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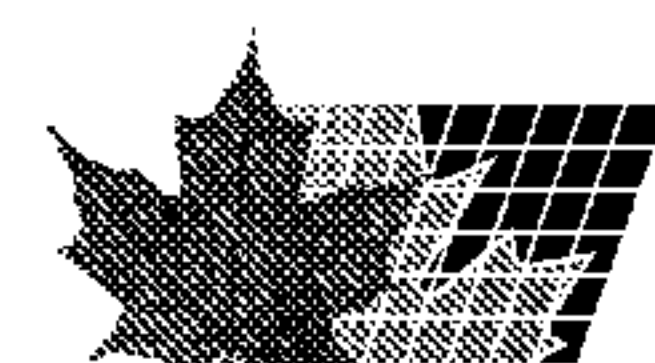
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(57) **Abrégé/Abstract:**

A portable device for the capture and manipulation of digital images, with an integrated projector for their display. The image capture aspect of the device would comprise a digital camera, and the device includes storage medium for both image assets as well as integrated image manipulation software for manipulation of captured images before their display. Finally, the device includes a integrated video projector for the display of captured or manipulated images as well as for the primary interface of the image manipulation software to the user. In addition to a digital camera for image capture, the device could optionally include a network interface for the acquisition of additional image assets via a computer network.



Application for Letters Patent

PORTABLE IMAGE CAPTURE AND MANIPULATION DEVICE WITH
INTEGRATED PROJECTION DISPLAY

Yakel et al.

5

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PORTABLE IMAGE CAPTURE AND MANIPULATION DEVICE WITH
INTEGRATED PROJECTION DISPLAY

This invention is in the field of consumer electronics and
5 digital image manipulation and handling, and more
specifically deals with the provision of a portable device
which provides in an integrated fashion a camera with
integrated image manipulation software and a projector
through which the image can be manipulated and displayed.

10

BACKGROUND:

It is believed that the widespread use of digital
15 photography can actually be credited with an enhanced role
for digital imagery as a communications or educational
media. While visual media have always been a strong
communications channel for educational or other purposes,
the increased comfort level amongst various key audiences,
20 in an educational context among others, with digital
photography and digital image manipulation provides or

strengthens further a role for digital imagery as a
educational tool. The use of digital imagery as a
demonstrative aid however would be further enhanced by the
use or availability of the device which would allow for the
5 rapid and user friendly capture and manipulation of images
from various sources along with their display.

The ever-increasing popularity of digital photography has to
some extent been fed in current society by the widespread
10 availability of digital cameras. Many different types of
hardware devices currently include digital cameras,
including cameras themselves as well as portable music
players, cell phones and other portable entertainment
devices. The widespread availability of digital cameras
15 makes it easy to capture digital photographs for subsequent
storage or review.

In many cases beyond the actual taking or capture of digital
photographs however, there are a number of other functions
20 or tasks which can or need to be undertaken in order to
either edit, review or display digital images once captured.
One of the limitations for example to the easy display of

captured digital photographs or other images is the need to actually display those images using some type of external hardware. For example in a typical workflow where digital photographs are captured using a digital camera, it is often

5 the case that those photographs are then loaded off of the camera onto the storage medium of a computer, from which they can either be printed or otherwise displayed on the computer display. The computer display might comprise one or more monitors directly connected to the computer on which

10 the photographs or images can be displayed, or in some cases might comprise a projector connected to the computer which would allow for the larger projection of those images onto a screen, wall or the like. The need however for support and maintenance of a separate hardware system for the display of

15 captured digital photographs is a limitation to the further widespread use of digital photography as a communications medium where the ability to rapidly display digital photographs on the results of their manipulation is desired. If there were a digital camera or a device containing a

20 digital camera which had an integrated hardware solutions for the display of digital photographs is believed that this would be a desirable enhancement or modification to products currently available in the marketplace.

There are certain digital cameras available which do presently provide for an interface to a television or the like so that the camera could be connected to an external display unit for the viewing of captured digital photographs without the need for uploading those photographs to a computer. However, insofar as even those types of units require the connection of the camera to an external device for the purpose of displaying captured digital images is believed that an integrated display device with a digital camera would be a desirable hardware enhancement.

Particularly where the use of digital imagery was to be incorporated into a larger audience environment such as educational or the like, it is likely the case that the best type of image display or output hardware which could be used would be a projector of some type since this would allow for the provision of a large-format display which many people could view. Again the viewing using a projector of digital imagery is currently possible but typically requires the uploading of the images in question from the camera to a computer for subsequent transmission or display from a projector unit -- even in certain circumstances where the

projector was modified to provide for a direct interface by which a camera could be connected in a similar fashion to the cameras discussed above which can be connected directly to a television, the simplicity of use of this type of
5 accommodation simply is not there. It is believed that the provision of a digital camera which allowed for integrated or on board large-format display of images would be a desirable innovation. Specifically a digital camera or similar device with an integrated projector would be a
10 desirable development.

In addition to the widespread availability of digital cameras and the popularity of digital photography as a hobby or as a communications medium, one of the other factors
15 which has led to the development of digital photography and imagery as a communications medium is the wide availability of computer software for image manipulation. Products such as Adobe PhotoshopTM and the like allow for the sophisticated manipulation of digital images into many final
20 forms. In the case of photography, image manipulation software such as this allows for image correction and cleanup such as redeye removal, alteration of various aspects of photographs etc. in the case of either the

combination of photography with other image assets or even
the general field of digital image creation, image
manipulation software such as this can provide many other
kinds of animation or drawing techniques which can also be
5 used in the preparation of finished digital images.

One of the shortcomings of the varying types of image
manipulation software which are available to market today is
the level of complexity in their use. While the software is
10 ultimately powerful allowing for an educated user to conduct
virtually limitless manipulation of images and image assets,
one of the limitations to consumer level acceptance or use
of more sophisticated image manipulation software is the
level of complexity operation. If it were possible to
15 provide image capitulations software which had all of the
power of a full-featured image manipulation suite used on a
personal computer that provided for a simplified user
interface for access to various types of functionality, it
is believed that the popularity of digital imagery as a
20 communications medium and the use of such sophisticated
software at a consumer or casual user level could be
enhanced.

One other function which digital image manipulation software allows for is the combination of image assets from various sources into finished works. For example, a digital photograph might be combined with some other images or other
5 multimedia content into a chart or other image for display. Subject to the appropriate permissions or licensing being in place, it may be the case for example that the user wish to create a finished image which included copies or representations of a work of art along with photographs from
10 the environment which could be used for example in art education context. This is obviously just one example of an application in which this type of a image manipulation or image creation could be contemplated but in that particular case, the ability to have a straightforward fashion capture
15 images or multimedia content from other sources, such as a computer network or the Internet, is another enhancement which could be made to the combination hardware device contemplated herein. The ability to locate and incorporate image assets from external network sources would be
20 desirable in the delivery of the integrated device as well as the image manipulation software outlined or discussed herein.

Overall then having identified some of the platform technologies involved in the use or development of digital imagery in the context of communications or education, it is believed that a digital camera with an integrated image
5 projector represents a novel enhancement over the state of image capture and display hardware available on the market today. Incorporation into that device of storage medium and computer processing hardware which would allow for the display of captured images on the projector as well as for
10 the operation of resident image manipulation software would make the device further desirable. The user interface for image manipulation software resident in such a device could comprise the display and operation of the software and images via the integrated projector, along with whatever
15 human interface device was desired. For example, in terms of the human interface and integrated keyboard, pointing device or the like could also be included, or the ability to connect the integrated device to external human interface devices such as a computer keyboard or mouse could also be
20 provided.

Beyond the general concept or idea of the combined hardware device outlined herein, it is also contemplated that image

manipulation software which had sufficient power to provide
for a large number of deep image processing functions
beneath a user-friendly interface would desirably be
developed for use in this device. The image processing or
5 manipulation software which is contemplated could also be
used on a standalone basis with a personal computer or the
like.

10 **SUMMARY OF THE INVENTION:**

At the present time and now summarized elsewhere herein, the
present invention comprises an image capture and
manipulation and display device which has an integral camera
15 for the capture of digital images to a memory, along with an
integral projector for integrated large-format display of
images captured using the device. In its most basic format
this invention could be a digital camera including a
projector, such as a pico projector or other type of a
20 projector capable of displaying large-format images.

Imaging software capable of retrieval and display, or in more complex embodiments manipulation, of images of within the memory is also contemplated to be resident within the device.

5

Optionally there might be a communications interface which would allow for wireless or wired connection of the device to a computer network such as the Internet for access to external assets for inclusion in the editing and
10 manipulation of images. The image manipulation software could have varying types of functionality.

DESCRIPTION OF THE DRAWINGS:

15

Preferred embodiments are provided in the accompanying detailed description which may be best understood in conjunction with the accompanying diagrams where like parts in each of the several diagrams are labeled with like
20 numbers, and where:

Figure 1 is a general diagram intended to demonstrate a prior art hardware combination which the present invention is intended to overcome;

5 Figure 2 is a perspective diagram of one embodiment of the integrated imaging device of the present invention;

Figure 3 is a block diagram of one embodiment of the electronic components of an integrated imaging device of the present invention, such as the embodiment of
10 Figure 2;

Figure 4 is a flowchart demonstrating one embodiment of an image capture transaction using the device of the present invention;
15

Figure 5 is a flowchart demonstrating one embodiment of an image display transaction using the device of the present invention;

20

Figure 6 is a flowchart demonstrating one embodiment of an image manipulation transaction using the device of the present invention;

5 Figure 7 is a flowchart demonstrating another image manipulation transaction using an embodiment of the device of the present invention;

DETAILED DESCRIPTION OF ILLUSTRATED EMBODIMENTS:

10

The following narrative is intended to generally speaking described the operation of the selected illustrative embodiments of the present invention, for the purpose of outlining or enabling its operation to those skilled in the art. Review of this information will, to those skilled in 15 the art, also infer or disclose reasonable modifications or extensions of the described subject matter, all of which are also contemplated within the scope hereof.

20 **Prior art:**

As will be outlined in further detail below, the overall concept of the present invention is the provision of a integrated hardware device which allows for image capture, manipulation and large-format display, all in one single
5 portable device.

Insofar as there is prior art which can be briefly demonstrated for the purpose of further supporting the novelty of the present invention, the present combination of
10 items which would most reasonably or foreseeably be used by an individual wishing to accomplish this same set of objectives would be a digital camera, personal computer containing a full image manipulation software suite, as well as a data projector connected to the computer. Pictures
15 could be captured using the digital camera and uploaded to the computer where they would be formatted or manipulated using the software resident on the computer. Finally, the computer and projector would be used in conjunction to display the results of the image capture or manipulation.

20

Figure 1 demonstrates this prior art combination in further detail. Again the precise nature of the hardware

combination demonstrated in Figure 1 is intended primarily for demonstration purposes and it will be understood that there are many other different types of hardware combinations which the integrated image handling device of

5 the present invention would also overcome. There is shown first of all in this Figure a digital camera 1, which is connected at some point to a personal computer 2 for the purpose of uploading data or images from the camera to the PC. The PC 2 would include potentially some type of image

10 manipulation software for the purpose of either simply loading and re-displaying images from the camera 1 or alternatively for the purpose of editing those images. The next element demonstrated in this Figure is a projector 3 which is connected to the personal computer 2 so that images

15 from the personal computer 2 can be displayed in a large format. It may also be the case that in certain prior art embodiments no projector 3 was used in that the desire was simply to display images from the camera 1 on the screen of the PC 2. Removal of the projector 3 from the prior art

20 hardware combination demonstrated in this Figure will be understood by those skilled in the art but the rendering or creation of the integrated image handling device of the present invention will still be understood to be novel over the general prior art combination demonstrated in this

Figure on the basis that the integrated nature of the camera and the output device which in the case of the present invention is a projector, as outlined in further detail below, when coupled with some type of image editing or
5 manipulation software resident on storage medium and executed upon hardware contents of the integrated device are contemplated within the scope of the present invention.

Also shown in Figure 1 are a scanner and a printer 4, 5
10 respectively operatively connected to the personal computer 2. Those two peripherals are demonstrated in this Figure simply for the sake of discussion elsewhere below -- the scanner 4 would be used if the user wished to scan some other type of a hardcopy document into an image asset for
15 use in any combination or image manipulation step using software on the computer 2, and the printer 5 is obviously shown just to demonstrate that in certain circumstances it may be desirable once an image is manipulated using the personal computer 2 to generate a hard copy using a printer.

20

The complexity and relative cost of this hardware combination can be seen and understood from this general

description. Three different pieces of hardware, namely the digital camera as well as a computer and projector, would be required. Beyond the cost of this hardware configuration it will also be understood that generally speaking this is
5 somewhat unwieldy in the case of a user who wishes to in a quick and straightforward manner conduct some basic image capture and display with intermediate image processing, since in addition to the need to actually have all three of these pieces of hardware there are other intermediate steps
10 involved such as the connection of the projector on the computer when the display step comes up, the physical loading of the photos from the camera across to the computer taking additional time, as well as the fact that depending upon the nature of the image manipulation software employed
15 on the personal computer there may be significant functional knowledge required to accomplish the desired effects.

Based on this general outline of one prior art configuration of computer hardware and software which could be used in a
20 digital photography capture, manipulation and display, it is suggested that the novelty and utility of the present invention, namely an integrated image capture, manipulation and display device can be demonstrated in further detail.

Integrated imaging device overview:

As outlined elsewhere herein, the primary concept of the
5 present invention is to provide an integrated imaging device
which contains the ability to capture digital images,
manipulate them and then display them in a large-format. In
terms of specific hardware aspects of the device and of the
invention, Figure 2 demonstrates one embodiment of an
10 imaging device 6 in accordance with the present invention.
The device 6 effectively comprises a digital camera 7 along
with an image projector 8 which is built into the device 6.
For the sake of simplicity in this diagram, the device 6
which is shown is a modified digital camera 7 in two which a
15 small footprint video projector 8 has been incorporated. As
will be discussed in further detail elsewhere below, it is
contemplated that there are small projectors such as this
available or coming available in the market today which will
make this type of a device a possibility. While the device
20 6 shown in this Figure is really just a modified handheld
format digital camera which incorporates a projector 8, it
will also be understood that the form factor of the device 6
of the present invention could take other various forms. It

may be the case for example that it was necessary to produce a device which was somewhat larger than the small format handheld digital camera in order to accommodate all of the necessary internal components to provide for the processing
5 ability to host image manipulation software within the device but so long as the device in aggregate fits within the general categorization of "portable" and is relatively easily movable by an individual so that it can be transported easily set up and used, it will accomplish the
10 goals of the present invention.

Figure 2 also shows a shutter button in the traditional camera context 17, which is a part of the human interface required for the device. The human interface 17 to the
15 device might also include an additional keyboard, joystick or other type or format of human interface for control of the device, as discussed elsewhere herein.

Figure 3 contains a block overview of the hardware of one
20 possible embodiment of the image capture and manipulation device of the present invention. In terms of the overall appearance or format of the device 6 it is contemplated that

it will effectively comprise a modified digital camera, as outlined above. Much of the hardware and its components will be understood to one skilled in the art of electronics design, in terms of onboard processors etc. as well as
5 cameras and computers and the like. The device 6 would include a CPU 9 which would perform the data capture and processing functions of the device 6. Pre-existing digital camera designs would also include a CPU of sorts but it is contemplated that the CPU in this case would be capable of
10 additional processing tasks insofar as part of the intention of the device of the present invention 6 is to in addition to capturing images from a camera 7 render or display them via a projector or display device 8. It is also contemplated that the device 6 would optimally include image
15 processing or manipulation software of some kind and on that basis the CPU 9 will potentially be involved in that aspect of the functionality of the device 6 as well. The device 6 also comprises a memory system which might include read-only memory 11, random access memory 12 and other storage space
20 or memory for the storage of image data, software instructions and the like. The read-only memory 11 is used to store at least some of the program instructions that are to be executed by the CPU my, such as portions of an operating system or kernel. The random access memory 12 is

used for temporary storage of data and a clock circuit 10 provides a clock signal required by the CPU 9-memory and CPU structures such as this will be well understood by those skilled in the art and as such attendant or obvious
5 modifications thereto will not depart from the intention and scope of the present invention.

Another key set of components in the device 6 would be the components or electronics related to image capture.
10 Specifically, it is contemplated that the device would include the necessary components to capture digital images like a camera. Digital camera components 7 [sensor chip, lens etc.] are contemplated to be a key element of the device 6 of the present invention. It is not necessary for
15 the purpose of illustrating the present invention to outline in further detail to outline in explicit detail all of the different circuitry involved in a digital camera 7 as basically the integration of the digital camera 7 to the overall device 6 in a fashion that digital images could be
20 captured by the camera 7 components for storage to the memory of the device 6 and subsequent display or manipulation are it is felt believed sufficient for the

purpose of illustrating the scope and intention of the present invention.

The next set of key componentry in the device 6 in addition
5 to the CPU components 9 et al. and the digital camera
components 7 are a video interface and a projection output
integrated into the device. It is explicitly contemplated
that the device of the present invention would contain a
projector 8 within the device since the intention of the
10 devices to provide for a unitary item which could be used in
the capture and manipulation of images as well as for their
large-format display. The only way to render an integrated
large-format display would be with an integrated projector
8. If the overall device 6 were to be of a larger format a
15 standard or traditional projector 8 could be used. If it
were alternatively desire to provide a smaller format device
6, a pico projector such as are currently being finalized
and released by various hardware manufacturers would be
incorporated, to provide for a projection output without the
20 need for such a large device or such a significant power
consumption. It will be understood however that any type of
a projector 8 could be used with attendant changes to the
overall format of size of the device 6 and all such changes

are contemplated within the scope of the present invention. Also shown in figure 3 is a video interface for driver 16 between the CPU 9 and the projector 8. Any type of a video circuit or driver which would be used between the CPU 9 and
5 the remainder of the device 6, to provide a signal capable of rendering info displayed to the projector 8 is contemplated to satisfy this element of the invention. It may also be the case that the projector 8 may include the necessary video interface hardware 16 within the related
10 components thereof and that will also be contemplated to be within the scope of the present invention.

The device 6 also might include a communications port 15 which could be a hardwired network interface card, or
15 optimally and as is specifically contemplated might be a wireless network interface whereby the CPU and the remainder of the electronic components of the device 6 could be connected to a computer network such as the Internet for the purpose of uploading or downloading images and assets to and
20 from that network for use in the image manipulation process by software resident upon the device 6. The communications interface 15 could be any apparatus allowing for the

transmission and receipt of data by the device 6 to an external device or network.

Finally demonstrated in Figure 3 are the operating system 14
5 or other program instructions, as well as image storage, within the memory of the device 6. The operating system 14 and program instructions for the image manipulation or display software therein will be understood by one skilled in the art, and the inclusion of image storage memory within
10 the device 6 will again be understood as this has been done in the past with digital cameras.

Finally it is contemplated that some type of human interface
17 would be necessary to allow the operator of the device 6 to interact with the image manipulation software which is
15 contemplated to be within the device 6 and to control the projector 8 and the camera 7. The human interface could be anything from a customized set of keys, switches or buttons which would allow user to interact with the device 6,
20 through to a connection for a keyboard or an integrated keyboard or mouse or the like, in a more traditional PC oriented implementation. The human interface might even

comprise a touchscreen somewhere on the device through which different menus and the like could be displayed in the user could interact by pressing on-screen on different selections. The key aspect of the human interface 17
5 component of the device 6 is that the user would be able to control the device 6 using such interface 17. The complexity of the interface 17 might to a limited degree be dictated by the amount of flexibility or control which was required for operation of the image manipulation or display
10 software contained therein -- if it was intended to provide a device 6 that had a more elaborate or full-featured image manipulation software resident therein it may be necessary to provide a more complete human interface 17, whereas if the device was going to be fairly simple in terms of image
15 capture and display a switch or a small number of keys along with a small display screen or the like might be a more desirable implementation. It is also contemplated that in certain circumstances the human interface 17 could work in conjunction with the projector 8 and the projector could in
20 effect project menus or interface items onto a surface and then the interface device being a keyboard or other type of input device could be used in conjunction with the display 8 to interact with the device 6. It will in any event be understood that any type of a human interface or input

device which allowed for the control of the device 6 of the present invention would be contemplated within the scope here of.

5 Looking past the overall hardware schematic of Figure 3, it is now intended or hoped to provide some additional background or understanding of the anticipated functionality of some of the aspects of the device 6 and the associated image manipulation software which is anticipated to be
10 installed or resident thereon.

Image capture:

15 The two key functions of the device 6 as outlined herein are image capture and image display. Image capture would be conducted by the device by a subset of the componentry which basically comprises a digital camera 7, which is capable of capturing digital images such as photographs and storing
20 them to memory within the device 6. As outlined generally above, for the purpose of the present disclosure and

invention, the specific componentry of a digital camera or a digital image capture circuit will be obvious to one skilled in the art and on that basis there will be a range of approaches which can be taken to providing that type of
5 functionality without departing from the scope of the present invention. The basic componentry of a digital camera, being a digital image sensor and a lens operatively connected to the remainder of the CPU 9 and the other circuitry of the device 6. Any combination of hardware or
10 software which can accomplish the objectives of capturing digital images for storage or manipulation within the remainder of the device 6 is contemplated within the scope of this component.

15

External asset capture:

As discussed elsewhere above from a cursory level, an optional element of the device 6 of the present invention is
20 a communications interface 15 by which the device 6 could either export or write images after capture or manipulation to an external network or storage location, or more likely

could be used for the purpose of capturing external image assets for use in the manipulation and display of images by the remainder of the device 6. It is primarily contemplated that the communications interface 15 would be a wireless
5 network interface such as those used in laptop computers, PDAs and the like, to access a wireless LAN cloud in a location. By virtue of this type of an interface 15, the device 6 could be used to, for example, download images from the Internet or elsewhere for use in manipulation and
10 display on the device 6. In a circumstance where the communications interface 15 was a network interface being used to access the Internet, or a similar external location, it may also be necessary for either the image manipulation software or other software components resident upon the
15 device 6 to include a browser, but the inclusion of a browser or a browser type component to the image manipulation software resident upon the device 6 will be something that can be accommodated or easily incorporated by one skilled in the art of software design and as such is all
20 contemplated within the scope of the present invention as well.

Beyond a wireless LAN interface, it is also conceivable that the device could actually include a wireless WAN interface 15 instead. For example a GSM or CDMA wireless modem could be included in the device if it was desired to provide, 5 obviously at a higher cost, a device 6 which could be used broadly and in locations where there might not otherwise be a local wireless network cloud available.

The communications interface 15 could also be a hardwired 10 interface rather than a wireless interface. For example it could be a hardwired network connection by which the device, with the necessary attendant network stack in the software of the device 6 could access a TCP/IP network or a network using another communications protocol, again to access 15 external storage or even the Internet for the purpose of download or upload of images and assets to and from the device 6. Finally the communications interface 15 beyond being a network interface might also be simply a port by which an external storage device could be connected to the 20 remainder of the device 6. For example it could comprise a USB port 15 by which a memory stick or other external storage device or drive could be connected to the remainder of the device 6.

Any type of a communications interface 15 which will accomplish the objective of either allowing for the export of captured images from the device 6 or more importantly the
5 import of external assets into the memory of the device 6 for use in association with captured images in manipulation and display thereof is contemplated within the scope of the present invention.

10

Projector/display:

As outlined in a cursory fashion under the summary on Figure 3, the other key electronic component of the present
15 invention which accomplishes the second leg of the anticipated workflow, being image display in addition to image captured by the camera 7, is the inclusion of a projector 8 and related necessary video interface with the CPU 9 and remainder of the components of the device 6 to
20 allow for large-format projection of images from the memory of the device 6 without the need for reliance on any external projection equipment or hardware.

If it was desired to use or provide a device 6 in accordance with the present invention that had optimal quality projection capabilities, it may be necessary for the entire
5 device 6 to be manufactured to a size that would allow for the incorporation of a conventional type of a LCD projector into the remainder of the device. In this type of a format, it may be slightly more unwieldy to use the camera 7 in a portable format but it would allow for the optimal output of
10 the images in question. In any event this is one approach which could be taken to the inclusion of a projector 8 in the remainder of the device 6.

The second option which is believed at present to be more
15 likely in the near term to be selected as the desirable format for the overall device 6 will be to use a small format LED-based projector within the device. There are now these LED-based pico projectors which are becoming available on a standalone basis in the marketplace which allow in a
20 very small format for a projector of acceptable projection quality in a far smaller footprint and with a far smaller power consumption. In fact it is hoped that this type of a pico projector could nearly be incorporated into a currently

standard sized digital camera case in accordance with the present invention, or something not much larger than it currently standard sized enclosure. In any event it is contemplated that any type of a projector which could be
5 incorporated into an enclosure with a digital camera 7 and the other related components for image capture, manipulation and display are contemplated within the scope of the present invention.

10

Storage media:

The device 6 would need to include storage medium of some type to which images captured by the camera 7 could be
15 captured, as well as any potential images or other assets which were captured or downloaded via the communications interface 15 could be stored, and to which modified images could be saved for display or export. There would also need to be storage on the device 6 capable of storing any
20 processor instructions for the CPU 9 which were necessary for execution or operation of the device 6 and specifically

the image display or manipulation software which is contemplated to be a part of the device 6.

The storage medium in the device 6 could either be solid-
5 state storage such as a memory chip or the like, or if a
larger degree or amount of storage was required then could
be feasibly integrated into the device 6 using a solid-state
technology, then it might also comprise a disk drive or some
other such similar storage device which when integrated
10 along with the CPU 9 and other related software and hardware
components could provide for larger capacity image storage
and software storage on the device. In the case of solid-
state large capacity storage, it will be understood that
memory cards such as those currently used in digital cameras
15 and the like are an ideal component for use in this capacity
as well.

Image manipulation software:

One of the key components of the device 6 in the present invention would be the inclusion of image manipulation reviewing software on the device 6. Even in the most basic embodiment of the device 6 which may not have a
5 communications interface 15 by which external image assets could be loaded or used in the manipulation of final images for display, the software within the device 6 would need to be capable of displaying images captured by the camera 7 on the projector 8. Computer software used for image display
10 or manipulation would basically comprise a set of processor instructions stored within a storage medium on the device 6 [either the storage medium or the ROM] which when loaded into the memory of the device 6 would allow the CPU 9 to access images stored within the storage medium and process
15 or format them for display by the projector 8. The precise nature of the software which be required to accomplish this objective would be obvious to one skilled in the art of programming for such devices and all such variations or embodiments which would accomplish the objective of allowing
20 the electronics of the device 6 to display via the projector 8 images contained within the storage medium on the device 6 which has been captured by the camera 7 are otherwise loaded thereon.

In a more elaborate embodiment the software contained within the device 6 for image viewing and manipulation could allow for the actual manipulation and editing of the images "on the device" without the need for transfer of those images to a PC or the like. If more elaborate image-editing or manipulation functionality was intended to be provided in the software resident upon the device 6 it may be the case that a more elaborate human interface device 17 such as some type of a keyboard or screen interface would be required. Again as outlined above in the more elaborate embodiment such as this in terms of a human interface, the input device would need to be determined that the output device which would typically be used for human interface would be the projector 8, whereby effectively the screen or display of the device would be projected or rendered on a surface rather than needing to incorporate a separate screen into the device itself.

It is explicitly contemplated that providing a powerful image editing suite, which was user friendly, as the image manipulation and viewing software on the device 6 would be the optimal presentation of the overall invention and device

6. Providing a device 6 which allowed for image capture with the camera 7 image projection with the projector 8, as well as for full-featured and yet easy to use image manipulation using software resident upon the device as well as a related human interface 17, is at the highest level the preferred embodiment contemplated of the present invention. In this embodiment image manipulation software, through the human interface 17, would allow for deep functionality in the editing of images contained within the device 6 and their rapid display. One explicitly contemplated and use for this device 6 in this format is in education or other industries such as sales and marketing where it would be desirable to be able to a live basis effectively rapidly mockup edited images or presentation slides based on captured images as well as downloaded or externally acquired digital assets.

It will in any event be understood that the use of any kind of software on the device 6 which accomplishes the basic objective of allowing for the display of images captured by the camera 7 by the projector or other video device 8, and might also allow for varying degrees or levels of editing to take place on the device in conjunction with the human

interface 17, is contemplated within the scope of the present invention.

5 **User interface:**

The human interface 17 of the device 6 as outlined elsewhere herein could take various forms, from a simple button or switch interface on the device in some fashion through to an
10 on-screen keyboard or iconic interface of sorts in conjunction with the projector 8. As is described elsewhere herein, the human interface 17 would be whatever type of an input device or combination of devices or interfaces was determined to be appropriate for interaction of the operator
15 of the device 6 with the various functions thereof. All such human input devices or variations are contemplated within the scope of the present invention. It is specifically contemplated that in certain more sophisticated image manipulation embodiments of the invention that the
20 human input device would interact with menus or other options which would be displayed via the projector 8 for activation or operation by the operator.

Output:

5 In addition to the projector 8, it is also possible that the
device 6 would include additional external interfaces such
as a printer port or the like to which the device 6 could be
connected so that different types of output from the device
6 could be accomplished such as printing of captured or
10 manipulated images and the like. Also as is outlined
elsewhere herein if the device 6 contained a communications
or network interface 15, it would be possible for output
from the device to take the form of network transmission to
either a printer or other output device or even a storage
15 device connected to that network. It is contemplated in any
event that a logical addition to certain embodiments of the
device 6 would be a printer port or other similar external
communication ports or buses and those are contemplated
within the scope hereof.

Transaction flows:

We will now briefly demonstrate some data and transaction flows using the device 6 the present invention to further
5 outline or enable the intended scope of this disclosure.

Image capture:

Figure 4 is the first transaction flow diagram intended to
10 demonstrate in a very basic context the capture of images using the device 6 of the present invention, for storage therein. Four steps of a basic image capture transaction are demonstrated.

15 In the first step, 4-1, the device 6 would be physically oriented for the capture of the image. In the context of the use of the camera 7 of the device 6 basically this step would comprise aiming the camera towards the image which was desired to be captured and perhaps making adjustments to the
20 camera settings using the human interface 17. The next step of this transaction would be to actually capture the image-

step 4-2 of Figure 4 shows the capture activation of the image, using human interface 17 of the device 6. In layman's terms this would basically signal or signify actually pressing the shutter button on the camera 7 once the image has been properly lined up for the camera 7 etc.

Upon activation of the camera 7 for capture of the image, the image would be captured by the camera hardware 7 in conjunction with the remainder of the CPU 9 and the other hardware of the device 6. This is demonstrated at step 4-3. Finally the last step shown in this basic transaction flow, at 4-4, is the writing of the image to the storage within the device 6. Once the image had been captured and stored to the storage of the device 6, the image capture transaction or function would be completed. In many ways the image capture flow here is identical to that of a traditional digital camera -- it is the capture of the image for storage in the memory of the device 6 which is customized with the addition of the projector 8, and the following image manipulation and display functions, which really provide the novelty of the present workflow and transaction.

Image display:

The second type of the data flow transaction which is desired to flow chart here for the demonstration of the basic operation of the device 6 of the present invention is an image display transaction. Referring to Figure 5, there is demonstrated a three-step flow for the generation of an image display using the projector 8 which is integrated into the device 6.

10

Shown first at step 5-1 is the selection of an image file to be displayed. This would be done by the user using whatever type of human interface 17 was integrated into the device and it is specifically contemplated that for example the human interface 17 might be used to select from icons representing different images stored within the device 6 as will be shown on the menu are selection screen which is being projected by the projector 8. In any event this first step would be the selection of an image for display in a basic image display transaction. Alternatively at the tail end of an image manipulation transaction the image may be

directly displayed without the need to selected from such a menu.

Once an image was selected by the user of the device 6, the
5 software resident in the device 6 would result in the
retrieval of that image from the memory of the device for
display. Retrieval of the image which was selected from the
storage of the device by the software and the CPU 9 along
with remaining or related components of the device 6 is
10 shown at step 5-2.

Having identified are retrieved the selected image from
memory or storage, the CPU 9 and remaining components of the
device 6 would then process or send that image to the
15 projector 8 for display. The human interface 17 might also
allow for adjustments of the projector 8 to adjust the
display of the image, as appropriate. Again similar to the
image capture transaction demonstrated above, this type of
an image display transaction is not particularly complex.
20 The novelty however of this transaction, in conjunction with
the configuration of the device 6 of the present invention
and the image capture transaction demonstrated by Figure 5,

is the fact that there is an integrated large-format display device, namely a projector 8, contained within the device so that no external hardware is required for large-format display of images from the device.

5

Image manipulation:

As has been mentioned elsewhere above in this document it is contemplated that the device 6 of the present invention
10 would include imaging software which would be used for the display and/or manipulation of images from the memory of the device 6 for projection on the projector 8 contained therein. The most basic version of an imaging software which could be contemplated for use in a device such as this
15 would simply be a software that would allow for the selection of particular images which were captured using the camera 7 of the present invention for display on the projector 8. In a more elaborate embodiment it is contemplated that the imaging software resident on the
20 device 6 could allow for more elaborate types of image adjustment and manipulation and it is finally here in this document intended for the purposes of the present

application to demonstrate two types of imaging manipulation transactions which could be carried out using a couple different embodiments of the device 6 or the software.

5 The first type of an imaging manipulation software or transaction which is shown, in Figure 6, is an imaging adjustment transaction where an image captured using the camera 7 of the device 6 is being adjusted perhaps by adjusting the lighting, cropping etc. before displayed by
10 the projector 8. Referring to Figure 6 there is a flow chart demonstrating one type of such transaction where it is contemplated that a image from the memory of the device 6 would be identified and certain adjustments would be applied to that image before its saving the display. Similar to the
15 display transaction demonstrated in Figure 5, the first step in the transaction flow figure 6 is the selection of an image from the memory of the device by the user using the human interface device 17, shown at step 6-1. Once the user selected an image from the memory of the device 6 the image
20 would be retrieved from the storage of the device, demonstrated at 6-2.

Once the selected image was loaded into the memory of the device 6, the next step would be for the user of the device 6, using the interface 17 and the software which was resident in the memory of the device 6 and had been also
5 loaded appropriately into the memory of the device 6 such that the CPU mine and other components could in conjunction there with edit the selected image, to use the interface 17 to apply the desired changes to the image. Various types of image formatting changes are contemplated and could be
10 accomplished using image manipulation software within the device 6. For example color settings of the image could be adjusted, cropping could be done even through to more elaborate functions being available in the image manipulation software such as redeye removal etc. It will
15 be understood that any type of an image editing function that can be contemplated in the mind of a person skilled in the art of programming such software could be accomplished using the device and method described herein so long as the functionality could be accommodated in the software and
20 processor instructions stored within the device 6 for use in image manipulation thereon.

Shown next at stage 6-4 is the saving of the edited image to the memory of the device 6. Once the edited image was saved back to the memory of the device it could either be the end of the flow chart as is shown in the one avenue at the end of the flow chart of Figure 6, or also wants the image was saved at 6-4 it could go on to be displayed using an image display flow such as that demonstrated in Figure 5. Again in terms of the capabilities of the imaging manipulation software which are contemplated herein, the capabilities of that software could be anything from the most basic image selection and viewing software which would not allow for manipulation such as that shown in Figures 6 and 7, through to more elaborate software which could accomplish the application of editing or feature changes to images within the memory of the device 6 such as demonstrated in Figure 6, or even the combination of multiple images or assets into finished images or works based upon the incorporation of an externally acquired assets or images along with those captured within the memory of the device using the camera 7 integral therein.

The final basic data transaction which is shown in a flow chart at the present time for the sake of demonstration of

more advanced contemplated functionality of the device 6 of the present invention is shown in Figure 7 which is a flow chart of one embodiment of the image manipulation transaction. The particular embodiment of the device 6
5 which would be used in the execution of the image manipulation transaction demonstrated in Figure 7 would be a device 6 which included a communications interface 15 with an external network such as the Internet, because it is contemplated that in this particular embodiment or
10 transaction, externally accessed images or assets, such as images available from the Internet or network storage locations, would be incorporated along with images captured by the camera 7 in the device.

15 Similar to the display transaction demonstrated in Figure 6, the first step in the transaction flow figure 7 is the selection of an image from the memory of the device by the user using the human interface device 17, shown at step 7-1. Once the user selected an image from the memory of the
20 device 6 the image would be retrieved from the storage of the device, demonstrated at 7-2.

Insofar as what is intended to be demonstrated by this particular flow chart is the combination of more than one external asset with an image captured and stored within the device 6, step 7-3 shows the stage in the flow where
5 external assets could be retrieved from other storage locations, on a computer network or on the Internet, where the device 6 included a communications interface 15 by which external storage locations could be accessed. It may for example be the case that a mockup or a mash up was being
10 made based on an image within the memory of the device 6 which was captured by the camera 7 along with one or more images to be accessed from the Internet. At this stage in the process, the image manipulation software could include the functionality to browse external storage locations using
15 the communications interface 15 within the device 6 and to pull copies of those assets into the local memory of the unit 6 for use in such a final work. What is contemplated at this particular juncture in the workflow is that one or more external assets would be pulled in and incorporated
20 into the edited image. The combination or editing of that image is demonstrated at step 7-4, with the saving of the finished image to memory at 7-5. Again that could either be the end of the manipulation transaction or the edited image could be moved on for display by the projector 8.

With all of these transaction workflows it is intended that these be merely demonstrative of the different types of functions which could be undertaken using the system and method of the present invention. It will be understood that changes could be made to the order of execution of some of the steps demonstrated in these flows and that changing the order of steps carried out or adding different elements to the basic functionality described herein does not depart from the intention and scope of the invention.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous changes and modifications will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all such suitable changes or modifications in structure or operation which may be resorted to are intended to fall within the scope of the claimed invention.

CLAIMS:

5 What is claimed is:

Application number / numéro de demande: 2645745

Figures: 1, 2, 3, 4, 5, 6, 7

Pages: _____

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