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Educational App for Children with Autism Spectrum Disorders (ASDs)

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Abstract

Children with Autism Spectrum Disorders (ASDs) are usually diagnose by the disturbances in the following domains; social relatedness, communication/play, and restricted interests and activities. As a result, interacting and communicating with children with ASDs are very intricate because of their lack of verbal and nonverbal communication skills. Understanding the needs of the children are also a very challenging task because of their difficulty in expressing their needs verbally, i.e. using gestures or pointing instead of words. To facilitate their social interaction, special effort needs to be made by parents and caregivers. Hence, Educational App for children with ASDs is developed to assist them. The application helps children with ASDs to improve their social life in interacting and communicating with others while helping their parents and caregivers to understand what the children really needs. At the same time, the application can be easily customized (i.e. adding activities) as the needs arise.

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1. Introduction

The diagnosis of Autism Spectrum Disorders (ASDs) requires disturbances in each of following domains: (a) Social relatedness includes marked impairment in non-verbal communication, peer relationships and social-emotional reciprocity, (b) Communication/play includes either a delay or total lack of spoken language and lack of developmentally-appropriate make-believe or social play, and (c) Restricted interests and activities includes encompassing preoccupations, adherence to non-functional routines or rituals, stereotypes and motor mannerisms [1]. As a result, interacting and communicating with children with ASDs can become very intricate because of their lack

of verbal and nonverbal communication skills. Consequently, children with ASDs are placed in a special education system to cater and meet their unique educational needs.

Augmentative and Alternative Communication (AAC) interventions have been shown to improve both communication and social skills in children with ASDs and other developmental disabilities. Studies show the introducing AAC in Early Intervention Program (EIP) can help the children with ASDs to fulfill their potential [2]. As the cost of acquiring a treatment for children with ASDs is very prohibitive, a cheaper alternative to help these children is needed. Often, a simple app was developed for iOS devices [3, 4] to accommodate the rising demands.

Hence, Educational App for children with ASDs is developed for iOS devices to focus on giving a solution to verbal communication problems, which can give the children a useful way of communication and interaction with others. Because children with ASDs have a difficulty in expressing needs verbally, i.e. using gestures or pointing instead of words, the app will give a new alternative that allows the children to select and choose what they need (or want to say) and thus avoiding any unwanted miscommunication.

This paper is organized as follows. Section 2 outlines the related work on helping children with ASDs. Section 3 introduces the design and implementation of the educational app. Section 4 elaborates the educational app in detailed. Finally, Section 5 provides the conclusion.

2. Related work

Concerning related work on application that help children with ASDs, several applications have been developed in the literature. Thus what follows is our survey on three existing applications.

Maite Frutoes et al. developed a desktop computer application categorized as serious games to help children with ASDs to learn new vocabulary and enhance their pronunciation of the new word [5]. The application used a voice recognition system to detect the correct pronunciation by the children.

Another approach is called iPrompts®[6] which is a software application for iOS devices. iPrompts® provides visual support to individuals with ASDs. The application enables the caregivers to create and present visual schedules, visual countdown timers, and visual choices, to help individuals with ASDs stay organized, understand upcoming events, and identify preferences.

Picaa[7] is another software application for iOS devices and designed to cover the main phases of the learning process: preparation, use and evaluation. It includes four kinds of educational activities (Exploration, Association, Puzzle and Sorting), which can be personalized by educators at content and user interface levels.

3. Approach and method

The app is divided into two main use cases, based on two types of users, for children with ASDs and for their parents and caregivers as shown by the flowchart of the application (referring to Fig. 1).

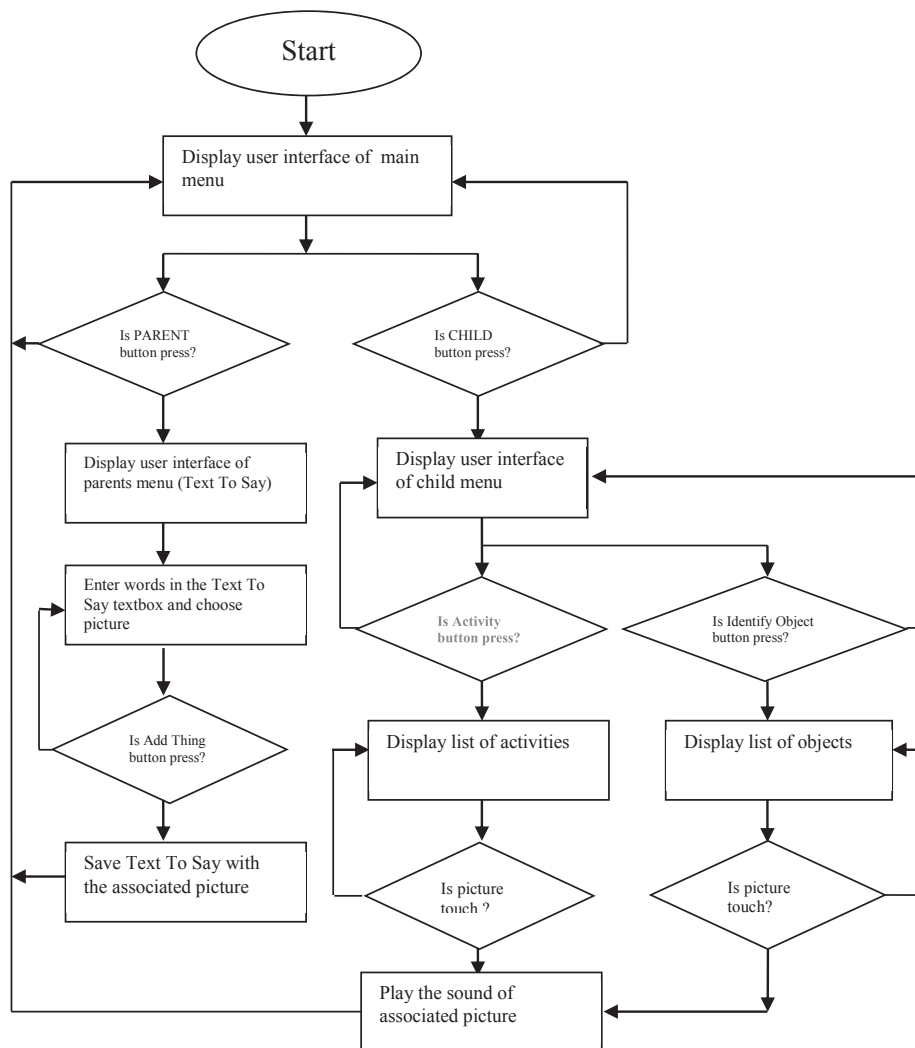


Fig. 1. Flow chart of the app

4. Result and discussion

Fig. 2.1 shows the user interface of the main menu. Here, there are two options, either pressing the PARENTS button or the CHILD button. Selecting the PARENTS button will open another screen for the parents to add activities for their children with ASDs while selecting the CHILD button is for the children with ASDs to start their own activities.



Fig. 2.1. User interface of the main menu.

Based on these two main flows, the following sub-sections discuss their functionalities.

4.1. Selecting the PARENTS button

Referring to Fig. 2.2, here, the parents can easily customized the app by adding activities to suit the needs of their children with ASDs. As shown in Fig. 2.2 (a), the parents can key in any text for the activities in the Text To Say's textbox. Then, the text can be associated to any picture in the photo gallery.

The paired text and picture can be added to the app's database by pressing the "Add Thing" button. For example, the Text to Say entered is "I want to go to toilet" can be paired with a photo related to toilet as shown in Figure 2.2(d).

If there is no picture available that can be associated with the text, the picture can be taken using the build in phone camera. Here, the "Take Picture" button is pressed to add picture taken by the camera. Thus, the pictures will illustrate what to say with sound generated from "Text to Say" textbox which can be listened by the children with ASDs.

The process can be repeated in order for the parents to customize the app with what their children with ASDs needs.

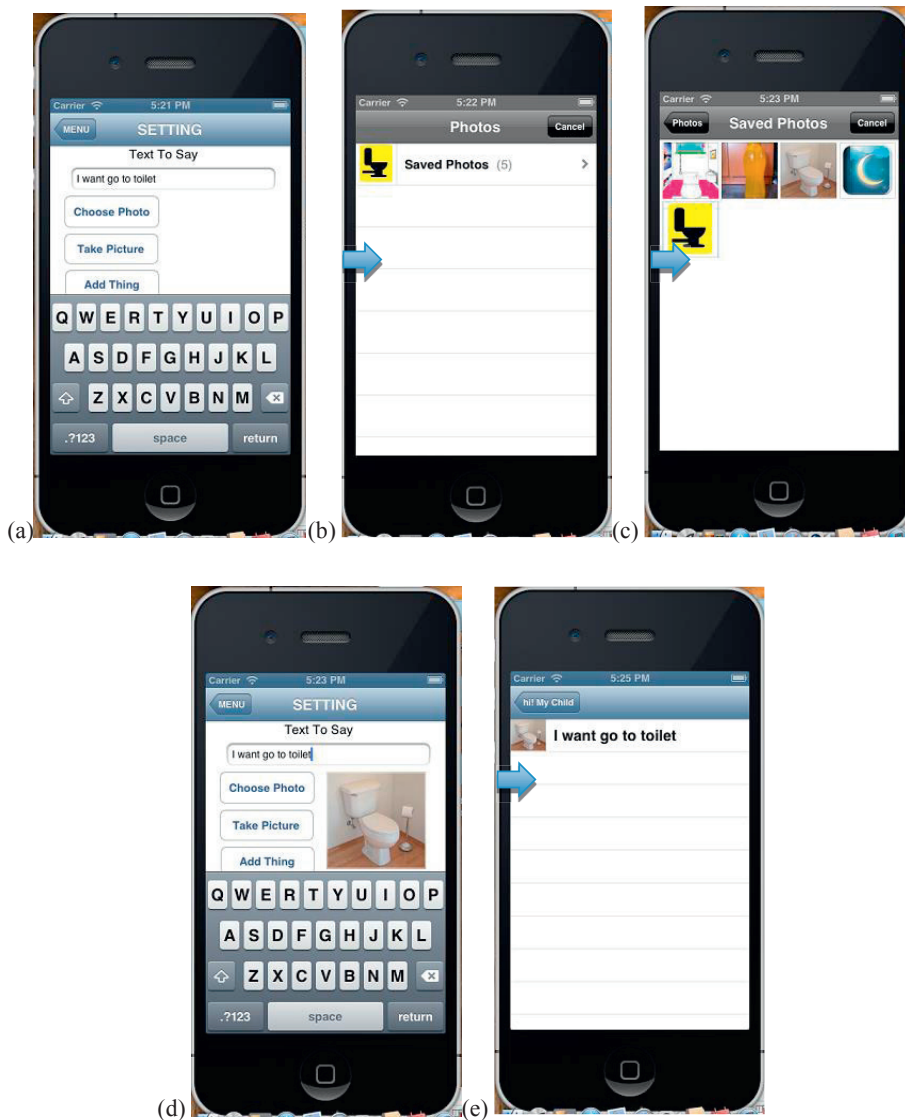


Fig. 2.2. Adding text and associated it with a picture

Figure 2.2(e) shows how the children with ASDs can use this application to express what they are trying to speak out based on pictures. For example, the pictures illustrates toilet which relates to text “I want to go to toilet” that produce sounds “I want to go to toilet”. Therefore, it will help the children to express their needs or what they are trying to do at that given situation.

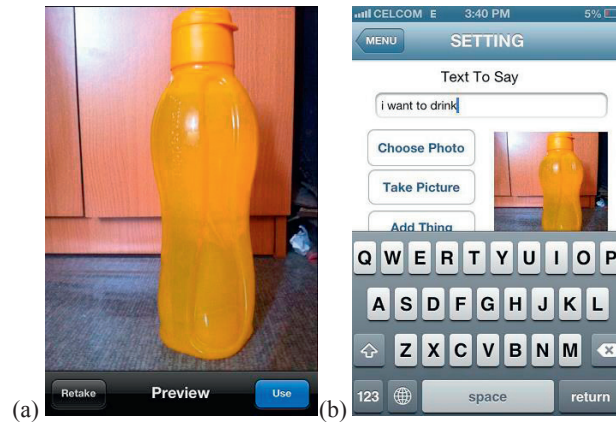


Fig. 2.3. Adding text and associated it with picture taken using the build in phone camera

Fig. 2.3 shows the “Text To Say” entered with picture which related to the text “I want to drink”. The picture was taken from the “Take Picture” button that engages the build in phone camera. This will add the picture with corresponding “Text To Say” into the apps’ database.

4.2. Selecting the CHILD button

Referring to Fig. 2.4, here the children with ASDs have two options, either pressing the Activity button or the Identify Object button. Selecting the Activity button will open another screen as shown in Fig. 2.4(b) for the children with ASDs to communicate on what they want to do.

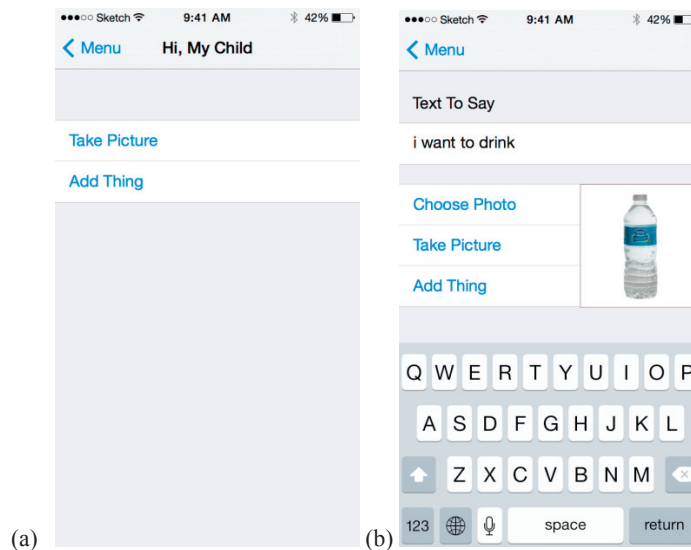
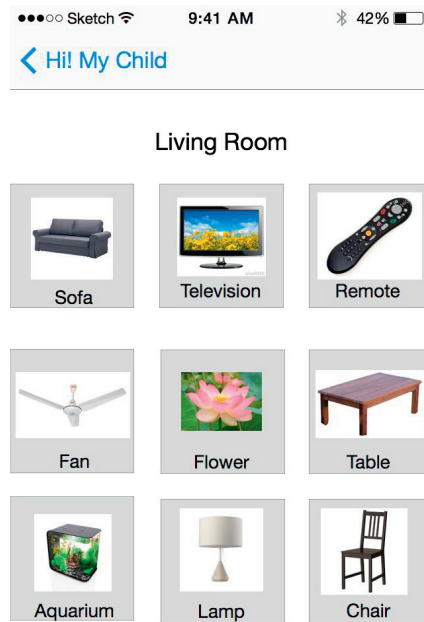


Fig. 2.4. User interface for children with ASDs

On the other hand, selecting Identify Object button will show several screens like in Fig. 2.5. Here, it will list out pictures related to living room, bedroom, kitchen and bathroom. Children with ASDs can interact with the picture and the audio speech associated with the picture will be played.



(a)

Fig. 2.5. Identify object list activities

5. Conclusion

The Educational App is created to help children with ASDs to improve their communication skills with other. By using this app, children with ASDs can follow the process of learning by listening to the audio sound after interacting with the picture of the object. The app can also help their parents to understand the needs of their children because it can avoid any unwanted miscommunication.

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