ABSTRACT
In this paper, we explain the design of a web application system to be used on a mobile tablet by autistic adults. A prototype system has been designed and implemented. The system will assist these individuals with their tasks in the workplace, which they would not otherwise be able to do on their own. Supervisors (or coaches) of these special needs persons will also be able to use this system to create and manage tasks.

KEY WORDS
Autism spectrum disorder, personal assistant, user interface design, web application

1. Introduction
Special needs groups such as the autistic community require assistance before they are able to work (function) independently without a personal supervisor or coach. Autism has been identified as the fastest growing serious development disability in the United States. Autism Spectrum Disorder (ASD) range in severity, “with autism being the most debilitating form while other disorders, such as Asperger syndrome, produce milder symptoms [1].” Individuals with ASD are often characterized by difficulties with social interaction, verbal and nonverbal communication, and engagement in repetitive behavior [2]. Recent statistics [3] from the U.S. Center for Disease Control identify around 1 in 88 children with ASD.

In this paper, we explain the design of an interactive Personal Assistant Webapp System (iPAWS). While other personal assistant applications such as TrapIt [4] represent a way to content discovery and consumption, the iPAWS frontend user interface (UI) provides tasks to assist these individuals with their assignments in the workplace. This frontend user interface which caters to these needs has already gone through several revisions of design, been properly tested, and implemented [5] for the Apple iPad. As such, the frontend design will not be discussed here. This paper focuses on the backend design of iPAWS instead. The backend design will be used by supervisors and a manager. As a special note, the term User is used to refer to the autistic individual, whereas user means a general person who uses iPAWS.

2. The Personal Assistant Web Application System
The overarching goal of iPAWS is to help autistic adults complete their tasks in the workplace with minimal to no supervision. By utilizing a mobile tablet such as the Apple iPad, these individuals can follow directions which are clearly articulated for their specific tasks. Researchers have studied different modes of learning for people on the autism spectrum such as using modalities on human computer interfaces to understand their behavior and ability [6], developing a computer-aided tutor for language learning [7], and computer-mediated dialogue for educational assessment [8].

2.1 Users
Autistic adults who are currently employed are Users on the frontend of iPAWS. Frequently, these individuals require supervision or coaching to complete tasks at their workplace. iPAWS provides supervisors with the capability to create tasks with step-by-step instructions to guide Users through their tasks. Figure 1 shows three example tasks that are assigned to one particular User. These tasks are separated into different categories.

Figure 1: User’s Task Page
Other users of iPAWS are the manager and supervisors who use the backend UI. Although these users may any browser to do their work, this system was designed to work particularly on the Google Chrome browser. Implementation of the prototype system was done using jQuery \[9\] and jQuery Mobile \[10\]. Design of the backend system will be explained in the next sections.

3. Manager Responsibilities

The manager’s role is mainly administrative and is limited to only a few functions in iPAWS: create new accounts for supervisors and Users (and possibly another manager), manage account information, and generate reports. After logging into iPAWS, the manager will be able to see all users in the system (shown in Figure 2). The name of each user and their role is clearly shown on the home screen. In general, the left side of the screen displays the main menu choices (including Home and Logout) while the right side of the page is the main content area.

3.1 Account Creation

The manager is responsible for creating new accounts for supervisors and Users in iPAWS. This usually happens when a new supervisor or User joins the organization. The manager can create a new account by selecting the Create Account button from the menu on the left (see Figure 3). On this page, new account types are chosen by choosing the user role options: User for the autistic individual or Supervisor for a new supervisor account. The manager has the option to upload an image for the new account as well on this screen.

3.2 Account Management

Besides account creation, the manager is also responsible for updating account information. After the manager selects a particular user on the Home page, the Update User Information page is shown (see Figure 4). Existing information will be pre-populated into their respective fields. Information for this user can now be updated in the system. The user’s account may also be disabled on this page by selecting the Disable button. Note that disabled accounts are not deleted from the system.

3.3 Reports

Report generation is an important component of iPAWS. The manager can generate reports for Users in the system. They may be generated on a weekly or monthly basis, or on an as-needed basis. Reports may be generated for a single user or all users. Information included on a report are sorted by User name and will include the following information: user’s name, tasks that are assigned to the
user, start and end times for each task, the number of steps completed in each task (if the task was attempted) or incomplete if the task was not worked on, and the IP address of the task.

Figure 5: Report for Single User

4. Supervisor Responsibilities

Supervisors are the work horses in iPAWS. They do the bulk of the work in the system. Their primary responsibilities involves the creation of new tasks, adding steps to tasks, and managing tasks which includes updating, deleting, and assigning them to the User. The supervisor's home page is shown in Figure 6. One nice feature on this page is the ability to see Users that are currently logged into iPAWS. Only Users that have tasks assigned to them by this supervisor will appear on the content area. In figure 6, User two appears along with all his assigned tasks.

Figure 6: Supervisor Home Page

4.1 Task Creation

One of the primary responsibilities of the supervisor is to create tasks that Users need to assist them in their work. Task creation includes creating main steps as well as detail steps within a main step. The main steps guide the User through their daily job. For supplementary help, the User can look at detail steps within main steps. An example task would be to assist the user in shelving books at a library. Figure 7 shows the Create New Task page in iPAWS. On this page, the supervisor can enter the task name, a description of the task, a category that the task belongs, and the option to include an image that describes the task. After all the information has been entered and the Next button is clicked, the supervisor is brought to the Add Main Step page where he has the option to start adding steps for the task. This is described in the next section.

Figure 7: Create New Task Page

4.2 Step Creation

After a task has been created, the supervisor is routed to the Add Main Step page (see Figure 8).

Figure 8: Add Main Step Page
On this page, the task name, task description, category, and task creator are automatically shown at the top of the page. The supervisor can now add a description for the first main step in the Main Step Description area. For added assistance to the User, the supervisor can upload a video as a visual aid as well as an audio file for audio aid. At this point, the supervisor can add one or more detail steps for the current main step. He does this by clicking on the Add Step button. The New Detail Step panel opens (see Figures 9 and 10) to allow entry of detail step instructions.

When all detail steps have been entered, the supervisor simply clicks on the Finish button to complete the task creation.

He can now click on this particular task in the content area to review the task’s instructions.

4.3 Task Management

After tasks have been created, the supervisor can review all of his tasks by clicking on the View Your Task button. Figure 11 shows the resulting page. At the present time, he has only one task created, the “Shelving Books” task.

The supervisor can edit individual tasks to add, remove, or change instructions within the task. Suppose the supervisor clicks on the Shelving Books task on his View Your Tasks page. The supervisor is then brought to the Task Edit page (see Figure 12). On this page, the supervisor can change the task name, task description, or category that the task belongs. Changing the task name may cause a problem if a User is currently using that particular task in his work. This is a scenario that must be investigated for a solution in the future.

Figure 12 shows that there are currently five main steps in the Shelving Books task. If the supervisor decides that a main step needs to be updated, he can click on that particular step. Suppose he clicks on the first main step which is “Check the spine label on the book.” This action brings him to the Edit Main Step page (see Figure 13) where he can now change the description of the main step or click on a detail step to update that particular step.
If he chooses to click on a detail step, then he will be brought to the Edit Sub Step page (see Figure 14). Here he can update the detail step description and upload an image, if he chooses to do so. Clicking on the Update button will bring him back to the Edit Main Step page.

At this point, all tasks that have previously been assigned to the user are shown (see Figure 16). Currently, there are three tasks given to this particular User, “Search the meaning of a word from a dictionary”, “Photo Copier”, and “Make Tea.”

Next, the supervisor can select the appropriate checkbox from his task listing (under Your Tasks in Figure 17) to assign them to the chosen User. In this case, we have selected the Shelving Books task.

After clicking the Assign Tasks button on the page, the Shelving Books task will be added to the Assigned Tasks listing for the user, as can be seen in Figure 17.
5. Conclusion

The backend design of iPAWS has been described from the viewpoint of the manager and supervisor. The goal of this design was to create a simple yet easy to navigate system for the users. After several iterations of the design, a prototype of iPAWS was successfully implemented and tested for feature discovery. This provided us with many good insights to the workings of iPAWS. We will investigate the “good” and “bad” features of this prototype and plan to design and implement a better system in the near future.

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References:


