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Designing a Touch Screen Kiosk for Older Adults: A Case Study

By Barbara Chaparro & Laszlo Stumpfhauser[1]

An independent-living senior center recently approached us with a request to "build a system that could track the fitness activity of their approximately 160 older residents." The center houses a Fitness Club that offers seven different fitness classes, personal training, physical therapy, a pool, a spa, and access to a multitude of exercise equipment (i.e., stationary bikes, treadmills, and weights). At the time of the request, residents were signing their names and activities on a sheet of paper as they entered the Fitness Club. Occasionally, the sign-in sheets were summarized into monthly reports to show resident attendance by class and the type of equipment they were using. This was a time-consuming process, however, for the Fitness Club staff, and was prone to data entry error.

It was obvious that if the sign-in procedure could be automated or computerized, tracking would certainly be easier. The user profile of the residents using the center revealed a wide range of visual and auditory ability, as well as differences in motor skills (with some residents using a walker or electric cart). They ranged in age from 71 to 101 with a mean age of 86. Thus, a new system with the following goals was proposed:

- easy to use for the non-computer literate
- easy to see for the visually-impaired
- easy to use for the motor-impaired
- more efficient to use than the current paper method (take less time to sign-in)
- more efficient to report usage than the current paper method

Automated methods of signing-in, such as ID cards with bar codes were examined, but rejected for a variety of reasons related to existing internal processes at the senior center. Given that the residents would need to sign-in themselves, we decided to create a touch screen application to facilitate this process.

A tracking program, called FitnessTrack, was developed using Visual Basic 6.0 and Microsoft Access. The primary goal of FitnessTrack was designed to be as simple as possible. Since signing-in to the center could not be strictly mandated, it was very important that the targeted users readily accept the new system and understand its importance to their well-being, as well as to the senior center as a whole. Our goal was to minimize the number of touches necessary to enter the resident's name and fitness activity so that the time required to sign-in was either faster or equal to the current sign-in process.

Originally, FitnessTrack was designed to have three screens (i) a screen to identify the resident, (ii) a screen to identify the activity, and (iii) a screen to confirm the resident name and activity selection. Screen shots from an early prototype are shown in Figures 1, 2, and 3, respectively.

To use FitnessTrack, residents would touch the first letter or letters of their last name on the keyboard to view their name on the list. Then, they would select their name on the list and touch the Continue button to bring up the Activity screen. On this screen residents would select the appropriate activity or activities, and then touch the Done button. The Yes or No button was then touched to confirm the

activity(ies) selected.

Several iterations were made to the FitnessTrack application to accommodate for resident capabilities and observed usability problems (revised screens are shown in Figures 4 and 5):

1. Button sizes of the on-screen touch keyboard were increased in size (2.5cm x 1.5cm) to insure successful targeting (button sizes well-exceeded anthropometric standards for adult-sized hands). Active regions of the keyboard buttons were expanded so that there was no 'dead' space in the entire keyboard.
2. Font sizes were increased to 18-26 point Arial to maximize readability.
3. A delay was programmed into each button response (on all screens) so that multiple touches were treated as single touches. We noted that in the early iterations, many of the residents had motor tremors that caused them to touch the screen (inadvertently) more than one time in succession. This resulted in repeated letters from the keyboard or activities that were selected and then immediately deselected. This occurred most times to the users' surprise and in some cases caused erroneous data to be stored. The forced delay after each touch caused the program to 'ignore' multiple touches so such surprises did not occur.
4. Check boxes were replaced by toggle buttons, since users were unsure whether they had to touch the small check box or the name of the activity to select it. Even though the program accepted either touch, the toggle buttons eliminated this confusion.
5. The third screen (confirmation screen, Figure 3) was deemed unnecessary and eliminated. Many times the residents would walk away after touching the Done button on the second screen, thus not completing the sign-in procedure. Even those that did view the third screen did not take the time to read the text.

CONCLUSIONS

A gradual roll-out of FitnessTrack, coupled with active user involvement throughout the design and development resulted in high acceptance of the new technology. Today, the average resident can sign-in in a matter of seconds (typically faster than a written sign-in). Fitness Club employees now are able to generate monthly and quarterly reports to monitor class attendance, equipment utilization, and to plan future activities. In addition, this project sparked interest in new applications to track other resident activities so that their needs can be better met.

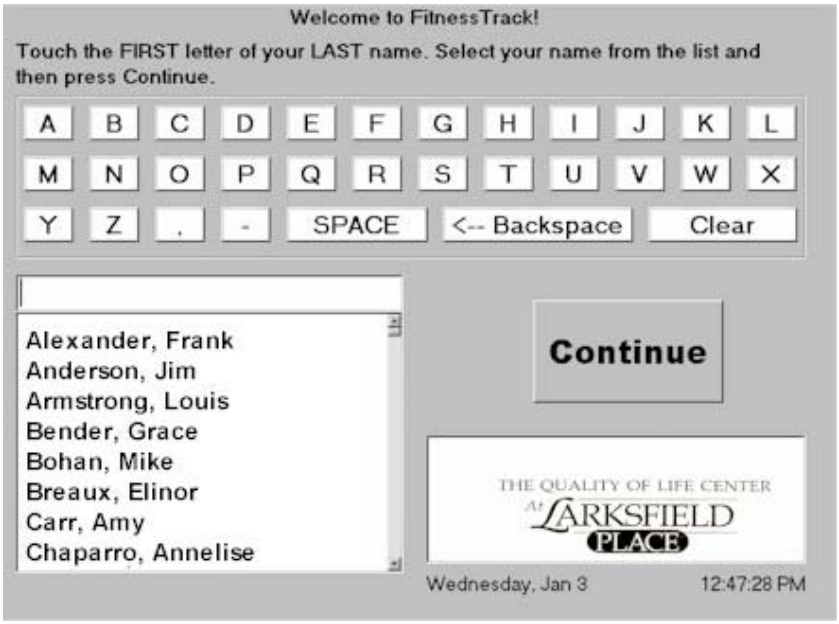

Figure 1. FitnessTrack sign-in screen. Residents touched the first letter(s) of their last name to 'scroll' to it in the list.

Figure 2. FitnessTrack activity screen. Residents touched the activity or activities in which they intend to participate.

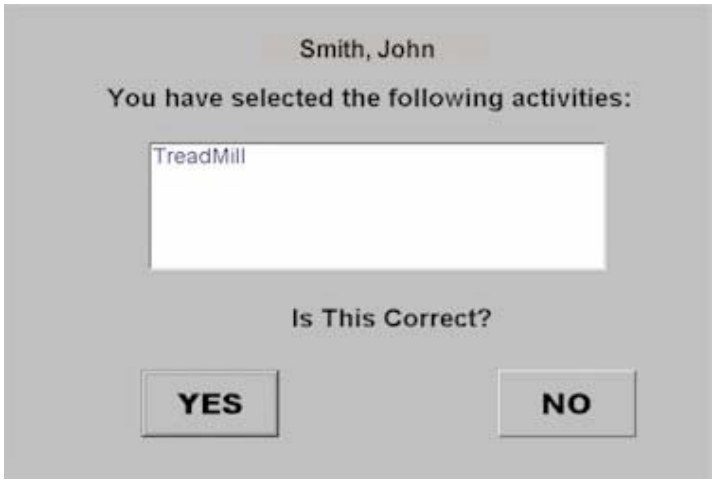

Figure 3. FitnessTrack confirmation screen. This screen was eliminated after residents became comfortable with the sign-in procedure.

Figure 4. Revised FitnessTrack sign-in screen. Button sizes and font sizes were increased to insure more accurate touching.

Figure 5. Revised FitnessTrack Activity screen. Check boxes were replaced with toggle push buttons to improve accuracy and to reduce touch confusion.

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