E-AMIGO: ASSISTANT FOR THE INTELLECTUALLY DISABLED

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ABSTRACT

The intellectual disabled are particularly impacted in the area of daily living skills. They often have trouble remembering routine tasks such as making dinner or taking a bath, or infrequent events such as doctor's appointments or sporting events. The e-Amigo seeks to alleviate this problem by providing event notifications through the use of a portable digital aid. Designed to accommodate the unique needs of an intellectually disabled individual, the e-Amigo incorporates a durable, elegant, and inconspicuous form with an easy viewing display screen. The screen displays event reminders at preset times to alert the patient of an event, accompanied by the voice of a caregiver. The portable device synchronizes with customized calendar software on the caregiver's computer, providing the caregiver full control over his or her patient's schedules. The initial prototype of the e-Amigo was implemented using a PDA and tested with professional caregivers. Finally, client evaluation of the e-Amigo prototype confirmed that the device has met its initial goals of aiding intellectually disabled people in conducting daily living tasks. Key recommendations for future improvements are button functionality for the PDA and scheduling application for the caregivers.

INTRODUCTION

Developmental Disabilities refer to severe and chronic disabilities that are attributable to an intellectual or physical impairment that begins before an individual reaches adulthood [1]. Intellectual Disabilities is a particular state of functioning that is characterized by both limited intelligence and adaptive skills [2]. According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR), published by the American Psychiatric Association (APA) [3], three criteria must be met for one to be diagnosed with an intellectual disability: an IQ below 70, significant limitations in two or more areas of adaptive behavior (the ability to function at age level in an ordinary environment), and evidence that the limitations became apparent in childhood.

The proportion of people with Intellectual Disabilities in North America is between 1% and 2%, which closely parallels the worldwide proportion of 1.4% [3]. The number of older adults with Intellectual Disabilities is increasing, because life span is increasing. Life expectancy of intellectually disabled people increased from 20 years in the 1930s to 60 years in 1980. Average life expectancy has increased by about 30 years for those with Down syndrome, which is the most recognizable form of Intellectual Disabilities. Current estimates suggest that more than one half a million Americans over the age of 60 are suffering from Intellectual Disabilities. This number is expected to double by 2030 [4]. Intellectual Disabilities are associated with many problems. Approximately 50% of intellectually disabled adults cannot care for themselves. These problems tend to increase in later life, because of continued mental decline with age. 1 out of every 10 intellectually disabled adults is totally dependent on others [4].

Over 75% of adults with Intellectual Disabilities live at home and are cared for by family members. This often leads to a crisis when family members are no longer able to provide adequate care or cannot manage a behavioural problem [4]. At-home and community supports range from one-to-one assistance from a caregiver with specific aspects of daily living (such as budgeting or shop-

ping) to full 24-hour support (including assistance with household tasks, personal care, dressing and the administration of medication). Some people with Intellectual Disabilities live in residential accommodation, also known as group homes, which are staffed around the clock.

SPECIFIC PROBLEM AREA

Intellectual Disability encompasses a broad variety of infliction. Daily living skills can be addressed through focusing on individual tasks that a patient performs. Daily living problems are encountered by all intellectually disabled persons.

SCHEDULING & NOTIFICATION SYSTEM

Caregivers are responsible for inputs into the base scheduler, which in turn communicates with a portable component that notifies the patient of their scheduled events. The two components of the system – the base unit and portable component, are the focus of the concept generation, and comprise the overall functionality required by the concept. Having a base unit for storing scheduling inputs is consistent with current caregiver practices, and offers a single point of contact for recording and viewing calendar events. A portable component is essential to allow patients to receive event notification regardless of their physical proximity to the base unit, and greatly increases the likelihood that the user views the notification.

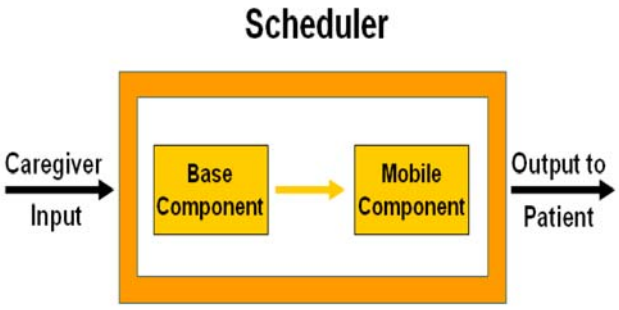

Figure 1: Systems Framework for Problem

In order to clarify how the device will assist caregivers and patients in recording and being reminded of events respectively, a scenario follows which will demonstrate the hypothetical device in action. Person A, a caregiver, is responsible for the care of four intellectually disables persons within the home. Person A has an office with a desktop computer. Person C is one of the people under Person A's care, a mildly intellectually disabled individual who is active in sporting and group activities. Person C needs reminders for daily, weekly and infrequent activities. Daily activities include meals, baths, and taking medication. Weekly activities include family visits and soccer games. Infrequent activities include doctor's appointments and volunteering programs. Currently, Person A has all of Person C's activities recorded in her planner. Whenever an important event is about to occur, Person A locates Person C inside the home to remind him of the event. With the device, Person A will be recording Person C's daily, weekly and in frequent tasks on a calendar program on her desktop computer. When any changes to Person C's schedules occur, Person A makes the corresponding changes on her calendar software. Once a week, Person A will synchronize the portable device with her computer, ensuring that all of Person C's activities are updated on the portable device. Once the synchronization is complete, the portable unit is returned to Person C. Now, whenever Person C has an upcoming activity, such as a meal or soccer game, a reminder automatically displays on the portable device, as well as sounds that alert Person C. So at 7:55, 5 minutes before dinner time, Person C's portable device, which is inside his pocket, begins to chime, alerting Person C and causing him to pick the device up from his pocket and view the display scene. On the display scene, Person C will see a reminder that dinner will be starting at 8:00, prompting him to head towards the kitchen and join his friends for dinner.

As demonstrated in the scenario, we determined that the personal computer will act as the base unit. The personal computer provides a familiar environment to caregivers, and enables the group to develop or modify scheduling software. Caregivers will be able to use the scheduling software to set up the schedule for multiple patients. In setting up the schedule, the caregiver enters the par-

ticular task/event, the time and day the event occurs and the type of task it is (weekly, daily, infrequent). This information is recorded in a database, which stores all scheduling information for the upcoming week for all patients. Once this is done, the next step is interfacing and synchronization with the portable devices. Once done, the caregiver can then synchronize with the patient's portable device to load the information, whereupon the caregiver can schedule tasks for the next patient. Synchronization will occur in the background once the portable device is connected to the computer.

Each patient will possess a portable device, which interfaces with the base unit and displays the patient's schedule for the upcoming week. The portable device will possess a software output interface that will display upcoming tasks to the patient in real-time, according to the schedule data entered by the caregiver in the base unit. From the numerous concepts, four main devices were established for the portable unit. These are illustrated in Figure 2.

Figure 2:Watch, Cell Phone, PDA and PDA as Portable Devices

Personal Data Assistants (PDAs) provide many of the functionalities found on desktop computers in a compact form, and provide a unique input method in the form of a touch screen. Mobile Phones are ubiquitous among adults, and also offer software capability. The Microsoft Smart Watch is a line of watches capable of running software. It provides ultra-portability and the required amount of processing power for scheduling tasks. The PlayStation Portable (PSP) is capable of running scheduling games that can be oriented towards the intellectually disabled. There are several common characteristics that the portable concepts share. They are all small and portable, provide visual and auditory cues, which can be utilized in alerting users of notifications, and can run custom-built software. towards daily living skills.

DISCUSSIONS

The goal of the first set of consultations with Person D and Person E (representatives of facilitating organizations) was to determine whether daily living was common problem among the intellectually disabled. Person D and Person E both confirmed that patients frequently encountered problems with daily living tasks and the group knew the project was heading in the right direction. A significant fact was revealed when the group consulted with Person A and Person B (potential users). Patients could easily learn how to do daily living tasks, but they had issues with remembering when to do the tasks. This fact coupled with research done on prompting systems led the group towards a solution that properly notified the user of the task. Person A, Person B and Person C, an intellectually disabled individual, also discussed what their needs for the device were. There were three key customer needs that shaped the concepts that were generated. First, the device had to be portable as patients were very active. The portable requirement led the group to think of having a base unit and a portable unit that could be carried along. Secondly, the device had to visual and audio cues, as some patients were illiterate. The cues requirement meant that the device had to have a display and a speaker. Thirdly, the device had to have professional aesthetics that would make the patient feel normal when using it. All three needs led the generation of the cell phone, watch, PDA and PSP concepts for the portable unit. In the third consultation, Person C and Person B discussed ideas that were pertinent to the form of the final prototype. As a group member showed them the Samsung P207, they noted how

"snazzy" and cool the cell phone looked. Based on their feedback, the group modeled the form of prototype after the Samsung P207. Issues to further explore include compliance, loss of device, as well as recognition and acknowledgment of reminder cues.

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