ECE 477 Digital Systems Senior Design Project

Homework 5: Packaging Specifications and Design

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Group Number: 12

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Introduction

This goal of this project is to implement a “Digital Picture Box” (DPB) that functionally is used to display to a VGA monitor, a database of pictures stored remotely on a personal computer via the Internet. The DPB is designed to connect directly to any standard VGA monitor or LCD screen and must have a custom TCP/IP server running with its own image transfer protocol in order for the data exchange with the PC to work. A JPEG decoder will be used to decrease network bandwidth requirements of the images.

Physical features include power and status LED’s to indicate the device is on and that a picture is being transferred respectively. Push buttons are used to cycle through the pictures stored on a remote PC. The device will be capable of being controlled remotely with the same functionality as the push buttons. The “Digital Picture Box” design basically consists of a small cubicle casing with push buttons and LED’s on the front and the following connectors on the rear: VGA connector, RJ-45 network connector, power and antennae connectors.

In the following sections all of the key requirements pertaining to the proposed project are discussed. A detailed analysis of similar commercial products is included. Specifications for the packaging of the DPB are included with a detailed rendering illustrating the proposed shape and size. A materials list of components needed for the packaging and a list of required tools is included. An approximation of the DPB’s weight and unit cost is attached. Finally, a list of references to the commercial products considered is included.

Commercial Product Analysis

The digital picture box can be thought of as a modular separation, in terms of function (information processing/decoding/transmission), from the display component of the many CPU enabled or stand alone digital picture frame devices on the market. The DPB evolved from that idea hence a product analysis of a digital picture frame is included. Our design aims to be more flexible, the separation enabling the DPB to operate with any VGA display screen or monitor.

The first commercial product analyzed is the Digi-Frame DF-1710 shown below in Figures 1 & 2. This high definition display in a natural wood frame is wall mountable and loads pictures via CD-ROM, another PC or the internet via Ethernet. It can show JPEG/MPEG-1 content, play MP3's and has many additional features for storage, security, and remote control. The dimensions of the frame are (WxHxD): 17.83" x 14.5" x 2.9" (23.5" x 19.5" x 3.25" with frame) with a screen size of 13.38" x 10.58" and weight of 19 pounds.

Figure 1.

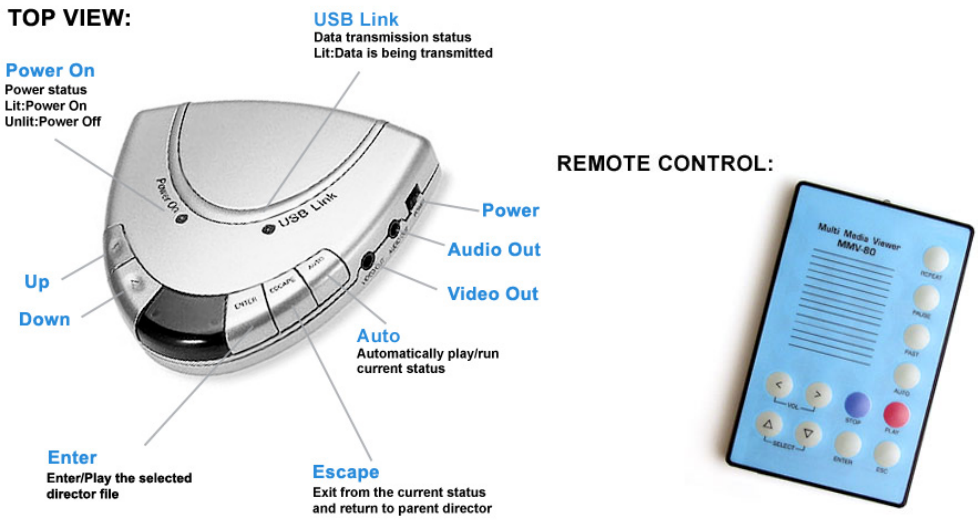
Figure 2.

The most impressive aspect of this product is that so much functionality is hidden behind the XGA-resolution display adding a depth of only 2.9” to the frame. The size of the display is striking and with the natural wood frame is an appealing package. In addition the packaging allows the frame to be rotated vertically allowing the customer to choose their preferred placement.

The main disadvantage of such a large display and frame, (24” x 20”) is the lack of portability. Once placed or mounted this product can’t easily be moved due to its weight and size and the sensitivity of the CD-ROM drive is an additional concern.

Our design packaging implements the same RJ-45 connector allowing picture transmission from the internet but adapts this interfacing to enable output to any VGA monitor or LCD display. The fundamental difference in packaging that makes our digital picture box unique is that the image processing is separated from the display allowing the consumer to switch the display with ease. The small size of our product means it is portable and allows it to be placed on a desk, beside or even out of sight behind the desired display.

The second commercial product being analyzed, the Vosonic Multi Media Viewer has slightly differing functionality but shares many of the same packaging considerations and goals as our device.



Vosonic MMV-80 Figure 3.

(Dimensions: 95 x 89 x 15 mm - Weight: 81g.)

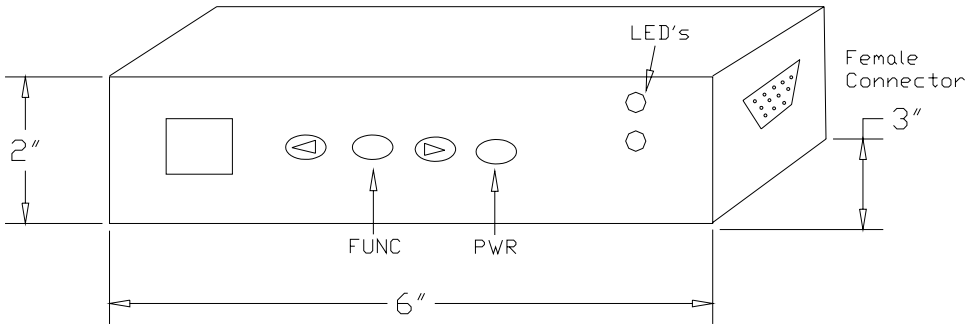
The MMV plays JPEG/MPEG/MP3 file formats, supports various memory cards is compatible with Windows 98/SE/2000 and Mac OS v8.6+ with USB driver and can play these files through NTSC/ Pal TV's or TFT monitors. As shown above, it can be controlled remotely with an IrDA remote.

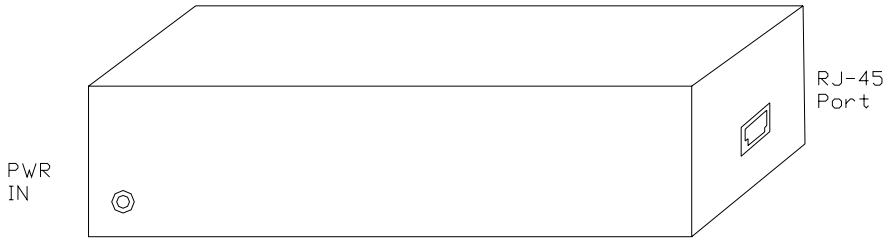
The MMV has a compact and sleek design with an easy to understand operation keypad making it appealing to consumers as it is portable and can sit atop or beside whatever screen is being used for the display. The outputs and inputs are well arranged on the sides of the casing and the LED's positioned on top where they can clearly be viewed. In addition the panel for IR signal reception is prominently placed ensuring a wide field of sight for the remote control operation in a room.

The most desirable aspect of this packaging is the user friendly and compact design which makes good use of space without cluttering or being too small for easy use. The buttons are evenly spaced and labeled as to their function making the product easy to understand and operate. These are features we plan to incorporate into the design of our DPB packaging. With careful and creative planning we may be able to achieve a more compact design due to the fact that the Digital Picture Box will not have a memory card slot and will possess only one 15 pin female HD connector as a video out. In addition the four pushbuttons (left, right, function and power) are the only functions needed on the remote control hence a smaller sleeker version will be used in our product. We plan to use similar plastic casing that is lightweight but tough to make the picture box sturdy and easily portable.

Packaging Specifications

Digital Picture Box – Top View (Front)





Digital Picture Box – Back

Materials List	Tooling Requirements
Pushbuttons	1. Adhesive
15 pin HD Female connector	2. Drilling and cutting tools
LED's	3. Screwdrivers
Plastic casing	
Ethernet cable	
Power cord and connector	

Estimate of Packaging Weight and Unit Cost

In order for the product to be marketable and portable, the general estimate for unit cost should be a maximum of $150 with a weight of approximately 3.5 oz (100g). Estimation of costs and weight will be fine tuned once specific material vendors are chosen.

Part	Weight (oz/lbs)	Unit Cost ($)	Quantity	Total Cost ($)
Epson Graphics Controller	0.2 oz	14.40	2	28.80
EDO DRAM	0.2 oz	Sampled	1	0.00
Rabbit 3000 Micro processor	1.0 oz	14.50	2	29.00
Pushbuttons	0.4 oz	0.25	4	1.00
15 pin HD Female connector	-	1.00	1	1.00
LED's	-	0.50	2	1.00
Plastic Casing	1.0 oz	10.00	1	10.00
Total Weight	2.8 oz		**Total Cost**	$ 70.80

References

Digi-Frame DF-1710
http://www.digi-frame.com/df1710.html

Vosonic Multi-Media Viewer
http://www.vosonic.co.uk/mmv80.html