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# Senior Travel Buddies: Sustainable Ride-Sharing & Socialization

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## **Abstract**

We are developing a system to be implemented at Continuing Care Retirement Communities (CCRCs) throughout the United States in an effort to encourage ride-sharing among residents in order to decrease their carbon emissions. We are focusing on senior citizens for two reasons – they are a growing segment of the population with driving habits that result in higher pollution, but they are also a population that is at risk of isolation and the mental and physical harm that can result from being isolated. Our system addresses both of these issues while leveraging the infrastructure and culture of CCRCs in addition to hiding the technology from the senior residents themselves.

## **Keywords**

Elderly, transportation, social well-being, community

## **ACM Classification**

H5.m. Information interfaces and presentation (e.g., HCI): Information Systems: User Interfaces: Graphical user interfaces (GUI).

## **Introduction**

Senior citizens are one of the fastest growing segments of the population in the U.S. with over thirty-six million Americans currently over 65 years of age and their numbers are estimated to double by 2030 to one in five[2]. In addition to being a growing segment of the population, the driving habits of the elderly cause them

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to pollute more than other drivers. In particular, seniors tend to “scout” a destination beforehand [10] – this allows them to become comfortable with the route and check both accessibility and the available parking. Seniors also tend to take frequent short trips, resulting in the catalytic converters on their cars never reaching the 600 degrees needed to effectively reduce pollution [10].

Although seniors are a compelling segment of the population to target based solely on their size and growth rate, developing a system that also encourages socialization addresses an additional risk that this population faces. As seniors age, their social network starts to decrease [7] and they face an additional risk of isolation. Such isolation has been shown to result in an increased risk of depression [9].

### ***Retirement Communities***

The users we are targeting for the system are both the residents of retirement communities and the managers of these communities. In trying to influence the driving patterns of seniors, retirement communities are a viable target, and in particular Continuing Care Retirement Communities (CCRCs) are the focus of our project. Since seniors take mostly short trips and have concerns regarding mobility, our approach requires a concentrated population of seniors who share the same starting point and destination. Retirement communities present a concentrated population of seniors, and from a discussion we had with an expert on aging [6], CCRCs present a group of seniors who are active and interested in social activities.

The goal of CCRCs is to allow seniors to “age in place” [7] and most such communities incorporate health

screening as part of their application process. Unlike retirement homes of the past, the goal of the CCRC is to attract seniors who will be healthy for the foreseeable future [1]. In addition, CCRCs place great emphasis on creating an active community and stress social activities in their marketing. In one study done of CCRC residents, a commonly cited reason for moving to a CCRC was the social environment [1]. In that same study, CCRC residents cited the social opportunities and the diversity of activities and events as important aspects of their community. In line with the growing senior population in general, there are currently over 2,200 CCRCs in the U.S. with approximately 725,000 residents [1]. In addition, CCRCs are projected to have a 15-20% annual growth rate [3].

Besides CCRCs having a social, active population of healthy seniors, CCRCs also have staff who are already responsible for some coordinating activities and providing residents with activity calendars [1]. In a survey we sent out to CCRC administrators, 100% of the respondents had some system in place for scheduling activities at the community and providing scheduled transportation for shopping and medical visits. In addition, all of the respondents distributed a schedule of activities by posting them in public areas and distributing paper copies to residents. One CCRC we visited had scheduled transportation on Mondays, Wednesdays, and Fridays for grocery shopping.

Although the seniors at CCRCs are active, social, and healthy, they cannot be assumed to be computer literate. In the survey we sent to CCRC administrators, the estimates as to computer ownership by residents covered a wide spectrum, but 33% estimated computer

ownership at less than 10%, and only one respondent estimated greater than 50% ownership. Such low estimates of computer ownership prohibit any solution that requiring seniors to interact using a computer.

### ***Research Goals***

Our research focused on whether the travel patterns of seniors can be modified to reduce carbon emissions either through the use of public transportation or ride sharing. As discussed in the next section, our research showed that seniors are unwilling to use public transportation if they had any other options. Based on the resistance to public transportation, our focus shifted to ride sharing as a means of reducing pollution while also increasing the socialization of seniors – a behavior that is important to their physical and mental wellbeing.

### **Design Process**

Our design process began by considering possible approaches to reducing the carbon emissions of seniors. Initially we sought to encourage public transportation use among seniors, however we found this solution was not feasible for numerous reasons. The vast majority of elderly in urban areas do not use public transportation, with only 1-2% of the trips taken by seniors are by bus, while in suburban areas the rate drops to 0.9% [12]. Seniors conveyed major issues about public transportation, such as being stranded [5], fear of safety [10], difficulty interpreting maps [10], and trouble keeping track of location [8]. Information gathered from ethnographic inquiries conducted both at a senior couple's home and a local senior center indicated that, in addition to the above mentioned concerns, seniors attached a serious socioeconomic stigma to riding the bus. Participants' overall consensus

was that they would only ride the bus if it was absolutely their last financial and mobility option. In one of our discussions, a 92-year old subject informed us that she had ridden the bus for the first time only a week prior to our meeting, citing the reason as being her driver's license had expired. She also informed us that she had resumed driving after it was renewed.

Following this feedback, we consulted Dr. Barbara Hawkins, an expert on the aged and aging who raised similar concerns about senior use of public transportation. Although we discussed current efforts being undertaken to address seniors' public transportation needs, virtually all of these programs required municipalities to make changes on an infrastructure level or redesign the community itself. The reluctance of seniors to use public transportation, compounded by the infeasibility of instituting system level changes, called into question the practicality of getting any significant number of seniors to switch to public transportation.

It became clear that seniors have a strong desire to maintain their independence and the car is a quintessential sign of that independence [2, 10]. As discussed in the introduction, CCRCs provide a concentrated population of seniors that are social, healthy, and active in a safe and managed environment. Residents are interested in social interaction and accustomed to engaging in activities with other residents.

The Senior Travel Buddies concept is a ride sharing system in which seniors still retain mobility through automobiles, but instead of each senior taking their own car to the same destination, seniors share rides to

the same event. CCRC administrators are the target users of this system, which they will use to manage trip schedules, define new trips residents are planning to take, and add other residents to the planned trips. As noted above, the majority of residents do not own a computer. In addition, respondents to our online survey of CCRC administrators indicated that the majority of residents contact them in-person or via telephone, so our solution allows the residents to continue using the mode of communication they are already comfortable using. Focusing on CCRC administrators as our target user group allows us to hide all technology involved in our concept from seniors, while still affecting their behavior. The information about trip availability would be communicated to the residents via schedules posted in common areas. Based on an on-going survey we have sent to CCRC administrators nationwide, all CCRCs have some system in place to communicate activities to residents and all of the locations currently post schedules and distribute fliers.

opportunity to make some new friends and will join Bob Li's planned trip. Patricia places a call to the event coordinator and is quickly added to the trip with Bob Li. The next week, Bob, Patricia, and another resident all ride together to the senior club, enjoying their increased socialization while also reducing their fuel consumption.

**Prototype**

A paper prototype (Figure 1) was developed to test the usability of the interface with CCRC administrators. The main interface of the model (Figure 2) uses a simple calendar-based interface displaying all of the scheduled events available. When the user selects a resident by clicking on their icon, those days on which they are participating in an activity (driving or riding) are highlighted. To create a new trip or add the selected resident to an existing trip, the administrator simply double-clicks on a date or drags the resident's icon to that date. The dialog shown in Figure 4 can then be used to add the profile for a new trip or join a resident to an existing trip. This model presents the user with a consistent interface based on a concept they are already familiar with (the calendar), and contains a minimal number of screens to learn.

To reach a broader range of potential users, we developed a video-based prototype of our system including audio explanations. This prototype was distributed to CCRCs around the U.S. to elicit additional feedback.

**Evaluation**

We conducted an evaluation of our paper-based prototype using Scenario Based Testing (SBT) with coordinators of retirement communities such as the

**Scenario**

Bob Li, a resident at the Golden Years retirement community, calls the event coordinator to report he is planning a trip to the local senior club on Sunday November 12th. Bob describes the local senior club event as a casual environment in which to meet new senior friends and he is willing to take two additional residents. Using the Senior Travel Buddies system, the coordinator creates a new trip profile for the event. At the end of the day, a trip schedule sheet detailing trip events is posted in the dining room and other public areas throughout the community. Patricia Ping is new to the community and unfamiliar with the local area. Instead of risking the chance of getting lost while driving around the city, she decides this is an

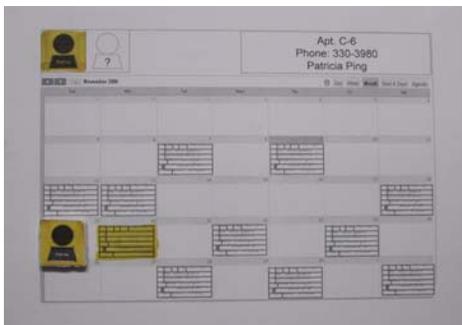


Figure 1. Paper Prototype

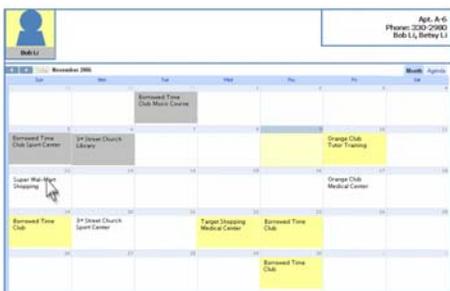


Figure 2. Main Calendar View

Redbud Hills and Bell Trace Retirement Centers. We first described the overall aim of our project and then presented the subjects with two scenarios: a resident calling to create a new trip, and a resident joining an existing trip. During the test we asked the subjects to think aloud. We observed and videotaped the testers as they manipulated the model and followed up with questions after the test.

Overall the usability tests provided a number of insights into which features worked well for our target user group and what features users would have difficulty understanding. Based on our tests, the system is feasible for users with some computer experience, but as one of the administrators pointed out, this is an industry with high turnover (60-80%) and many of the employees are not very experienced with computers. With such high turnover, they emphasized that the system must be easy to learn. Based on our testing and the need to address a user base that may lack computer skills, we altered some features of our design to keep the operation as simple as possible and easy to learn. The particular design issues raised during testing include:

- The first step in interacting with the system is to click on the icon for a resident (the residents in an apartment are identified using caller ID). The testers did not notice these icons and instead started by clicking on a date in the calendar. To address this, the calendar is now initially grayed out and the "Select Resident" popup window is displayed (Figure 3).
- In the schedule of events for a single date in the calendar we had shaded "people shaped" icons that indicated the number of passengers who could still join a trip, but these were sometimes interpreted as

residents who had already joined a trip – not available slots. This was modified to differentiate residents who have joined a trip from remaining slots (Fig. 4).

- Although the daily schedule had icons to indicate residents had joined the trip, it did not easily indicate to the coordinator who these people were. To address this, a tooltip will be displayed when the user moves the cursor over the icon representing a resident who has joined the trip (Figure 4).

### Conclusion

The Senior Travel Buddies system can increase ride-sharing among seniors living in CCRCs and other retirement communities throughout the U.S. by leveraging the characteristics of the CCRC population and the infrastructure already in place. In addition, it will increase the socialization of seniors – an important factor in their continued physical and mental health. To estimate how much this approach would reduce pollution, we calculated the reduction in carbon emissions if CCRC residents switched to using ride-sharing for only 30% of their travel needs. Based on our observations when visiting CCRCs, automobiles such as the Buick LeSabre are popular among residents, and the estimated highway mileage for this car is 19mpg in city driving [14]. Using the Climate Care carbon calculator [4] a senior who drives only 5,200 miles per year would generate 2.87 tons of carbon dioxide. If each shared ride consisted of only the driver and two other residents, the CO<sub>2</sub> generated by the passengers would decrease to 2.009 tons, for an average of 2.296 for the driver and passengers. With a current estimated CCRC population of 725,000, [1] the net reduction in CO<sub>2</sub> emissions would be 416,150 tons. However, in addition to being applicable to the 2,240 CCRCs in the U.S., there are also 32,886 assisted living

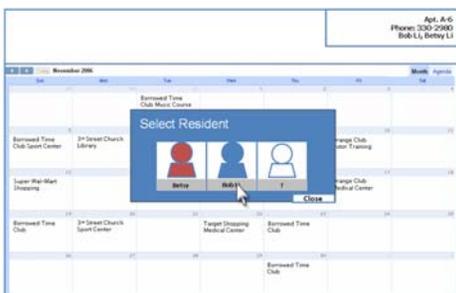


Figure 3. Select Resident Window

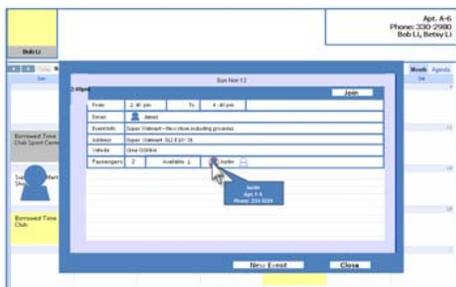


Figure 4. Schedule Details Window

residences and 21,203 senior housing residences where this approach may also be applicable.

To determine whether residents would actually use this system, in our survey of CCRC administrators we included a series of questions using a Likert scale to get their estimate as to whether their residents would be interested in getting rides from other residents, providing rides to other residents, and taking/providing rides to residents they did not previously know. The responses we received indicated that residents were expected to have at least a medium level of interest with some administrators estimating a high level of interest. In addition, when discussing the concept with an event coordinator during our usability test, she felt residents would be interested in the approach as long as the other passengers were from the retirement community.

### Acknowledgements

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