IMAGO solutions corp.

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February 20, 2006

Dr. Andrew Rawicz
School of Engineering Science
Simon Fraser University
Burnaby, British Columbia
V5A 1S6

RE: ENSC 440 Functional Specifications for a Digital Photo Album

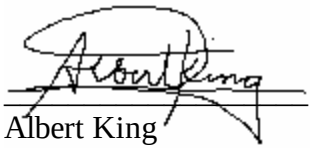
Dear Dr. Rawicz:

The attached document is a functional specification for a *Digital Photo Album* describing the basic functionalities of our product including some higher level specifications that would be later pursued during the final product development phase. We are developing a digital photo album equipped with a user friendly interface that will have large storage capacity and ample screen area for comfortable viewing. Our product will bring people a new way to enjoy their photos without worrying too much about cost and storage.

Our attached functional specification elaborates on the functionalities that our product shall possess as a proof of concept. It also details some more advanced specifications that our company will get into during the final phase of our product development. Finally, it includes a test plan that will improve on the quality and usability of our product.

Imago Solutions Corp is composed of four engineering science students: Timothy Chueh and Ali Rawshanaei studying Computer Engineering, Albert King studying Systems Engineering, and Patty Sa studying Electronics Engineering. If you have any questions, comments or suggestions, please contact us via email at ensc440-proj@sfu.ca or call me at (604) 805-9754.

Sincerely,



Albert King
Imago Solutions Corp.

Enclosure: Functional Specifications for a Digital Photo Album

IMAGO
solutions corp.

Functional Specification
for a
Digital Photo Album

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Submitted to: Steve Whitmore
Andrew Rawicz

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Executive Summary

Digital cameras are becoming more and more prevalent in our everyday lives. Now that their popularity is eclipsing the use of conventional film, many of the shortcomings of digital cameras are becoming more evident. Without a PC to provide permanent storage, users are left without digital copies of their photographs. Even users with PCs often find themselves in a dilemma when they are away from their PC long enough that the memory on their camera fills. In order to take more pictures users must delete photos and lose them forever or purchase additional memory at costs much higher than purchasing an additional roll of film. Most users would rather take pictures more sparingly than face this dilemma.

Digital photos also make it difficult to share photos without the use of a computer. Users must make prints of their digital photos at a cost higher than developing conventional photos in order to share photos in ways that people are accustomed to [1].

Imago Solutions' Digital Photo Album provides a solution for both the storage and viewing of digital photos. The Digital Photo Album will be designed to complement the digital camera in order to make digital photography a more pleasant experience. The device provides storage for the photos on a memory card when the memory card is filled. The device also provides a means to view digital photographs in a form factor similar in size to conventional developed film photos without the need to make prints.

Development of the Digital Photo Album is split into two stages. The first stage will culminate with the completion of a proof-of-concept prototype. At this point, the device will be functioning as a standalone device and support all key requirements. The form factor of the device will not be complete but the proof-of-concept will show that the desired form factor for the production model is possible with current technology.

The second stage of development will be completion of the production model of the device. This will include support for all the listed requirements in our functional specifications as well as the form factor that will be used in production. The completion of the second stage will include support for all relevant standards as well as the completion of all User Documentation. Marketing, such as the naming and the packaging for the product, will be left for after the second stage of development and will be considered a separate project of a different scope.

Table of Contents

Glossary

Album	Albums are groupings that every photo must belong to. They provide a means to sort photos beyond the date and time the photo was taken.
Contact Sheet	A print of thumbnails from a group of photos. It provides a quick visual reference to the photos contained in that group.
CSA	Canadian Standards Association.
FCC	Federal Communications Commission.
Memory Card	Removable storage medium that are used in digital cameras. Most common standards include Compact Flash and Secure Digital.
PC	PCs as used in this document will refer to systems with Microsoft Windows 2000 or Windows XP installed.
Slideshow	A group of photos selected by a user that can be viewed in a specific order. Photos can belong to more than one slideshow.
Thumbnails	A smaller version of a larger sized photo. Used for browsing to allow a user to see more photos at once on a screen of limited size.

1 Introduction

Imago Solutions' Digital Photo Album is a consumer product that compliments digital cameras by helping a user take advantage of the benefits inherent to digital photos. The device provides a large amount of storage for digital photos compared to the memory typically used in digital cameras. This allows users to take additional photographs without the need to purchase additional expensive memory cards or have access to their personal computer. The device also provides a way to view photos in a size similar to a standard 4x6" photo without the need to pay for developing the photos. The requirements for this device are as described in this functional specification document.

1.1 Scope

This document describes the functional requirements that must be met by our device. These requirements cover the requirements for a proof-of-concept prototype as well as the functions of the device that will go into production. These requirements will give direction to the design of the device as well as providing a reference for future design documents.

1.2 Intended Audience

The functional specifications document is intended to be used by all team members of Imago Solutions. Team members will use this document during our design phase to ensure that our design is feature complete before moving on to implementation. After implementation, team members will use this document during our testing phase to ensure that all specified requirements are met. This document can also be used by team members to assess whether we have met the interests of our intended market. Any changes made to this document will be done before beginning the design of the device.

1.3 Classification of Requirements

Throughout the description of requirements, the following convention is used to denote functional requirements:

[Rn–x] The Functional Requirement

where **n** is the functional requirement number and x represents the priority of the requirement with respect to our development stages. Possible values of **x** are as follows:

- **I** This requirement applies to the first stage in the prototype development. This constitutes the essential requirements that must be completed before moving on to the rest of the requirements. Requirements with this priority will be included in the production device.
- **II** This requirement applies to the prototype. Requirements with this priority apply to the prototype and will be included in the production device.
- **III** This requirement applies to the production device only. Requirements with this priority only apply to the production device.

2 System Requirements

2.1 System Overview

Imago Solution's device provides two fundamental functions. Our device allows the user to view digital photos in a similar fashion to flipping through a photo album. Our device also allows the user to unload the photos stored in their camera's memory onto our device, thereby freeing memory space to take more photographs.

Photos are loaded onto the device by connecting the camera to the device or by removing the cameras memory card and inserting it into our devices memory card slot. When photos are first copied onto the device, they are placed in groups that our device will consider an album. A default "shoe-box" album is used when the user has no preference. Photos on the device can be moved between albums.

Photos can be viewed in groups based on the date the photo was taken, the album the photo belongs to, or in user created slideshows. Slideshows provide a way for a user to create a custom list of photos that can be shared in sequence on the device.

The device provides key functions that PCs provide for digital cameras. This grants many of the advantages digital cameras have over film to photographers who are not computer users. Although PCs are very powerful in a broad sense, our device will still compliment well with them for camera users who are also PC users. Although PCs can perform many of the functions that our device performs, the portable nature of our device allows it to become more integrated in the day to day uses of digital cameras. In terms of photo storage, the device provides a middle step between the camera and the computer by allowing a user who normally unloads their photos on their PC to store their photos on the device when they are away from their PC. When returning to their PC, the user can then transfer the photos from our device onto their PC in a similar fashion to how they would normally transfer the photos from their camera to their PC.

For users who are not accustomed to using PCs, our device provides a complete solution to compliment their digital camera. It provides a medium to store and a means to view their photos. As a storage medium, our device can hold their photos until they develop their photos. Many digital photo printing services will provide copies of your photos on an optical storage medium after making prints for the user [2]. At this point in time, the user can free the memory on our device. Our device also provides a means for users to print their own photographs through a consumer colour printer without the need for a PC.

Due to time constraints, the development of a prototype of our device will focus on the device hardware and device software. Software for PC functionality as well as compatibility with devices such as printers will be left for our development stage after the scope of this project course is complete. These stages of development are reflected in the classification of our functional requirements.

2.2 General Requirements

[R1–III] The device shall turn on instantly. (i.e., The device will not have a boot time).
[R2–III] The device can be set to turn off automatically on timer.
[R3–III] The device shall give low power warnings.

2.3 User Interface Requirements

The requirements for the user interface of the device will be described based on the task being performed. Device controls are left ambiguous because the specific controls to manipulate the user interface will be left to the design of the device. The user interface is critical to this device because it must provide a seamless experience for accessing all the functions. As a digital photo album and a device targeting a broad range of users, our informal requirement for the user interface requires that it be as simple as filling a photo album with photos.

[R4–III] The device shall provide on screen instructions when a user needs help.
[R5–III] The device interface shall respond to user input within 0.1 seconds [3].
[R6–II] The device interface shall be intuitive for non English speakers.

2.3.1 Photo Management and Browsing

Photo management and browsing will be considered browsing mode in this document. Browsing mode constitutes all actions involved with organizing the photos on the device as well as searching for specific photos to view. Photos must be managed in an automatic and intuitive manner, while still offering the option for the user to control the details. The underlying file management of the photos on the device shall be kept transparent to the user. Photos on digital cameras will be transferable to our device to allow a user to free memory on their camera for additional photos.

[R7–I] Photos stored on a memory card can be copied onto the device.
[R8–I] Photos copied to the device shall be assigned an album. (A default album will be available).
[R9–II] The screen shall display multiple thumbnails of photos stored on the device for navigational purposes.
[R10–II] The device will provide multiple views for browsing photos.
[R11–II] Photos stored on the device shall have the option of being sorted by date.
[R12–II] Photos stored on the device shall have the option of being sorted by album.
[R13–II] Photos stored on a memory card shall have the option of being sorted by date.

[R14–I] A selected photo can be displayed on the screen. (i.e., enter viewing mode with the selected photo).

[R15–I] A selected photo can be deleted.
[R16–II] A selected photo can be added to a new or existing slideshow.
[R17–II] A selected photo can be removed from slideshows it is in.
[R18–II] A selected photo can be copied onto a memory card.
[R19–II] A selected photo can be moved from one album to another.
[R20–III] A selected photo can associate itself with a recorded audio clip.
[R21–III] A selected photo can playback an associated audio clip.
[R22–III] A selected photo can display an associated text note.

[R23–II] A selected album can be copied onto a memory card.
[R24–II] A selected album can be added to a new or existing slideshow.
[R25–II] A selected album can be opened to view thumbnails of the photos within.
[R26–II] A selected album can be displayed on the screen. (i.e., enter viewing mode with the selected album).
[R27–III] A selected album of photos can associate itself with a recorded audio clip.
[R28–III] A selected album of photos can playback an associated audio clip.
[R29–III] A selected album can display an associated text note.

[R30–II] A selected date of photos can be copied onto a memory card.
[R31–II] A selected date of photos can be added to a new or existing slideshow.
[R32–II] A selected date of photos can be added to a new or existing album.
[R33–II] A selected date of photos can be deleted.
[R34–II] A selected date of photos can be opened to view thumbnails of the photos within.
[R35–II] A selected date of photos can be displayed on the screen. (i.e., enter viewing mode with the selected date).
[R36–III] A selected date of photos can associate itself with a recorded audio clip.
[R37–III] A selected date of photos can playback an associated audio clip.
[R38–III] A selected date of photos can display an associated text note.

2.3.2 Viewing Photos

When viewing photos, photos will always be a part of a group of photos. A group of photos constitutes all the photos from a certain date or all the photos within an album. Groups of photos must contain one or more photos. Viewing photos on the device is analogous to viewing photos in a photo album. The device must provide the functionality a user would expect when flipping through a conventional photo album. It must also provide enhancements that can only be provided through digital photos.

[R39–I] The screen shall display photos that are stored on the device.
[R40–II] The screen shall display photos that are stored on a memory card.
[R41–III] Information regarding a photo can be displayed alongside the photo.
[R42–I] The user can navigate to view the next photo in the group.
[R43–I] The user can navigate to view the previous photo in the group.
[R44–I] The user can navigate to return to browsing mode.

2.3.3 Slideshows

Slideshows are groups of photos that can be displayed with automatically timed transitions between photos. A photo can be part of more than one slideshow, or none at all. Slideshows on the device are analogous to conventional slideshows where the presenter can select photos from a variety of dates and albums to create a presentation. Creating a slideshow involves the user browsing through their inventory of photos and selecting the photos they want to include. Like a conventional slideshow, the order of photos can be manipulated and the photos can be set to transition manually or automatically. Slideshows provide a means for a user to create groups of photos for viewing that would not be sorted together based on the date the photo was taken or the album it would be categorized under.

[R45–I] A slideshow shall be selected by its name.
[R46–III] A slideshow can display an associated text note.
[R47–I] A slideshow shall be composed of one or more photos stored on the device. (i.e., slideshows will not include photos stored on a memory card).
[R48–III] A slideshow shall have the option to transition between photos automatically or manually.
[R49–III] A slideshow shall have the option to set the time between transitions when automatic transitions are chosen.
[R50–III] A slideshow shall have the option to set unique transition animations.
[R51–I] A slideshow can be exited at any time. (i.e., return to browsing mode).

2.4 PC software requirements

Software included with the device for PCs will allow a PC to manage the photos on the device. Though the device is designed to replace a PC for some digital camera users, software with our device allows a user who already takes advantage of their PC to use our device as a potential middle-man when their PC may not be readily accessible.

[R52–III] When connected to the PC, photos that have yet to be copied to the PC can be set to copy over automatically.
[R53–II] Photos on the PC can be copied to the device.
[R54–II] Photos on the device can be copied to the PC.
[R55–III] Photos on the device can be moved between albums by the software on the PC.
[R56–III] Photos on the device can be added to slideshows by the software on the PC.
[R57–III] Photos on the device can be cropped by the software on the PC.
[R58–III] Photos on the device can be resized by the software on the PC.
[R59–III] Text notes can be added to photos, albums, dates of photos and slideshows.
[R60–III] The software shall provide a backup solution for the device.

[R61–III] The software shall provide a restoration solution from backup for the device.
[R62–III] The software on the device shall be updatable via software on the PC.

2.5 Peripheral Compatibility Requirements

Peripherals include devices other than a PC that our device will interface with. Connecting to other devices expands the functionality of our device while maintaining the same intuitive ease of use provided by the device on its own.

2.5.1 Digital Cameras

Interfacing directly with digital cameras will provide file transfer functionality to users who are uncomfortable removing the memory card from their camera.

[R63–III] The device shall connect directly to digital cameras that support industry standards.
[R64–III] Photos on the digital camera can be copied to the device.

2.5.2 Printers

Interfacing with printers allows a user to make prints without the need for a PC.

[R65–III] A selected photo on the device can be printed on a compatible printer.
[R66–III] Photos in a selected album on the device can be printed on a compatible printer.
[R67–III] Contact sheets can be printed from a selected album on the device.
[R68–III] Contact sheets can be printed from a selected date of photos on the device.

2.5.3 External Displays

[R69–III] The device can be connected to external displays.
[R70–III] Photos can be mirrored on the external display when viewing photos on the device.

2.6 Physical and Usability Requirements

Physically, the device must similar in size and weight with what people are comfortable with. Comparing our device to a photo album for printed photos provides a standard for comparison [4].

[R71–III] The device shall be similar in height and width to a standard purse size photo album.
[R72–III] The device shall be similar in weight to a standard purse size photo album.
[R73–III] The device shall look appealing to a broad demographic.

[R74–III] The device shall be operable with one hand.

2.7 Performance and Reliability Requirements

[R75–II] The device shall provide space to store over one thousand photos.
[R76–III] The device shall be able to withstand a waist height drop with no internal damage.
[R77–III] The device shall be usable in outdoor and indoor lighting.
[R78–II] The device shall not crash under normal usage.
[R79–II] The device software shall exit gracefully on critical errors.
[R80–III] The device shall be water resistant to a reasonable extent.
[R81–III] The device shall use rechargeable batteries.

2.8 Standards Support

[R82-I] The device shall conform to CSA safety standards.
[R83-III] The device shall not violate FCC regulations.
[R84-III] The device shall conform to all applicable standards that govern electronics upon release to the market.

2.9 User Documentation

[R85–III] User documentation will include a user manual and product webpage.
[R86–III] User documentation shall be provided in English, French and Spanish. Additional languages shall be provided for localized editions of the device in international markets.
[R87–III] The User Manual shall be written for an audience with minimal knowledge of digital cameras.
[R88–III] The User Manual shall be written for an audience with minimal knowledge of PCs.
[R89–II] A product webpage shall be created providing product information.
[R90–III] A product webpage shall be created providing technical support.
[R91–III] A product webpage shall be created providing technical information and details not included in the User Manual written for an audience with intermediate knowledge of PCs.

3 Test Plan

Testing of the device will encompass functional testing, usability testing and aesthetic surveys. Although functional testing will ensure that our device meets the requirements outlined in this document, as a consumer electronic product, it is critical that usability tests are conducted on both the prototype and production device. Aesthetic surveys will be performed after the proof-of-concept prototype has been completed but before the design of the production device.

For functional testing, each requirement for the prototype described in this document will be tested by a user familiar with the device. Testing with other user profiles will be left for usability testing. Each requirement will be tested individually to ensure that it is functioning and it will also be tested in a variety of sequences to ensure robustness.

Usability testing will be done on the prototype to ensure that the design used to implement the functional specifications meets the needs of all the groups in our target market. Feedback from usability testing can then be used to refine the prototype and also to refine the design of the production device. Performance metrics such as response time will be tested here but will not be required to be met. Performance requirements will all be left for the production device.

Aesthetics will be tested during the design of the production device. A variety of looks for our device can be used for production to meet the different aesthetic preferences of our customers as long as our physical and usability requirements are met.

Our product will be designed to work with a variety of peripherals. There are too many different peripherals for our test plan to include all of them. The use of standards will help alleviate many compatibility issues. The focus of our peripheral testing will be to ensure that our device is working to the specifications of certain standards. Testing will then be done with a subset of peripherals to ensure our implementation of the standards is functioning correctly.

More specific test procedures will be developed after the design phase. This will allow tests to be developed that can specifically test the robustness of the design in terms of meeting the requirements outlined in the functional specifications.

4 Conclusion

This functional specification document fully defines the requirements for a Digital Photo Album. The development of the device is divided into two phases. The first phase which culminates with the completion of a proof-of-concept prototype is underway and on pace to be completed over the course of this semester. The prototype will fulfill all the requirements prioritized as **I** and **II** requirements.

5 References

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[4] Amazon.com, Lewis N. Clark 1803 Collection Photo Album, February 2006. [Online]. Available: http://www.amazon.com/exec/obidos/tg/detail/-/B00009PM0Q/sr=8-7/qid=1140502806/ref=pd_bbs_7/102-8781536-7288118?%5Fencoding=UTF8&v=glance. [Accessed: February 2006].