DIGITAL APPLIANCE DATA DOWNLOAD DEVICE FOR DATA STORAGE

FIELD OF THE INVENTION

The present invention relates in general to removable storage devices. More particularly, the present invention relates to a portable data storage device for connecting to digital appliances and automatically downloading digital data from the digital appliances.

BACKGROUND OF THE INVENTION

The application of digital technology is rapidly being applied to a host of consumer appliances. For example, the digital camera is a significant application that is widely expected to become a major application of digital technology. The digital camera employs a microprocessor and other supporting circuitry to convert an analog image into a set of digital pixels, thereby forming a digital image. The digital pixels are stored in a memory area of the camera for later retrieval and processing. The digital images can then be downloaded to a personal computer (PC) or a notebook computer for viewing and editing.

Fig. 1 is a block diagram showing an overall structure of a conventional digital camera. The camera 10 has a central processing unit (CPU) 12 which functions as a control unit, an image photographing unit 14, a data converting and compressing unit 16, a memory controller 18 which functions as an interface, a data memory 20 which is a storage medium, a

first in first out (FIFO) circuit 22, and a communication port 24.

The CPU 12 controls operations of the components of the camera 10. The image photographing unit 14, which is typically implemented as a charge coupled device, converts a detected image into analog signals. The data converting and compressing unit 16 converts the analog signals into digital signals which represent the image data, and compresses and encodes the image data. The image data is written into the data memory 20 through the FIFO circuit 22 by operation of the memory controller 18. The data memory 20 is typically a standard flash memory PC card or other nonvolatile memory and is typically constructed in accordance with the PCMCIA (Personal Computer Memory Card International Association) standard. The image data can be read out from the data memory 20 through the FIFO circuit 22 by operation of the memory controller 18. A communication port 24 is provided to download image data directly to a PC.

Flash memory is the most common form of digital image storage space in a digital camera. When the memory area becomes full, the memory area must be cleared before more pictures can be taken. In the earliest digital cameras to arrive in the marketplace, the flash memory modules were not removable. Those cameras require that the camera be connected to a PC or notebook computer to download the images. Newer cameras provide a removable flash memory module. Accordingly, when such a memory module is full, it can be replaced with an empty memory module. The user is then free to take additional pictures and postpone the download to a later time. Unfortunately, although the flash memory modules are removable, they are also relatively expensive. As a result, a user is likely to purchase only one or two additional memory modules, which still limits the user's picture taking capability.

At present, digital camera images are stored in the internal memory (e.g., flash memory, RAM, etc.) of the camera which, when it becomes full, requires downloading through a port (e.g., serial, parallel, SCSI) to a PC. This is not

convenient to the user if a PC is not readily available. Transfer of images over a serial port is very slow.

A digital camera is only one example that uses flash memory to provide a removable storage solution. Other digital information appliances, such as smart phones, personal digital assistants and the like, similarly rely on flash memory to provide a removable storage solution.

Although the art of removable storage devices is well developed, there remain some problems inherent in this technology, particularly the storage capability and economic feasibility. Therefore, a need exists for a low cost, removable storage solution that overcomes the drawbacks of the prior art.

SUMMARY OF THE INVENTION

The present invention is directed to a portable data download and storage device that downloads digital data from a digital appliance, such as digital image data from a digital camera, into a data storage medium.

According to one aspect of the present invention, a data download and storage device provides digital data storage for a data generation device, wherein the data generation device is one of a plurality of data generation device types. Each data generation device has a communication port for communicating according to a predefined communication protocol. The data download and storage device comprises a data storage medium; a read/write head for writing data on a surface of the data storage medium and reading data from a surface of the data storage medium; communication means being selectively connectable to the communication port on the data generation device; processing means being coupled between the read/write head and the communication means for transferring digital data between the data generation device and the data storage medium; and data transfer initiation means connected to the processing means to initiate the transfer of the digital data between the data generation device and the data storage medium.

In accordance with an aspect of the present

invention, the data transfer initiation means comprises an electronic switch.

In accordance with a further aspect of the present invention, a portable power source for supplying power to the data download and storage device is provided. The portable power source preferably comprises a battery.

In accordance with a further aspect of the present invention, memory means coupled to the processing means is provided for storing a plurality of communication protocols. Each communication protocol corresponds to a different one of the data generation device types, for transferring data between the data generation device and the data download and storage device.

In accordance with a further aspect of the present invention, protocol selection means for selecting a communication protocol from the plurality of communication protocols responsive to the data generation device is provided. The protocol selection means preferably comprises an electronic switch. Moreover, the protocol selection means comprises means for interrogating the data generation device.

In a further embodiment within the scope of the present invention, a data download and storage device for retrieving and storing digital data from a digital camera having a communication port is provided, and comprises a magnetic storage medium; a read/write head for writing data on a surface of the magnetic storage medium; a communication port being connectable to the communication port on the digital camera for accepting data from the digital camera; and processing means coupled between the read/write head and the communication port for transferring the data received on the communication port to the magnetic storage medium.

According to further aspects of the invention, the device can further comprise protocol selection means in electrical communication with the processing means for selecting a communication protocol from a plurality of communication protocols such that the communication port communicates with the digital camera according to the selected

communication protocol. The protocol selection means preferably comprises at least one electronic switch and means for interrogating the digital camera. Moreover, the device can further comprise memory means, with the communication protocols being stored in the memory means. Moreover, the device can further comprise a data transfer initiation means in electrical communication with the processing means for initiating the transfer of the data, wherein the data transfer initiation means comprises an electronic switch.

Another embodiment within the scope of this invention includes a data download and storage device for retrieving and storing data from a digital data generating device having a communication port for communicating according to a predetermined communication protocol, comprising a data transfer port being connectable to the communication port on the digital data generating device for accepting data from the digital data generating device; first memory means for storing data received from the digital data generating device; and a controller coupled between the data transfer port and the first memory means for transferring digital data between the digital data generating device and the first memory means using the predetermined communication protocol.

According to another aspect of the present invention, the device further comprises transfer initiation means connected to the controller to initiate the transfer of data between the digital data generating device and the first memory means, and second memory means for storing a plurality of communication protocols.

According to another aspect of the present invention, the controller comprises means to interrogate the digital data generating device to determine the predetermined communication protocol of the digital data generating device and means to select the predetermined communication protocol from the plurality of communication protocols stored in the second memory means for use in the data transfer.

According to another aspect of the present invention, the device further comprises a detachably coupled data storage

device, preferably having a disk drive and a magnetic storage medium.

According to another aspect of the present invention, the device further comprises means to transfer data from the first memory means to the magnetic storage medium.

According to another aspect of the present invention, the device further comprises a detachably coupled docking station for connecting the download and storage device to a personal computer to transfer data from the first memory means to the personal computer.

The foregoing and other aspects of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

Fig. 1 is a block diagram showing the basic structure of a conventional digital camera;

Fig. 2 is a block diagram of an exemplary data download device in accordance with the present invention;

Fig. 3 is a flowchart showing the operation of the data download device of Fig. 2;

Fig. 4 is a block diagram of a further exemplary data download device in accordance with the present invention;

Fig. 5 is a block diagram of the data download device of Fig. 4 coupled with a data storage device;

Fig. 6 is a flowchart showing an exemplary operation of the device of Fig. 4;

Fig. 7 is a flowchart showing a further exemplary operation of the device of Fig. 4;

Fig. 8 is a block diagram of an exemplary docking station in accordance with the present invention;

Fig. 9 is a block diagram of the data download device of Fig. 4 coupled with a data storage device and the docking station of Fig. 8; and

Fig. 10 is a flowchart showing an exemplary process of providing device protocol and driver software to a device

in accordance with the present invention.

DESCRIPTION OF EXEMPLARY EMBODIMENTS AND BEST MODE

The present invention is directed to a portable data retrieval and storage device (hereinafter also referred to as "data download device") that adds the capability of downloading digital data from a digital appliance (hereinafter also referred to as a "digital data generating device"), such as digital image data from a digital camera, into a data storage medium, without the use of a personal computer (PC). In other words, a data download device in accordance with the present invention connects to and queries a digital appliance, such as a digital camera, and then downloads and stores digital data from the appliance. Moreover, the data download device automatically queries the digital appliance to determine the device type and communication or data transfer protocol. The data download device can be coupled with a data storage device, such as a disk drive, or can be a separate, stand-alone device.

Fig. 2 shows a block diagram of an exemplary data download device in accordance with the present invention. In this embodiment, the data download device 30 is a stand-alone device, and is not coupled to a separate data storage device or disk drive. The data download device 30 comprises a processor or controller 32, preferably a microprocessor or CPU, that controls the operations of the components of the data download device 30. The device 30 also comprises a storage or memory media 34, such as a magnetic disk or tape. The storage media 34 is driven past a read/write head 36 for storing data retrieved from a digital appliance or digital data generating device (not shown).

The device 30 further comprises an initiate transfer mechanism 40, preferably an electronic or mechanical switch, such as a push button. The mechanism 40 is actuated when it is desired to begin data transfer from a data generating device to the data download device 30. The mechanism 40 is preferably user activated.

Communication circuitry including a communication

port 44, preferably serial, is provided to enable communication of data between the data download device 30 and a digital data generating device. The data download device 30 communicates with a communication port of the data generating device to directly download digital data stored in the data generating device to the storage or memory media 34.

As described above with respect to Fig. 1, a digital appliance 10 generates data. This data is typically stored in a memory 20 residing in the digital appliance 10. The digital appliance 10 also has a communication port 24, typically a serial or parallel port. The present invention couples with the communication port 24 of the digital appliance 10, and transfers the data from the memory 20 to media 34 residing in the device 30. For example, a digital camera takes a digital image by capturing light images and converting the images into digital image data and storing the digital image data in a memory 20. An appropriate cable is connected between the communication port 24 and the communication port 44 of the device 30.

The data download device 30 can be connected to existing data generating devices such as digital cameras via connectors such as a serial cable, IRDA, PCMCIA flash adapter, ATA flash card, SCSI, parallel, or USB. Thus, the device 30 transfers digital image data directly from the memory in digital cameras to removable media without the use of a personal computer. The present invention is more economically feasible than flash memory and image transfer between the data generating device and a PC is much faster than with flash memory.

It should be noted that in a digital camera, a controller preferably monitors one of its inputs for a predetermined signal that indicates that the device 30 of the present invention is coupled thereto. When the predetermined signal is detected, the digital camera controller transfers digital image data to the device 30.

Additionally, the device 30 has a protocol select mechanism 38 for selecting a communication or transfer protocol

and driver from one of a plurality of protocols and drivers stored in a memory 42, depending on the type of the digital data generating device to which it is connected. Protocol selection occurs when a transfer is initiated by the initiate transfer mechanism 40. The protocol select mechanism 38 can comprise an electronic switch. The memory 42 within the data download device 30 is preferably non-volatile, such as a flash ROM, and contains multiple protocols and drivers for the direct download of digital image data from different types of digital cameras. This is desirable because each digital camera has a different protocol using a different driver. Thus, the data download device 30 functions with, and downloads from, each different type of digital camera. Moreover, the device can be configured to accept (i.e., upload and store) additional (existing and future) camera transfer protocols and drivers.

A power source 46, preferably detachable and portable, and preferably a battery pack, either a standard battery (e.g., 9 volt or AA alkaline) or more preferably, a rechargeable battery, is provided as a power supply. Thus, there is no additional power drain on the data generating device. Optionally, a power switch 49 is provided so that the power source 46 can be manually turned off to save power when not in use.

The data download device 30 also optionally includes an indicator lamp 48, preferably a multi-color LED or a plurality of LEDs that indicates the status of a data transfer. For example, the indicator lamp 48 can be a two color LED that turns red if, upon data download initiation via the initiate transfer mechanism 40, the data storage media 34 does not have enough unused or free storage space remaining to download the contents of the camera (i.e., disk full), and the LED turns green after a successful download of the memory of the data generating device (i.e., transfer successful). Additional LED indicator lamps can be incorporated to indicate other statuses such as "on going transfer" or "unsuccessful transfer". The indicator lamp 48 is separate from any indicator lamps that may be present on the power source 46 (e.g., battery pack indicator

LEDs).

After data transfer, the storage media 34 on which the data is stored can be inserted in a PC drive for transfer, viewing, and editing of the digital data. The data is stored on the storage media in a format independent of the camera type and protocol. Moreover, the device 30 can be installed into an optional docking station (described in further detail below) for connection to a PC. Thus, data can be transferred from the media 34 to any type of PC, such as an IBM PC-compatible or a Macintosh. The device 30 stores files in the storage media 34 in any of a plurality of different formats, such as IBM PC-compatible DOS and Macintosh.

Fig. 3 is a flowchart detailing the operation of the exemplary data download device of Fig. 2. The data download device 30 monitors the initiate transfer mechanism 40 at step 101. When the mechanism 40 is activated, the device 30 determines the type of data generating device it is connected to and will be receiving digital data from, at step 105. After determining the type of data generating device it is connected to, at step 110, the device 30 retrieves the appropriate protocol and driver from the memory 42.

At step 130, the device determines whether the storage media 34 has enough space for the data transfer. If the storage media 34 is full, an indicator lamp 48 is activated at step 135 and the data transfer is halted. If the storage media 34 does have enough space for the data transfer, the transfer is executed at step 140. An indicator lamp 48 is activated at step 142 to indicate a successful transfer. When the transfer is completed, the indicator lamp 48 is deactivated and the device 30 returns to the initiate transfer mechanism monitoring mode.

The data download device 30 has a sleep mode that decreases the amount of power consumed by the device 30. The device 30 awakens when the initiate transfer mechanism 40 is activated, when the device 30 is mounted in a docking station for connection to a PC, or when the device 30 is attached to a data generating device. When the data download device 30

awakens by connection to a data generating device, the device 30 sends a start sequence to the data generating device. Sleep mode is not used while in the docking station.

In a further embodiment of the present invention, a data download device is coupled, preferably detachably coupled, to a memory interface of a data generating device via a communication port. Thus, the data download device acts as a memory (e.g., data memory 20 in Fig. 1) of the data generating device. Data is written directly, as it is generated, to a storage or memory area or media in the data download device by operation of a controller in the data generating device via an interface and communication ports. In accordance with this embodiment, for example, the data download device 30 of Fig. 2 is coupled via communication port 44 to communication port 24 of the data generating device 10 of Fig. 1. As it is generated, the image data is provided to the data download device 30 through the FIFO circuit 22 by operation of the memory controller 18. The data download device 30 appears to the data generating device 10 of Fig. 1 as a memory (e.g., memory 20, a flash memory) of the data generating device 10. Each image transfer that is intended for the memory 20 of the data generating device 10 is directly provided to the data download device 30 for storage in storage or memory media 34. It should be noted that in this exemplary embodiment, an initiate transfer mechanism 40 is not required because the data download device interprets and responds to the commands of the data generating device as if it were a memory of the data generating device. Thus, the data generating device initiates the transfer of data files.

In one alternate embodiment, the data download device is coupled to the data generating device through a flash memory interface via a flash adaptor port and a port connector and cable (e.g., Compact Flash™ ATA, PCMCIA, etc.). The data download device interprets and responds to all ATA flash commands as if it were flash memory in accordance with the ANSI ATA flash specification.

In a further embodiment of the present invention, a

data download device is coupled, preferably detachably coupled, to a data storage device such as a disk drive, preferably portable, to allow a user to download digital data (preferably serial) from digital appliances into a storage media, such as a disk, through a port (preferably parallel) of the data storage device. Currently available portable data storage devices, such as a ZIP drive or a CLIK drive (Iomega Corporation, Roy, Utah), are the preferred data storage devices.

An exemplary data download device that is used in conjunction with a data storage device is shown in Fig. 4. An exemplary data storage device is shown coupled to a data download device in Fig. 5.

The data download device 200 has a microprocessor controller 210, a buffer manager 215, an interface bus 220, a data transfer port 225, an input port 230, and an output port 235. The device 200 also comprises an initiate transfer mechanism 240, two memories 245, 247, a power source 246, and an indicator lamp 248. A sleep controller 250 is also provided.

The microprocessor controller 210 controls operations of the components of the device and such functions as data generating device polling, switch detection, and communication, preferably parallel, with a data storage device. The controller 210 controls the interfaces except for when the data download device 200 is docked to a docking station (described in further detail below with respect to Fig. 8). The controller 210 receives a signal indication from the input port 230 when the data download device is connected to a data generating device or when the data download device is connected to a docking station.

When the initiate transfer mechanism 240 is activated, the controller 210 accesses the first memory 245 to update and retrieve the appropriate device protocol and driver. The initiate transfer mechanism 240 is preferably a push button or electronic switch that is activated to initiate the data downloading. If the device is in sleep mode, activation of the

initiate transfer mechanism 240 awakens the device. Protocols and drivers of different data generating devices are installed and stored in the first memory 245, preferably a non-volatile flash memory, such as a flash ROM. After receiving the proper protocol and driver, the controller 210 transfers digital data in accordance with the protocol from the data generating device to a second memory 247, preferably RAM such as a 1 MB static RAM, of the data download device 200. The controller 210 then provides the digital data to the attached data storage device via the interface bus 220. The controller 210 is preferably an 8052 microprocessor running at 32 MHZ.

The buffer manager 215 gives the controller 210 random access to the second memory 247. The buffer manager 215 has various registers including a control register, an auto-incrementing buffer pointer register, and a data register. The second memory 247 is used to buffer data during downloads (preferably serial) from the data generating device to decrease the number of drive motor ramp-ups. Preferably, the buffer manager 215 is a byte sequential controller that gives the controller 210 random access to some of the bytes, e.g., the first 32k bytes, in the second memory 247, and sequential only access to the remaining bytes in the memory 247. The purpose of the byte sequential portion of the buffer manager is to reduce overhead during high-speed device communication.

The interface bus 220 connects with and communicates with the data storage device and the first memory 245. The interface bus 220 detects and transfers packet information, handles soft reset commands, supports send diagnostics command, detects unexpected writes to command file register, and supports programmed I/O modes. The interface bus 220 is preferably a standard connection bus that complies with limited implementations of ANSI Standard ATA-2. The bus 220 of the data download device connects to the data storage device, such as a disk drive, via a standard drive connector, preferably a parallel port connector. With respect to the docking station, the controller 210 can select not to drive the bus 220 which allows disk drive bypass signals to pass directly through to

the docking station.

The data transfer port 225 is preferably a high-speed serial port that is connectable to the data generating device and is a PC-compatible serial port using an external clock (not shown) appropriate for proper baud rate selection. The port is preferably mode selectable via a serial control register from preferably 9600 to 230k bits per second; however, other rates can be used. By implementing a high-speed serial interface, digital data generating devices that support 230k bits/second data can be used to transfer data to the data download device 200 at high speed. The data transfer port 225 is connected to the controller 210 and interrupts when data is received and when a data transmission is complete. Both interrupts are enabled via an interrupt control register. The data transfer port 225 is turned off between downloads.

The input port 230 is coupled to sense inputs such as "connected to data storage device" and "connected to docking station". These inputs are then provided to the controller 210.

The output port 235 is connected to a status indicator 248, preferably a multi-color LED or combination of LEDs. The status indicator 248 is used to indicate such drive status as disk full, transferring, transfer complete, and low battery. Series of flashes can show low battery, write protected, and no disk, etc.

A power source 246 is connected to the controller 210 to supply power to the device 200. The power source 246 is preferably detachable and preferably a battery pack, and is either a standard battery (e.g., alkaline) or more preferably, a rechargeable battery. A power switch 249 is preferable so that the device does not need to be removed from the data storage drive to prevent battery discharge between data downloads. Thus, the device and the data storage drive can remain coupled after the power has been turned off.

A sleep controller 250 is used to put the download device 200 into a low-power consumption mode (i.e., sleep mode) to increase the battery life.

A translator (not shown), such as an external single voltage serial level translator (e.g., RS-232 level translator), is used to convert data download device high-speed serial port signals to appropriate levels for a serial connector.

An external IRDA input interface IC (not shown) is optional and converts outputted infared signals from a data generating device to parallel data. This interface uses an interrupt system to access the controller 210.

An optional low voltage monitor IC (not shown) monitors the voltage and alerts the data download device controller 210 when a low voltage situation occurs via a sense input.

Preferably, the above described data download device is fabricated on a printed circuit board and enclosed in a shock-ruggedized enclosure. Preferably, a high temperature substrate is used to provide increased environmental robustness.

The data download device of Fig. 4 is coupled, preferably detachably, to a data storage device. Fig. 5 shows the data download device 200 of Fig. 4 coupled to an exemplary data storage device 255.

The data storage device 255 comprises a conventional disk drive 257, such as a ZIP drive or a CLIK drive (Iomega Corporation, Roy, Utah), for reading/writing to storage media 256 such as a disk, a controller 258, an interface bus 260, a buffer manager 265, and a memory 270. The hardware is packaged for portability. A multi-color indicator (not shown), such as an LED, displays the drive's current status. During digital data transfers between the device 200 and the storage media 256, data is buffered by the buffer manager 265 in memory 270 and translated to a parallel interface and written to the storage media 256 using a file system and disk format that are recognizable to current personal computers (e.g., Macintosh, PC including FAT16, FAT32, and NTFS disk formats). Preferably, the power source 246 of the data download device 200 also powers the data storage device.

Fig. 6 is a flowchart detailing an exemplary operation of the exemplary data download device of Fig. 4 coupled to a data storage device. The data download device 200 monitors the initiate transfer mechanism 240 at step 301. When the mechanism 240 is activated, the power source is turned on by closing the optional switch 249, at step 303. Upon initiation of the initiate transfer mechanism 240, the controller 210 of the data download device 200 interrogates the data generating device through the data transfer port 225, preferably a serial port, to determine which type of data generating device it is connected to and will be receiving digital data from, at step 305. After determining what type of data generating device it is connected to, the device 200 retrieves the appropriate protocol and driver from the first memory 245 at step 310.

At step 327, the data transfer begins with the digital data being transferred from the data generating device to the second memory 247. At step 330, the device 200 determines whether the storage media in the data storage device has enough space for the data transfer. If the storage media is full, an indicator lamp 248 is activated at step 335 and the data transfer is halted. If the storage media does have enough space for the data transfer, the data is buffered into a suitable file format (e.g., PC including FAT16, FAT32, and NTFS or Macintosh) and transferred from the second memory 247 to the storage media in the data storage device, at step 340. With respect to media, the digital data is stored in the appropriate format depending on the type of storage media detected by the data storage device. An indicator lamp 248 is activated at step 342 to indicate a successful transfer. When the transfer is completed, the indicator lamp 248 is deactivated and the device 200 returns to the initiate transfer mechanism monitoring mode.

Fig. 7 is a flowchart showing a further exemplary operation of the device of Fig. 4. A desired transfer is initiated at step 350 by activation of an initiate transfer mechanism 240, such as a user pressing a "start" button on the

data download device 200. Initialization of the data download device 200 and the data generating device occurs at step 352, in which the data download device 200 obtains, for example, a directory of the data files, such as image data files, the size of the data files, the number of data files, the type of data generating device, the data transfer protocol etc. from the data generating device. Alternately, if the data generating device did not provide its transfer protocol to the data download device 200 during initialization, the data download device 200 retrieves the protocol from a memory, such as first memory 245 (similar to step 310 in Fig. 6). After initialization, at step 355, the data download device 200 allocates buffer space in its memory (such as second memory 247) to receive the data file(s). Data transfer of a data file begins at step 357 and the data is transferred to the buffer memory 247 at step 360.

As data is being transferred, the buffer 247 is checked to determine whether it is full at step 363. If the buffer 247 is full, then the data in the buffer 247 is transferred to the storage media in the data storage device, at step 370, thereby freeing the buffer 247 at step 373 to receive additional data, and data transfer continues at step 360.

If the buffer 247 is not full at step 363, it is determined at step 365 if the transfer of the data file is complete. If the transfer of the data file is complete, the data in the buffer 247 is transferred to the storage media at step 376. It is then determined if any additional files remain to be transferred, at step 380. If not, then the data transfer process ends. If additional files remain to be transferred, processing continues at step 355.

If the transfer of the data file at step 365 is not complete, it is determined at step 368 if the buffer 247 is empty. If the buffer 247 is empty, then recovery is initiated at step 385 and processing continues at step 355. If the buffer 247 is not empty, then additional data is transferred to the buffer 247, with processing continuing at step 360.

The data download device of the present invention can be connected to a PC so that the data received from a data generating device and stored on storage media within the data download device can be transferred, viewed, or edited.

In one additional embodiment in accordance with the present invention, a docking station is provided which enables a data download device to be connected to a PC. A docking station allows the data download device, either standing alone or coupled with a data storage device, to connect to a host computer as a removable media logical disk drive. An exemplary docking station 400 is shown in Fig. 8. The docking station 400 comprises a docking station interface connector 405, a buffer manager 410, a transfer port 415 (preferably SCSI and/or parallel), a power supply interface 420, and a controller 425.

The docking station 400 connects a data download device (e.g., data download device 200 from Fig. 4) and a data storage device (e.g., data storage device 255 from Fig. 5) to a PC 500, as shown in Fig. 9. The docking station 400 is connected to the data download device 200 through the docking station interface connector 405. The docking station interface connector 405 is preferably a slide pin connector that attaches to the data download device 200. The docking station 400 is connected to the PC 500 by the transfer port 415.

The docking station 400 transfers data from the storage media to the PC 500. The docking station 400 can also convert the data to SCSI, parallel, or any other format, using conventional conversion techniques, prior to sending the data to the PC 500. In the docking station 400, the PC 500 acts as the host and controls file directory and data transfers through the buffer manager 410. The data download device 200 and the data storage device 255 use the docking station buffer manager 410 and controller 425 instead of using their respective buffer managers and controllers. Commands, such as SCSI or parallel port commands, are passed to the data storage device 200 and to the data storage device 255 through the docking station buffer manager 410 over the interface buses 220 and 260.

The docking station 400 supplies power to the data

download device 200. When the data download device 200 is docked, it receives power from the docking station 400 through the power supply 420. The docking station 400 receives power from the PC 500 and supplies power to the data download device 200 through the docking station connector 405. The docking station 400 preferably charges a rechargeable battery if that is used as a power source 246 for the data download device 200. If a standard battery pack (e.g., 9 volt or AA alkaline) is installed as a power source 246, the docking station 400 does not attempt to charge the batteries.

When mounted in the docking station 400, the controllers 210, 258 of the data download device 200 and the data storage device 255, respectively, do not drive the interface bus. The controllers 210, 258 are idle while in the docking station 400. The firmware of the data download device 200 and the data storage device 255 bypass the interface bus and enable a buffer manager bypass interface (not shown) (e.g., the devices 200, 255 set register bits disabling the interface bus and enabling a buffer manager bypass interface). The data download device 200 and the data storage device 255 operate in a bypass mode using commands to/from the docking station 400. Thus, the docking station 400 has control over the interface.

The data generating device communication or data transfer protocol and driver software (i.e., data generating device firmware) are initially stored in a memory, storage area, device or media, such as a ROM, a RAM, a hard drive or a floppy disk. The memory, storage area or device can reside on the data generating device or at a remote site, such as on a PC or on a computer network, such as at an internet website.

Fig. 10 is a flowchart showing an exemplary process of providing data generating device protocol and driver software to a data download device in accordance with the present invention, such as the devices described with respect to Figs. 2 and 4. At step 601, the data download device is connected to a device, such as a personal computer, that accesses the storage area, device or media on which the desired firmware resides. In one exemplary embodiment, the device

driver of the data download device is loaded into the PC at step 605, and this accesses a software menu which lists various data generating devices. At step 610, the desired data generating device is selected. At step 615, the firmware of the data generating device is downloaded from the storage area, device or media via the PC, or accessed from a remote computer network such as an internet website, and stored into a memory, such as the memory 42 of Fig. 2 or the first memory 245 of Fig. 4, of the data download device. Thus, the data download device can upload and store additional camera transfer protocols and drivers as they are introduced into the marketplace.

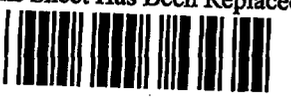
Another exemplary process of providing data generating device protocol and driver software to a data download device in accordance with the present invention includes uploading the device protocol and driver software directly from the data generating device if it is contained within the data generating device. The data generating device is connected to a data download device. The data download device (e.g., device 200 in Fig. 4) determines the type of data generating device it is connected to and then determines if it already has that particular device's protocol and driver stored in its memory (e.g., first memory 245 in Fig. 4). If the data download device does not contain the data generating device's protocol and driver, the data download device transfers the protocol and driver data from the memory of the data generating device and stores it in its memory (memory 245).

It should be noted that although the portable device of the illustrated embodiments is preferably a digital camera, the present invention is not limited thereto. For example, the present invention can be applied to a smart phone, personal digital assistants, and notebook computers (not shown). Any digital data, such as sound data, can be downloaded and saved by the present invention, not just digital image data.

Although illustrated and described herein with reference to certain specific embodiments, the present invention is nevertheless not intended to be limited to the details shown. Rather, various modifications may be made in

the details within the scope and range of equivalents of the claims and without departing from the invention.

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What is claimed:

1. A data download and storage device for providing digital data storage for a data generation device, wherein said data generation device is one of a plurality of data generation device types, each data generation device having a communication port for communicating according to a predefined communication protocol, the data download and storage device comprising:

a data storage medium;

a read/write head for writing data on a surface of said data storage medium and reading data from a surface of said data storage medium;

communication means being selectively connectable to said communication port on said data generation device selected from said plurality of data generation device types;

processing means being coupled between said read/write head and said communication means for transferring digital data between said data generation device and said data storage medium; and

data transfer initiation means connected to said processing means to initiate the transfer of said digital data between said data generation device and said data storage medium.

2. The data download and storage device as recited in claim 1, wherein said data transfer initiation means comprises an electronic switch.

3. The data download and storage device as recited in claim 1, further comprising a portable power source for supplying power to said data download and storage device.

4. The data download and storage device as recited in claim 3, wherein said portable power source comprises a battery.

5. The data download and storage device as recited in claim



1, further comprising memory means coupled to said processing means for storing a plurality of communication protocols, each communication protocol corresponding to a different one of said data generation device types, for transferring data between said data generation device and said data download and storage device.

6. The data download and storage device as recited in claim 5, further comprising protocol selection means for selecting a communication protocol from said plurality of communication protocols responsive to said data generation device.

7. The data download and storage device as recited in claim 6, wherein said protocol selection means for selecting a communication protocol comprises an electronic switch.

8. The data download and storage device as recited in claim 6, wherein said protocol selection means comprises means for interrogating said data generation device.

9. The data download and storage device as recited in claim 1, wherein said data generation device comprises a digital camera.

10. The data download and storage device as recited in claim 1, wherein said data storage medium comprises a magnetic disk.

11. A data download and storage device for retrieving and storing digital data from a digital camera having a communication port, comprising:

a magnetic storage medium;

a read/write head for writing data on a surface of said magnetic storage medium;

a communication port being connectable to said communication port on said digital camera for accepting data from said digital camera; and

processing means coupled between said read/write head

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and said communication port for transferring said data received on the communication port to said magnetic storage medium.

12. The data download and storage device as recited in claim 11, further comprising protocol selection means in electrical communication with said processing means for selecting a communication protocol from a plurality of communication protocols such that said communication port communicates with said digital camera according to said selected communication protocol.

13. The data download and storage device as recited in claim 12, further comprising memory means, said plurality of communication protocols being stored in said memory means.

14. The data download and storage device as recited in claim 12, wherein said protocol selection means comprises at least one electronic switch.

15. The data download and storage device as recited in claim 12, wherein said protocol selection means comprises means for interrogating said digital camera.

16. The data download and storage device as recited in claim 11, further comprising data transfer initiation means in electrical communication with said processing means for initiating the transfer of said data.

17. The data download and storage device as recited in claim 16, wherein said data transfer initiation means comprises an electronic switch.

18. The data download and storage device as recited in claim 11, further comprising a portable power source for supplying power to said data download and storage device.

19. The data download and storage device as recited in claim

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18, wherein said portable power source comprises a battery.

20. A data download and storage device for retrieving and storing data from a digital data generating device having a communication port for communicating according to a predetermined communication protocol, comprising:

a data transfer port being connectable to said communication port on said digital data generating device for accepting data from said digital data generating device;

first memory means for storing data received from said digital data generating device; and

a controller coupled between said data transfer port and said first memory means for transferring digital data between said digital data generating device and said first memory means using said predetermined communication protocol.

21. The data download and storage device of claim 20, further comprising transfer initiation means connected to said controller to initiate the transfer of data between the digital data generating device and said first memory means.

22. The data download and storage device of claim 21, further comprising second memory means for storing a plurality of communication protocols.

23. The data download and storage device of claim 22, wherein said controller comprises means to interrogate said digital data generating device to determine said predetermined communication protocol of said digital data generating device and means to select said predetermined communication protocol from said plurality of communication protocols stored in said second memory means for use in said data transfer.

24. The data download and storage device of claim 20, further comprising a power source for supplying power to said data download and storage device.

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25. The data download and storage device of claim 20, further comprising a detachably coupled data storage device.

26. The data download and storage device of claim 25, wherein said data storage device comprises a disk drive and a magnetic storage medium.

27. The data download and storage device of claim 26, further comprising means to transfer data from said first memory means to said magnetic storage medium.

28. The data download and storage device of claim 20, further comprising a detachably coupled docking station for connecting the download and storage device to a personal computer to transfer data from said first memory means to said personal computer.

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