderly.

The project is scheduled to be carried out from August 2015 to June 2016 by the 6-memebr team, the Gru Family, with an estimated budget of S$147,070.

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1. Statement of Problem

Population aging and social isolation among the elderly are becoming increasingly severe problems in nowadays society, especially in developed countries. According to World Population Aging Report published by United Nations in 2013, the global share of older people (aged 60 years or over) increased from 9.2 per cent in 1990 to 11.7 per cent in 2013 and will continue to grow as a proportion of the world population, reaching 21.1 percent by 2050. Globally, 40 per cent of older persons aged 60 years or over live independently, that is to say, alone or with their spouse only. As countries develop and their populations continue to age, living alone or with a spouse only will likely become much more common among older people in the future.

Researches have shown that old people with fewer social lives are more likely to die even if they are happy in their solitude. This suggests the danger of social isolation among the elderly. In order to maintain physical and mental health, seniors could connect with their family and friends frequently as well as participate in various interesting activities to enhance their social connectedness.

Social Networking Services (SNS) could be an effective and efficient solution. According to a two-year project funded by European Union, training elderly to use social media will improve cognitive capacity, increase a sense of self-competence and could have a beneficial overall impact on mental health and well-being (University of Exeter, 2014).

There are some platforms existing in the market targeting on friendship establishment, family interaction and social connectedness. However, most of them are not user-friendly to and thus not widely used by the elderly. It would be helpful to develop a social platform especially catering to needs of the elderly.

2. Design Objectives

Driven by the preceding demands, our group proposes a mobile phone application to primarily facilitate and to further promote social connectedness of the elderly. The application is designed to achieve the following objectives.

1. The application should allow users to make voice calls, video calls and send voice messages to other users as communication channels. The application will not include text messaging because it is not an easy to use function for most elderly.
2. The application should allow users to join communities categorized by hobbies and other topics. The community should provide online learning courses for group members to take. The application should also allow community members to receive notifications of news updates and invitations for events organized by communities.
3. The application should allow users to share their daily life events and experiences with friends, by providing a platform of information sharing and interactive communication.

The application is designed to be encouraging and motivating for the elderly in achieving those objectives. When taking online courses posted by community core members in the form of online videos and blogs, the application will encourage the elderly to complete the course by showing progress and motivate the learning by periodic reminders. The posted life events will be viewable by the friends and thus the elderly will be able to communicate and socialize under the posts by writing comments. Additionally, the application also allows users to play braining-training games. The games are selected based on the effectiveness of stimulating different parts of brain and their level of popularity.

Taking the advantage of being a social media platform for the elderly and family, the application will also provide helpful tools for the everyday life. For example, in future, family members could set reminder to inform the elderly of the events they registered and the things they need to do such as taking medicine, as the elderly are weak in memory.

3. Technical Approach

After settling down WHAT the project is and WHY this project topic should be adopted, HOW the goal will be approached is to be discussed. Under guideline of Hyman's nine-step model, all the steps needed have been went through to come up with the final solution.

3.1. Identifying Customer Needs

The first thing we need to do is to identify the needs of our targeted user group, the elderly. By this time, it is difficult to generate a detailed and complete user needs due to various preferences of each personnel. The elderly might have different social behaviors, which makes it difficult for us to abstract customer needs. Therefore, we decide to employ a **top-down approach**, where we categorize people's needs first and then move to more detailed areas, such as functionalities and interface designs.

We have conducted a preliminary discussion with 100 seniors and 50 caregivers from residential centers for the elderly, who have rich experience in assisting elder people. Caregivers are chosen to be surveyed because they have motivations to create a better life for as well as a clear understanding of the challenges of the elderly. They outlined to us what and how the elderly would like to socialize in daily routines. After a careful and systematical analysis, we found the elderly's needs can be categorized into four categories, namely Mental Needs, Social Needs, Emotional Needs and Learning Needs. Further breaking these down, they could be more specifically identified as chatting with their family and friends, participating in social events and interest groups, sharing their daily life events, and learning new knowledge and training their brains.

Besides commonly shared needs, our target users have some special needs due to physical and mental status. Physically, their senses are weaker compared to other people. Mentally, elderly people tend to be cautious and apprehensive towards trying complicated applications. Therefore, a simple and elderly-friendly interface is of high importance.

The interview results showed that the elderly are very likely to chat with their children, relatives, cousins as well as friends. However, unlike other people, they make voice or video calls most of the times. They also indicated their desire of the application through which they can send voice or video messages to family and friends. Thus, we decide to set the communication channel to be voice message instead of text input by default.

We also concluded that community members are more likely to participate in social activities than individuals. Most of the elderly are shown to be reluctant to social activities. However, once they receive notifications from the community, a lot of them shown to be interested. The invitation from acquaintances are more encouraging. Most of them show the willing to join.

Besides the mental and social needs, we realized that a lot of seniors spend their time unconsciously in reflecting their life events. Given the opportunity, they are very willing to share what they see and experience with others. Also, quite a large portion of them agreed that learning some techniques maybe useful for their health.

After drafting the prototype, we will be interviewing the caregivers as well as the elderly again to plan in greater details the functionality and design of the application. We will then develop the first design for them to review before implementation commences.

3.2. Identifying Target Specifications

A **spiral approach** will be adopted to identify and generate satisfactory specifications.

The user requirements gathered from the surveys and interviews will be used to decide on the key functionalities to be included in the product. A low fidelity prototype will be drafted to facilitate the illustration of the specifications. Short interviews with researchers in elderly research labs in Nanyang Technological University will also be conducted, to analyse and refine specifications defined previously. A high fidelity interface prototype will be generated based on the analysis and volunteers will be invited to simulate the usage of the product. Their feedback will be gathered to identify any potential improvement.

With the first draft version of mock-up, the product will be distributed among more seniors for investigation purpose. 50 users with age range from 50 to 70 will be reached out and their feedback will be collected in order for us to modify and consolidate the design. This will be done several times and in each iteration, an identified possible improvement will be evaluated. For example, if they feel better with a shortcut to send messages to a specific person, we will consider adding this feature.

This process will be repeated till conditions listed below are satisfied:

1. Over 80% of our volunteers feel satisfied with the functionality and find our GUI friendly.
2. Over 50% of volunteers show their interest in downloading and trying out the application.

With this spiral approach, we are confident in the identified requirements and specifications. Catering to the special needs of our target users, our application will definitely win a good market share.

3.3. Generating Design Concepts

To facilitate adoption of the solution in the target group, several design concept alternatives have been came up with as outlined below.

Design Concepts	**Description**
Mobile application	To implement the system on mobile phone as a mobile application.
Web portal	To implement the system on website as a web portal.
Accessibility on multiple platforms	To implement the system on multiple platforms.
Alternative voice communication channel	To minimise the use of keyboard input. Most of the communication will be carried out in voice and voice input will be prioritized in design.

Accessible functionalities within 4 steps	To design accessible functionalities which can be reached within as small numbers of actions as possible. In this project, the maximum number of clicks to reach any functionality is limited to 4, in order to achieve a user-friendly interaction.
Simple GUI with enlarged font	To strive for simplification in GUI and without redundant functionalities. More specific design concepts for this include large and understandable icons, minimising texts etc.
Security	To design functions that ensure the contacts in this application are known by the elderly in real life to prevent possible swindling from strangers.

Table 1: Details of Design Concept Alternatives

3.4. Selecting Design Concept

The design concept alternatives proposed in the previous section were carefully examined and evaluated. The result for selecting design concepts is as followed.

Design Concepts	**Selected (Y/N)**	**Reason**
Mobile application	Y	As the application focuses on social communication, it must be portable and widely available on-the-go. In other words, communication may happen anytime and anywhere, and the application must be able to support that. A mobile application offers obvious advantage in this scenario compared to web-based and desktop-based platform. The prevalence of smart phones provides a ground for adoption of the application. On the other hand, mobile application faces the same issue of unfamiliarity with technology as web application and desktop application do. Therefore, given obvious advantage of mobile application, the application will be landed as a mobile application.
Web portal	N	Given the disadvantages in accessibility and cost-return analysis, the application will not be landed as a web portal.
Accessibility on multiple platforms	N	Given the cost-return analysis of implementing on multiple platforms, the application will not be landed on multiple platforms for current phase.
Alternative voice communication channel	Y	One of the difficulties that the elderly face in using technology is the inconvenience of keyboard input. Often, the elderly are not able to communicate fast enough using keyboard and thus it will affect the quality of communication. Besides, the elderly are often short in sight, which makes it difficult for them to use text input. Therefore, in order to provide smooth communication experience and bridge the elderly from telephone

		communication to this platform, the application will focus on providing convenient and elderly-friendly voice communication channel.
Accessible functionalities within 4 steps	Y	Since the elderly have limited ability in learning to use new system and have poor short term memory, minimising the actions to perform a function would be a helpful design concept to bear in mind.
Simple GUI with enlarged font	Y	One difficulty faced by the elderly is the high precision of smart phone with relatively small font and complex user interface. As the elderly experience decline in physical function and cognition, they may not be able to navigate through complex user interface or point accurately to a specific icon on the screen. Thus, the application caters to this problem by designing a simple user interface with enlarged font to reduce the problem.
Security	Y	As the elderly are more vulnerable to be swindled than youngsters, it would be an essential concept to ensure the application help the elderly to prevent from potential unknown strangers in their contacts.

Table 2: Details of Design Concept Selection

4. Project Management

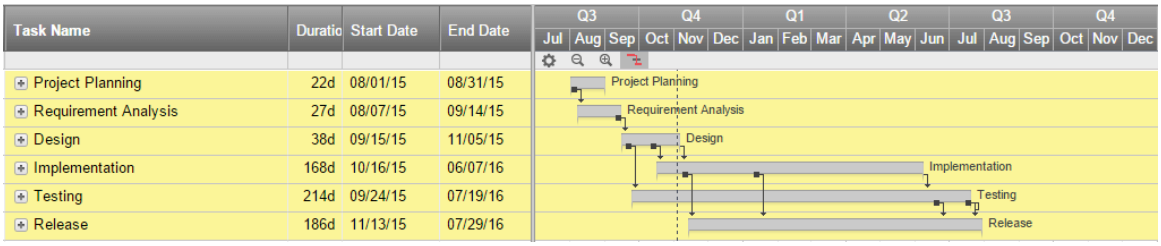

Figure 1: Gantt Chart (Summary) for the Project

A full Gantt Chart for the project is to be viewed in the Appendix A. Since the Gantt Chart is large in size, a clearer version is to be referred from the team's wiki page.

This project is planned to last for 12 months. There are six major stages. In the first stage of project planning, user requirements will be investigated, documented and validated with stakeholders. In the second stage of requirement analysis, requirements will be analyzed and transformed into prototypes which will be communicated with stakeholders. In the third stage of design, based on the prototype, system architecture will be designed. In the fourth stage of implementation, a functioning system will be built following the prototype and the system architecture. The development tasks will start with implementing back-end core functionalities, followed by building front-end application. In the fifth stage of testing, unit, integration and system testing will be conducted in sequence. User acceptance test (UAT) will be conducted at the end. In the sixth stage of release, documents will be prepared as assistance for future maintenance and improvements. Quality assurance should be conducted throughout the project. The testing, implementation and release process will be executed in parallel. Before each release the project team will test the functions implemented and release the tested features.

The details of personnel and division of responsibilities are as followed.

Role	**Name**	**Responsibilities**
Project Manager	Liu Yikun	• Responsible for overall delivery of product
QA Manager	Li Yishan	• Responsible for overall product and process quality, implementation of QA processes • Report to Project Manager • Monitor and coordinate the work of QA Engineer
QA Engineer	Wong Way-ne	• Devise test plans, conduct tests • Report to QA Manager
Lead Developer	Ma Xiaoxue	• Responsible for overall technical lead Responsible for technical aspects of product release • Report to Project Manager • Monitor and coordinate the work of front-end and back-end developer

Front-end Developer	Wang Siqi	• Android front-end programming • Participate in the entire SDLC, generating work products including documentation, source code, unit and integration tests • Report to Lead Developer
Back-end Developer	Mao Huiqi	• Server, application and database programming • Participate in the entire SDLC, generating work products including documentation, source code, unit and integration tests • Report to Lead Developer
Release Engineer/Manager	Liu Yikun	• Create baselines and build and integrate changes for delivery

Table 3: Details of Roles and Responsibilities among Project Team

4.1. Deliverables

For the different stages of the project, deliverables are listed and should be communicated to stakeholders to ensure smooth progressing.

At the end of the requirement elicitation stage, Software Requirement Specification (SRS) should be agreed by the stakeholders at the tentative timeline of Sep 10, 2015.

At the end of the requirement analysis stage, the product prototype should be presented to the stakeholders at the tentative timeline of Oct 13, 2015.

At the end of the design stage, design documents (including final architecture design, component designs of back-end and front end) should be delivered at the tentative timeline of Oct 31, 2015.

At the end of each implementation and testing phase, a system with successful pass of User Acceptance Test (UAT) should be delivered to customers.

At the time of release, maintenance documents and personnel training documents should be passed to customers at the end of each release.

4.2. Budget

The cost of our project mainly comes from personnel cost, equipment cost, software license fee, research and interview fee. Personnel cost includes salary of project team members and all their expenses like transportation and communication fees. Equipment cost includes cost of development computers and sever installation. See below for detailed budget.

Categories	**Particulars**	**Expenditures**		
		Estimated Quantity	Estimated Unit Price (S$)	Estimated Subtotal (S$)
Personnel	Team Salary	6 x 8 x 220	10	105,600.00
	Transportation	3	40	120.00
	Developer Salary	6 x 8 x 80	10	38,400.00

	(externally hired)			
	Subtotal			144,120.00
Research and Interview	Survey Printing	300	0.50	150.00
	Survey Distribution Personnel	30	10.00	300.00
	Interview Conducting Personnel	10	50.00	500.00
	Interviewee	100	10.00	1000.00
	Subtotal			1950.00
Equipment Fee	Development Tools	1	1000.00	1000.00
	Subtotal			1000.00
Total		**S$147,070.00**		

Table 4: Estimated budget

4.3. Communication and Coordination with Sponsor

The communication with sponsor consist of different forms throughout the project period.

Forms of Communications	**Personnel involved**
Weekly email update	Project Manager with Sponsor Representative
Bi-weekly meeting	Project Manager with Sponsor Representative
Prototype demo	Whole Project Team with Sponsor Representative
Mid-term presentation	Whole Project Team with Sponsor Representative
Final presentation	Whole Project Team with Sponsor Representative

Table 5: Communication with Sponsor

4.4. Team Qualifications

The project team, the Gru Family, consist of 6 undergraduates from School of Computer Engineering, Nanyang Technological University. All of them are pursuing their Bachelor in Computer Science. In terms of project management, the team are proficient in Software Development Life Cycle and have been involved in a few large projects for clients. In terms of programming, the team are proficient in Java, Python, C, C++, C#, Angular JS, PHP, HTML etc.

5. Conclusion

SeniorConnect is proposed by the team Gru Family, to satisfy the social, emotional, mental and learning needs of the elderly. As suggested by its name, SeniorConnect is born with the ultimate goal to assist elderly people to connect with each other easily and to get connected in social activities actively, which will lead them to healthier life.

6. References

University of Exeter. (2014, December 12). *Training elderly in social media improves well-being, combats isolation*. Retrieved from Science Daily: http://www.sciencedaily.com/releases/2014/12/141212111649.html

7. Appendix A: Project Gantt Chart