

## **WHITE PAPER**

BoardSpeaker™

A new alternative augmentative  
communication device

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## A NEW ALTERNATIVE AUGMENTATIVE COMMUNICATION DEVICE

**BoardSpeaker™**- the first Dynamic Overlay™ Augmentative Communication Device

Picture symbol communication is a widely used means of augmentative communication for individuals who cannot speak, allowing even very young nonspeaking individuals a method of communicating. One of the most popular forms of picture symbol communication is the Picture Communication Symbols™ as implemented in the popular Boardmaker™ software, a concept developed by the staff at Erinoak of Mississauga, Ontario, Canada.

In order to facilitate communication using these picture symbols, communication boards are commonly used. Electronic communication boards are typically designed with defined buttons or cells which vary in number and size with each cell capable of holding a picture symbol and an audio message. Depending on the communication ability of the individual user, one individual may work with only one cell with one large picture symbol while another individual may have dozens of cells containing dozens of small picture symbols.

Electronic communication boards generally fall into one of two categories based on their underlying technology. The first category is the digital recording boards that use digitized voice which is inexpensive but lacks versatility. The second category is the computer/PDA based boards that use synthesized speech which is very versatile but quite expensive. Thus there is currently a wide gap in terms of pricing and functionality between these two categories. BoardSpeaker's Dynamic Overlay system fills this gap by offering capabilities significantly beyond that of the digital recording boards yet at a fraction of the cost of the computer/PDA based communication boards. This point is best illustrated by means of a summary table (see Table 1 on page 2) which gives a side-by-side comparison of the different technologies.

<b>TYPES OF COMMUNICATION BOARD</b>	<b>DIGITAL RECORDING</b>	<b>***** NEW ***** DYNAMIC OVERLAY</b>	<b>DYNAMIC DISPLAY</b>
<b>MAIN UNDERLYING TECHNOLOGY</b>	Voice recording chips	Data optically encoded on paper cards	Computer system running Windows/WinCE
<b>EXAMPLES OF MANUFACTURER'S PRODUCTS USING SUCH TECHNOLOGY</b>	<u>Adaptivation</u> : VoicePal <u>AMDi</u> : Tech/Talk <u>Attainment Company</u> : Go Talk <u>Enabling Devices</u> : Communication Builder <u>Saltillo</u> : ChatBox <u>Sym Systems</u> : EasyTalk, DigiCom <u>Zygo</u> : Macaw, Parakeet	<u>Afforda Speech</u> : BoardSpeaker	<u>DynaVox Systems</u> : DynaVox Series <u>Enkidu Research</u> : Impact <u>Prentke Romich</u> : SpringBoard, Vanguard, Vantage <u>Saltillo</u> : ChatPC-II <u>Sym Systems</u> : e-talk <u>Zygo</u> : Dialect, Optimist
<b>DISPLAY</b>	Paper, non-powered	Paper, non-powered	LCD display - requires power
<b>SOUND PLAYBACK</b>	Digitized voice playback	Text-to-speech synthesis	Text-to-speech synthesis
<b>TOUCH INTERFACE</b>	Pressure sensitive switches	Touch screen	Touch screen
<b>OVERLAY MEDIUM</b>	Overlay generally sits on top of pressure sensitive switches thus overlays are subject to wear	Overlay picture cards under touch screen hence not subject to wear	Electronic overlays not subject to normal wear
<b>CHANGING OVERLAYS</b>	Difficult. Requires manual dexterity to change overlays. Also requires re-programming of the messages by an able person when changing overlays	Easy. A simple pull-push action which can usually be done by the individual without assistance. Requires no re-programming when changing overlays	Easiest
<b>EASE OF MASTERING USAGE CONCEPT</b>	Easy	Easy	Can be difficult to abstract the concept of multiple layers behind buttons for some users
<b>BUTTON CELL CONFIGURABILITY</b>	Not changeable, typically fixed number of cells at the time of purchase	Easy, configurable from 1 cell to 54 cells	Easy, configurable on screen
<b>MESSAGE STORAGE</b>	Messages stored inside voice chips. New messages are recorded over the previous messages hence there is no way of saving and re-using previously recorded messages	Messages are embedded on picture cards, easy to re-use, never needs re-recording	Saved on the computer's memory, easy to re-use. (Can also be expanded to accommodate word prediction, semantic compaction, spelling and other language functions)
<b>PRICE RANGE</b>	Ranges from \$179 to \$2355 Typical price around \$500	\$995	Ranges from \$2095 to \$6495 Typical price around \$4500
<b>BATTERY LIFE</b>	Longest	Long	Shortest
<b>DURABILITY</b>	Robust	Durable	Fragile
<b>WEIGHT</b>	Lightest	Medium	Heaviest

Table 1. Comparison of technologies used in communication boards

## Understanding Dynamic Overlay™

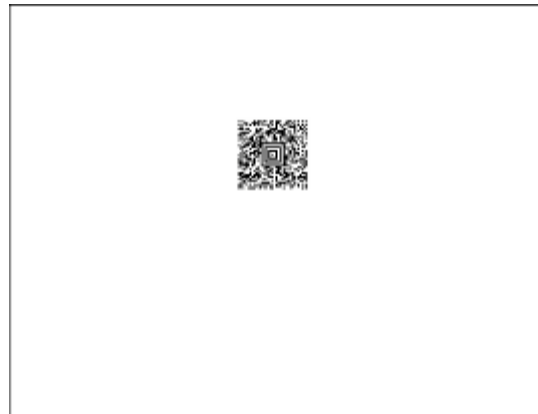
Both digital recording communication boards and dynamic display communication boards have been around for many years. Most readers working in the AAC field are already quite familiar with operation and functionality of these types of communication boards.

BoardSpeaker, on the other hand, uses a new system of Dynamic Overlay picture cards. There are two components that make the Dynamic Overlay system work, the first is the picture cards with embedded information and the second is the overlay changer mechanism. These are described in detail below.

Firstly, the picture cards. Unlike the paper overlay cards used in conventional recording communication board, the paper overlay cards used in the BoardSpeaker contains embedded digital information.



Front side of a picture card



Backside of the same picture card

Shown above is a picture card and its corresponding backside. On the front of this example picture card, the area is divided into nine cells with picture symbols printed in each of the nine cells. On the back side of this card, there is a high-density 2D (two-dimensional) barcode imprinted. For those who may not be familiar with 2D barcode, they are similar in concept to the common UPC barcodes found on grocery goods but they hold much more data. The 2D barcode has following information about the picture card on its front side:

1. Information for mapping each physical cell on the picture card to its corresponding cell on the touch screen.
2. Introductory speech message for this card which is automatically played back one time when this picture card is shown.
3. Speech message to be played when cell #1 on the touch screen is pressed; speech message to be played when cell #2 on the touch screen is pressed and so on...

Because each picture card holds **all** of the information about itself, the picture and its audio messages can **never** become separated. This is one of the key advantage of the Dynamic Overlay system, the picture cards are totally self-contained.

Secondly, the picture cards are shuffled by an overlay changer that allows dynamic, sequential display of the picture cards one at a time to the user **without** requiring the user to physically handle the individual picture cards. Shown below are photos of the BoardSpeaker with its drawer open and its drawer capacity. The overlay changer mechanism holds up to 40 picture cards in its drawer at one time.



Photo showing the drawer opened.



The drawer holds up to 40 picture cards.

To change a card, it is simply a matter of pulling out and pushing in the drawer. This action is very easy to do and can typically be done by the users themselves without any assistance. And if one should need to take out one or all of the picture cards, it is as simple as opening the drawer and retrieving the appropriate cards.

In operation, a miniature camera inside the BoardSpeaker scans the 2D barcode on the back of the picture card each time a picture card is changed as result of opening and closing the drawer. This ensures that the picture card and its corresponding speech information are kept in synchronization. The decoded speech information is then sent to the text-to-speech synthesizer as the particular picture card is shown or when the touch screen is activated.

### **Advantages of Dynamic Overlay**

As can be seen from the above description, the advantages of BoardSpeaker's system of Dynamic Overlay are several:

- a) Inexpensive paper picture cards. There are no electronics of any kind on the picture cards themselves, thus the material cost is basically that of the cardstock material and printing of the cards.

- b) There is never a need to re-record audio messages. Since message information is printed as 2D barcode symbol on the picture cards, this information can never become separated from the picture card.
- c) Fully customizable content to suit individual needs. Teachers and parents can design their own overlay cards with pictures/symbols and speech messages they want. One can set up a library of these picture cards customized for each individual for different occasions or for special events.
- d) Users, including young children, can change overlay cards themselves without requiring outside assistance. No user training is usually required to operate the device.
- e) Picture cards are easy to view and carry, making it ideal for sharing with other persons. No programming of any kind is required by the recipient of these picture cards. All they have to do is put them inside the BoardSpeaker and they can be using them right away!

Also, there are many applications for the BoardSpeaker aside from augmentative communication. For example, there is no need to confine oneself to using only picture icon symbols. By simply changing the content (what is displayed on the picture cards and the audio messages for playback), teachers and parents can create self-narrating children's story books. Or by going one step further, one can create an *interactive* self-narrating children's story book so that when a child touches certain part of the picture, a message associated with that part of the story book plays back. Also, picture cards may include real-life photographs of people, things and places which can then be used as a self-narrating encyclopedia.

## **Summary**

Picture symbol communication remains a popular choice because it is very quick to learn, there is no literacy requirement, and what they learn can be generalized across many aspects of their lives. BoardSpeaker is not intended to replace a high-end dynamic display communication board, but rather, BoardSpeaker is the ideal stepping stone for people who have outgrown the capabilities of the low-end voice recording devices but are not yet ready to master the complexities of the high-end tablet-PCs. Thus BoardSpeaker is the ideal augmentative communication device that fulfills this need in the market place.

Afforda Speech is a Canadian company dedicated to bring affordable speech products to the market place. For more information, see: [www.affordaspeech.com](http://www.affordaspeech.com)

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