FP:(Eleven-X Incorporated)

3 results **Offices** all **Languages** en **Stemming** true **Single Family Member** false **Include NPL** false

Sort: Relevance **Per page:** 10 **View:** All 1 / 1 Machine translation

1. 2004203658 A REPLENISHABLE ONE TIME USE CAMERA SYSTEM WITH RECAPPING MECHANISM AU - 26.08.2004

Int.Class H04N 1/21 **Appl.No** 2004203658 **Applicant** Google Inc. **Inventor** Silverbrook, Kia

CLAIMS: 1. A pagewidth ink jet printhead assembly comprising a pagewidth ink jet printhead and a recapping mechanism for recapping the print head, the recapping mechanism comprising: a first stationary ferrous arm; a solenoid coil wrappendaround a portion of said ferrous arm; a second moveable arm located substantially adjacent said first arm and biased towards said print head; and a series of membranes attached to said second moveable arm, said membranes sealing said print head when in a non printing position; wherein said solenoid, when activated, causes said moveable ann to move away from the surface of said print head structure sufficiently to allow paper or film to be inserted between said membranes and said print head structure for the printing of ink thereon. 2. A print head assembly as claimed in claim 1 wherein said membranes are resiliently collapsible against the surface of said print head structure. 3. A print head assembly as claimed in claim I or claim 2 wherein said solenoid comprises an elongated winding of a current carrying wire which is wrapped around a protruding portion of said first arm, said elongated winding being substantially the length of said print head structure. 4. A print head assembly as claimed in any previous claim wherein said membranes comprise two mutually opposed elastomer trips running substantially the length of the ink jetting portions of said print head structure so as to surround said ink jetting portions, A print head assembly as claimed in any previous claim wherein said second movable an is biased against the surface of said print head structure. 6. A print head assembly as claimed in any previous claim wherein said solenoid is activated to move said second arn closely adjacent said first ann with a first level of current and said solenoid is retained whilst printing closely adjacent said first arm with a second substantially lower level of current. 7, A print head assembly as claimed in any previous claim wherein said assembly is utilized in a hand held camera device. a print head mechanism for printing out pictures on demand. The ink supply cartridge 42 includes a side aluminium strip 43 which is provided as a shear strip to assist in cutting images from a pater roll. A dial mechanism 44 is provided for indicating the number of "prints left". The dial mechanism 44 is snap fitted through a corresponding mating portion 46 so as to be freely rotatable, As shown in Fig. 6, the print head includes a flexible PCB strip 47 which interconnects with the print head and provides for control of the print head. The interconnection between the Flex PCB strip and an image sensor and print head chip can be via Tape Automated Bonding (TAB) Strips 51, 58. A moulded aspherical lens and aperture shim (Fig. 5) is also provided for imaging an image onto the surface of the image sensor chip normally located within eavity 53 and a light box module or hood 52 is provided for snap fitting over the cavity 53 so as to provide for proper light control. A series of decoupling capacitors eg. 34 can also be provided.

Further a plug 45 (Fig.7) is provided for re-plugging ink holes after refilling. A series of guide prongs eg, 55-57 are further provided for guiding the flexible PCB strip 47. The ink supply mechanism 40 interacts with a platten unit which guides print media under a printhead located in the ink supply mechanism. Fig. 8 shows an exploded view of the platten unit 60, while Figs.9 and 10 show assembled views of the platten unit. The platten unit 60 includes a first pinch roller 61 which is snap fitted to one side of a platten base 62. Attached to a second side of the platten base 62 is a cutting mechanism 63 which traverses the platten by means of a rod 64 having a screwed thread which is rotated by means of cogged wheel 65 which is also fitted to the platten 62. The screwed thread engages a block 67 which includes a cutting wheel 68 fistened vi a a fastener 69. Also mounted to the block 67 is a counter actuator which includes a prong 71 The prong 71 acts to rotate the dial mechanism 44 of Fig.6 It can be seen that the preferred embodiment provides for a simple and inexpensive means of re-capping a printhead through the utilisation of a solenoid type device having a long rectangular form. Further, the preferred embodiment utilises minimal power in that currents are only required whilst the device is operational and additionally, only a low keeper current is required whilst the printhead is printing. Turning next to Fig. 13 and Fig. 14, Fig. 13 illustrates an exploded perspective of the ink supply cartridge 42 whilst Fig. 14 illustrates a close up sectional view of a bottom of the ink supply cartridge with the printhead unit in place. The ink supply cartridge 42 is based around a pagewidth printhead 102 which comprises a long slither of silicon having a series of holes etched on the back surface for the supply of ink to a front surface of the silicon wafer for subsequent ejection via a micro electro mechanical system. The form of ejectio an be many different forms such as those set out in the relevant provisional patent specifications of the attached appendix. In particular, the ink jet printing system set out in the provisional patent specification entitled "An Image Creation Method and Apparatus (138)" filed concurrently herewith is highly suitable. Of Course, many other inkjet technologies, a referred to the attached appendix, can also be utilised when constructing a printhead unit 102. The fimdamental requirement of the ink supply cartridge 42 being the supply of ink to a series of colour chamies etched through the back surface of the printhead 102. In the description of the preferred embodiment, it is assumed that a three colour printing process is to be utilised so as to provide full colour picture output. Hence, the print supply unit 42 includes three ink supply reservoirs being a cyan reservoir 104, a magenta reservoir 105 and a yellow reservoir 106. Each of these reservoirs is required to store ink and includes a corresponding sponge type material 107 109 which assists in stabilising ink within the corresponding ink channel and therefore preventing the ink from sloshing back and forth when the printhead is utilised in a handheld camera system. The reservoirs 104, 105, 106 are formed through the mating of first exterior plastic piece 110 mating with the second base piece il 1. At first end of the base piece i includes a series of air inlet 113 115. The air inlet leads to a corresponding winding channel which is hydrophobically treated so as to act as an ink repellent and therefore repel any ink that may flow along the air inlet channel. The air inlet channel firther takes a convoluted path firther assisting in resisting any ink flow out of the chambers 104 -106. An adhesive tape portion 117 is provided for sealing the channels within end portion 118. At the top end, there is included a series ofrefill holes for refilling corresponding ink supply chambers 104, 105, 106. A plug 121 is provided for sealing the refill holes. Turning now to Fig. 14, there is illustrated a close up perspective view, partly in section through the ink supply cartridge 42 of Fig. 13 when formed as a unit. The ink supply cartridge includes the three colour ink reservoirs 104, 105, 106 which supply ink to different portions of the back surface of printhead 102 which includes a series of apertures 128 defined therein for carriage of the ink to the front surface. The ink supply unit includes two guide walls 124, 125 which separate the various ink chambers and are tapered into an end portion abutting the surface of the printhead 102. The guide walls are further mechanically supported and regular spaces by a block portions eg. 126 which are placed at regular intervals along the length of the printhead supply unit. The block portions 126 leaving space at portions close to the back ofprinthead 102 for the flow of ink around the back surface thereof,. The printhead-supply unit is preferably formed from a-multi-part plastic injection mould and the mould pieces eg. 10, 11 (Fig. 1) snap together around the sponge pieces 107, 109. Subsequently,.a syringe type device can be inserted in the ink refill holes and the ink reservoirs filled with ink with the air flowing out of the air outlets 113 -115. Subsequently, the adhesive tape portion 117 and plug 121 are attached and the printhead td ted for operation capabilities. Subsequently, the ink supply cartridge 42 can be readily removed for refilling by means of removing the ink supply cartridge, performing a washing cycle, and then utilising the holes for the insertion of a refill syringe filled with ink for refilling the ink chamber before returning the ink supply cartridge 42 to a camera. Turning now to Fig. 15, there is shown an example layout of the Image Capture aid Processing Chip (ICP) 48. The Image Capture and Processing Chip 48 provides most of the electronic functionality of the camera with the exception of the print head chip. The chip 48 is a highly integrated system. It combines CMOS image sensing, analog to digital conversion, digital image processing, DRAM storage, ROM, and miscellaneous control functions in a single chip. The chip is estimated to be around 32 mm using a leading edge 0 18 micron CMOS/DIRANlAPS process. The chip size and cost can scale somewhat with Moore's law, but is dominated by a CMOS active pixel sensor array 201, so scaling is limited as die sensor pixels approach the diffraction limit. The ICP 48 includes CMOS logic, a CMOS image sensor, DRAM, and analog circuitry. A very small amount of flash memory or other non-volatile memory is also preferably included for protection against reverse engineering. Alternatively, the ICP can readily be divided into two chips:

one for the CMOS imaging array, and the other for the remaining circuitry. The cost of this two chip solution should not be significantly different than the single chip ICP, as the extra cost of packaging and bond-pad area is somewhat cancelled by the reduced total wafer area requiring the colour filter fabrication steps. The ICP preferably contains the following functions: Function megapixel image sensor Analog Signal Processors Image sensor column decoders Image sensor row decoders Analogue to digital Conversion (ADC) Column ADC's Auto exposure 12Mbits of DRAM DRAM Address Generator Colour interpolator Convolver Colour ALU Halftone matrix ROM Digital halftoning Print head interface 8 bit CPU core Program ROM Flash memory Scratchpad SRAM Parallel interface (8bit) Motor drive transistors Clock PLL JTAG test interface Test circuits Busses The CPU, DRAM, image sensor, ROM, Flash memory, Parallel interface, JTAG interface and ADC can be vendor supplied cores. The ICP is intended to run on 1.5V to minimise power consumption and allow convenient operation from two AA type battery cells. illustrates a ayout of the ICP 48. The ICP 48 is dominated by the imaging array 201, which consumes around 80% of the chip area. The imaging array is a CMOS 4 transistor active pixel design with a resolution of 1,500 x 1,000. The array can be divided into the conventional configuation, with two green pixels, one red pixel, and one blue pixel in each pixel group. There are 750 x 500 pixes groups in the imaging array. The latest advances in the field of image sensing and CMOS image sensing in particular can be found in the October, 1997 issue of IEEE Transactions on Electron Devices and, in particular, pages 1689 to 1968. Further, a specific implementation similar to that disclosed in the present application is disclosed in Wong et, al, "CMOS Active Pixel Image Sensors Fabricated Using a l.8V, 0.25gm CMOS Technology", IEDM 1996, page 915. The imaging array uses a 4 transistor active pixel design of a standard configuration. To minimise chip area and therefore cost, the image sensor pixels should be as small as feasible with the technology available. With a four transistor cell, the typical pixel size scales as 20 times the lithographic feature size. This allows a minimum pixel area of around 3.6nm x 3.6am. However, the photosite must be substantially above the diffraction limit of the lens. It is also advantageous to have a square photosite, to maximise the margin over the diffraction limited in both horizontal and vertical directions. in this case, the photosite can be specified as 2.5,im x 2.5gm, The photosite can be a photogate, pinned photodiode, charge modulation device, or other sensor. 'The four transistors are packed as an shape, rather than a rectangular region, to allow both the pixel and the photsite to be square. This reduces the transistor packing density slightly, increasing pixel size. However, the advantage in avoiding the diffraction limit is greater than the small decrease in packing density. T'he transistors also have a gate length which is longer than the minimum for the process technology. These have been increased from a drawn length of 0.18 micron to a drawn length of 0.36 micron. This is to improve the transistor matching by making the variations in gate length represent a smaller proportion of the total gate length. The extra gate length, and the shaped packing, mean that the transistors use more area than the minimum for the technology. Normally, around 81pm' would be required for rectangular packing. Preferably, 9,75p m has been allowed for the transistors. The total area for each pixel is 16grm, resulting from a pixel size of 4pm x 4pm. With a reslotution of 1,500 x 1,000, the area of the imaging array 10i is 6,000gm x 4,000.tm, or 24nmani The presence of a colour image sensor on the chip affects the process required in two major ways: the CMOS fabrication process should be optimised to minimise dark current Colour filters are required. These can be fabricated using dyed photosensitive polyimides, reultiing in an added process complexity of three spin coatings, three photolithographic steps, three development steps, and three hardbakes. There are 15,00 analog signal processors (ASPs) 205, one for each of the columns of the sensor. The ASPs amplify the signal, provide a dark current-reference, sample and hold the signal, and suppress the fixed pattern noise There are 375 analog to digital converters 206, one for each four columns of the sensor array. These may be delta-sigma or successive approximation type ADC's A row of low column ADC's are used to reduce the conversion speed required, and the amount of analogue signal degradation incurred before the signal is converted to digital. This also eliminated the hot spot (affecting local dark current) and the substrate coupled noise that would occur if a single high speed ADC was used. Each ADC also has two four bit DAC's which trim the offset and scale of the ADC to further reduce FPN variations between columns. These DAC's are controlled by data stored in flash memory during chip testing, The column select logic 204 is a 1:1500 decoder which enables the appropriate digital output of the ADC's onto the output bus. As each ADC is shared by four columns, the least significant two bits of the row select control 4 input analog multiplexers. A row decoder 207 is a 1:1000 decoder which enables the appropriate row of the active pixel sensor array. This selects which of the !000 rows of the imaging array is connected to analog signal processors, As the rows are always accessed in sequence, the row select logic can be implemented as a shift register. An auto exposure system 208 adjusts the reference voltage of the ADC 205 in response to the maximum intensity sensed during the previous frame period. Data from the green pixels is passed through a digital peak detector. The peak value of the image frame period before capture (the reference frame) is provided to a digital to analogue converter (DAC), which generates the global reference voltage for the column ADCs. The peak detector is reset at the beginning of the reference frame. The minimum and maximum values of the three RGB colour components are also collected for colour correction. The second largest section of the chip is consumed by a DRAM 210 used to hold the image. To store the 1,500 x 1,000 image from the sensor without compression, 1.5 Mbytes of DRAM 210 are required. This equals 12 Mbits, or slightly less than 5% of a 256 Mbit DRAM. The DRAM technology assumed is of the 256 Mbit generation implemented using 0.18pm CMOS. Using a standard 8F cell, the area taken by the memory array is 3.1 lnnm. When row decoders, column sensors, redundancy, and other factors are taken into account, the DRAM requires around 4mml. This DRAM 210 can be mostly eliminated if analog storage of the image signal can be accurately maintained in the CMOS imaging array for the two seconds required to print the photo. However, digital storage of the image is preferable as it is maintained withou degradation, is insensitive to noise, and allows copies of the photo to be printed considerably later. A DRAM address generator 211 provides the write and read addresses to the DRAM 210. Under normal operation, the write address is determined by the order of the data read from the CMOS image sensor 201. This will typically be a simple raster format. However, the data can be read from the sensor 201 in any order, if matching write addresses to the DRAM are generated. The read order from the DRAM 210 will normally simply match the requirements of a colour interpolator and the print head. As the cyan, magenta, and yellow rows of the print head are necessarily offset by a few pixels to allow space for nozzle actuators, the colours are not read from the DRAM simultaneously. However, there is plenty of time to read all of the data from the DRAM many times during the prnining process. This capability is used to eliminate the need for FIFOs in the print head interface, thereby saving chip area. All three RGB image components can be read from the DRAM each time colour data is required. This allows a colour space convere to provide a more sophisticated conversion than a simple linear RGB to CMY conversion. Also, to allow two dimensional filtering of the image data without requiring line buffers, data is re-read from the DRAM array. The address generator may also implement image effects in certain models of camera. For example, passport photos are generated by a manipulation of the read addresses to the DRAM. Also, image framing effects (where the central image is reduced)-image warps, and kaleidoscopic effects can all be generated by manipulating the read addresses of the DRAM. While the address generator 211 may be implemented with substantial complexity if effects are built into the standard chip, the chip area required for the address generator is small, as it consists only of address counters and a moderate amount of random logic. A colour interpolator 214 converts the interleaved patter of red, 2 x green, and blue pixels into RGB pixels. It consists of three 8 bit adders and associated registers. The divisions are by either 2 (for green) or 4 (for red and blue) so they can be implemented as fixed shifts in the output connections of the adders. A convoiver 215 is provided as a sharpening filter which applies a small convolution kernel (5 x 5) to the red, green, and blue planes of the image. The convolution kernel for the green plane is different from that of the red and blue planes, as green has twice as many samples. The sharpening filter has five functions: To improve the colour interpolation from the linear interpolation provided by the colour interpolator, to a close approximation of a since interpolation. To compensate for the image "softening" which occurs during digitisation. To adjust the image sharpness to match average consumer preferences, which are typically for the image to be slightly sharper than reality. As the single use camera is intended as a consumer product, and not a professional photographic products, the processing can match the most popular settings, rather than the most accurate. To suppress the sharpening of high frequency (individual pixel) noise. The finction is similar to the "mnsharp mask" process. To antialias Image Warping. These functions are all combined into a single convolution matrix. As the pixel rate is low (less than I Mpixel per second) the total number of multiplies required for the thre colour channels is 56 million multiplies per second. This can be provided by a single multiplier. Fifty bytes of coefficient ROM are also required. A colour ALU 113 combines the functions of colour compensation and colour space conversion into the one matrix multiplication, which is applied to every pixel of the frame, As with sharpening, the colour correction should match the most popular settings, rather then the most accurate. A colour compensation circuit of the colour ALU provides compensation for the lighting of the photo. The vast majority of photographs are substantially improved by a simple colour compensation, which independently normalises the contrast and brightness of the three colour components. A colour look-up table (CLUT) 212 is provided for each colour component. These are three separate 256 x 8 SRAMs, requiring a total of 6,144 bits. The CLUTs are used as part of the colour correction process. They are also used for colour special effects, such as stochastically selected "wild colour" effects. A colour space conversion system of the colour ALU converts from the ROB colour space of the image sensor to the CMY colour space of the printer. The simplest conversion is a i's complement of the RGB data. However, this simple conversion assumes perfect linearity of both colour spaces, and perfect dye spectra for both the colour filters of the image sensor, and the ink dyes. At the other extreme is a tri-linear interpolation of a sampled three dimensional arbitrary transform table. This can effectively match any non-linearity or differences in either colour space. Such a system is usually necessary to obtain good colour space conversion when the print engine is a colour electrophotographic. However, since the non-linearity of a halfioned ink jet output is very small, a simpler system can be used, A simple matrix multiply can provide excellent results. This requires nine multiplies and six additions per contone pixel. However, since the contone pixel rate is low (less than I Mpixelsec) these operations can share a single multiplier and adder. The multiplier and adder are used in a colour ALU which is shared with the colour compensation function. Digital halfioning can be performed as a dispersed dot ordered dither using a stochastic optimised dither cell. -A halftone matrix ROM 116 is provided for storing dither cell coefficients. A dither cell size of 32 x 32 is adequate to ensure that the cell repeat cycle is not visible. The three colours cyan, magenta, and yellow are all dithered using the same cell, to ensure maximum co-positioning of the ink.dots. This minimises "muddying" of the mid-tones which results from bleed of dyes from one dot to adjacent dots while still wet. The total ROM size required is I KByte, as the one ROM shared by the halftoning units for each of the three colours. The digital halftoning used is dispersed dot ordered dither with tochastic optimised dither matrix. While dithering does not produce an image quite as "sharp" as error diffusion, it does produce a more accurate image with fewer artefacts. The image sharpening produced by error diffusion is artificial, and less controllable and accurate than "u'sharp mask" filtering performed in the contone domain. The high print resolution (1,600 dpi x 1,600 dpi) results in excellent quality when using a well formed stochastic dither matrix. Digital halftoning is performed by a digital halftoning unit 217 using a simple comparison between the contone information from the DRAM 210 and the contents of the dither matrix 216. During the halftone process, the resolution of the image is changed from the 250 dpi of the captured contone image to the 1,600 dpi of the printed image. Each contone pixel is converted to an average of 40.96 halftone dots, The ICP incorporates a 16 bit microcontroller CPU core 219 to run the miscellaneous camera functions, such as reading the buttons, controlling the motor and solenoids, setting up the hardware, and authenticating the refill station. The processing power required by the CPU is very modest, and a wide variety of processor cores can be used. As.the entire CPU program is run from a small ROM 220. Program compatibility between camera versions is not important, as no external programs are run. A 2 Mbit (256 Kbyte) program and data ROM 220 is included on chip. Most of this ROM space is allocated to data for outline graphics and fonts for specialty cameras. The program requirements are minor. The single most complex task is the encrypted authentication of the refill station. The ROM requires a single transistor per bit. A Flash memory 221 may be used to store a 128 bit authentication code. This provides higher security than storage of the authentication code in ROM, as reverse engineering can be made essentially impossible. The Flash memory is completely covered by third level metal, making the data impossible to extract using scanning probe microscopes or electron beams. The authentication code is stored in the chip when manufactured. At least two other Flash bits are required for the authentication process: a bit which locks out reprogramming of the authentication code, and a bit which indicates that the camera has been refilled by an authenticated refill station. The flash memory can also be used to store FPN correction data for the imaging array. Additionally, a phase locked loop resealing parameter is stored provided for scaling the clocking cycle to an appropriated correct time. The clock frequency does not require crystal accuracy since no date functions are provided. To eliminate the cost of a crystal, an on-chip oscillator with a phase locked loop 124 is used. As the frequency of an on-chip oscillator is highly variable from chip to chip, the frequency ratio of the oscillator to the PLL is digitally trimmed during initial testing. The value is stored in Flash memory 121. This allows the clock PLL to control the inkjet heater pulse width with sufficient accuracy. A scratchpad SRAM is a small static RAM 222 with a 6T cell. The scratch pad provided temporary memory for the 16 bit CPU, 1024 bytes is adequate. A print head interface 223 formats the data correctly for the print head. The print head interface also provides all of the timing signals required by the print head. These timing signals may vary depending upon temperature, the number of dots printed simultaneously, the print medium in the print roll, and the dye density of the ink in the print roll. The following is a table of external connections to the print head surface: The print head utilised is composed of eight identical segments, each 1.25cm long. There is no connection between the segments on the print head chip. Any connections required are made in the external TAB bonding film, which is double sided. The division into eight identical segments is to simplify lithography using wafer steppers. The segment width of ,25cm fits easily into a stepper field. As the print head chip is long and narrow (10cm x 0.3mm), the stepper field contains a single segment of 32 print head chips. The stepper field is therefore 1,25cm x 16cm., An average of four complete print heads are patterned in each wafer step. A single BitClock output line connects to all 8 segments on the print head. The 8 DataBits lines lead one to each segment, and are clocked in to the 8 segments on the print head simultaneously (on a BitClock pulse). For example, dot 0 is transferred to segment, dot 750 is transferred to segment;, dot 1500 to segment2 etc simultaneously. The ParallelXferClock is connected to each of the 8 segments on the print head, so that on a single pulse, all segments transfer their bits at the same time. The NozzleSelect, BankEnable and ColorEnable lines are connected to each of the 8 segments, allowing the print head interface to independently control the duration of the cyan, magenta, and yellow nozle energizing pulses. Registers in the Print Head Interface allow the accurate specification of the pulse duration between 0 and 6 ms, with a typical duration of 2 ms to 3 ms. A parallel interface 125 connects the ICP to individual static electrical signals. The CPU is able to control each of these connections as memory mapped IO via a low speed bus. The following is a table of connections to the parallel interface: A serial interface is also included to allow authentication of the refill station. This is included to ensure that the cameras are only refilled with paper and ink at authorized refill stations, thus preventing inferior quality refill industry from occurring. The camera must authenticate the refill station, rather than the other way around. The. secure protocol is communicated to the refill station via a serial data connection. Contact can be made to four gold plated spots on the iCP/print head TAB by the refill station as the new ink is injected into the print head. Seven high current drive transistors eg.227 are required Four are for the four phases of the main stepper motor two are for the guillotine motor, and the remaining transistor is to drive the capping solenoid. These transistors are allocated 20,000 square microns (600,000 F) each. As the transistors are driving highly inductive loads, they must either be turned off slowly, or be provided with a high level of back EMF protection. If adequate back EMF protection cannot be provided using the chip process chosen, then external discrete transistors should be used. The transistors are never driven at the same time as the image sensor is used. This is to avoid voltage fluctuations and hot spots affecting the image quality. Further, the transistors are located as far away from the sensor as possible. A standard JTAG (Joint Test Action Group) interface 228 is included in the ICP for testing purposes and for interrogation by the refill station. Due to the complexity of the chip, a variety of testing techniques are required, including BIST (Built In Self Test) and functional block isolation. An overhead of 10% in chip area is assumed for chip testing circuitry for the random logic portions. The overhead for the large arrays them image sensor and the DRAM is smaller. The JTAG interface is also used for authentication of the refill station. This is included to ensure that the cameras are only refilled with quality paper and ink at a properly constructed refill station, thus preventing inferior quality refills from occurring. The camnera must authenticate the refill station, rather than vice versa. The secure protocol is communicated to the refill station during the automated test procedure. Contact is made to four gold plated spots on the ICP/print head TAB by the refill station as the new ink is injected into the print head. Fig. 16 illustrates rear view of the next step in the construction process whilst Fig. 17 illustrates a front camera view, Turning now to Fig. 16, the assembly of the camera system proceeds via first assembling the ink supply mechanism 40. The flex PCB is intercomnected with batteries only one 84 of which is shown, which are inserted in the middle portion of a print roll 85 which is wrapped around a plastic former 86. An end cap 89 is provided at the other end of the print roll 85 so as to fasten the print roll and batteries firmly to the ink supply mechanism. The solenoid coil is interconnected (not shown) to interconnects 97, 98 (Fig. 8) which include leaf spring ends for interconnection with electrical contacts on the Flex PCB so as to provide for electrical control of the solenoid. Turning now to Figs. 17 -19 the next step in the construction process is the insertion of the relevant gear chains into the side of the camera chassis. Fig. 17 illustrates a front camera view, Fig. 18 illustrates a back side view and Fig. 19 also illustrates a back side view. The first gear chain comprising gear wheels 22, 23 are utilised for driving the guillotine blade with the gear wheel 23 engaging the gear wheel 65 of Fig.8. The second gear chain comprising gear wheels 24, and 26 engage one end of the print roller 61 of Fig. As best indicated in Fig. 18, the gear wheels mate with corresponding buttons on the surface of the chassis with the gear wheel 26 being snap fitted into corresponding mating hole 27, Next, as illustrated in Fig. 20, the assembled platten unit is then inserted between the print roll 85 and aluminium cutting blade 43. Turning now to Fig. 21 by way of illumination, there is illustrated the electrically interactive components of the camera system. As noted previously, the components are based around a Flex PCB board and include a TAB film 58 which interconnects the printhead 102 with the image sensor and processing chip 51. Power is supplied by two AA type batteries 83, 84 and a paper drive stepper motor 16 is provided in addition to a rotary guillotine motor An optical element 31 is provided for snapping into a top portion of the chassis 12. The optical element 31 includes portions defining an optical view finder 32, 33 which are slotted into mating portions 35, 36 in view finder channel 37. Also provided in the optical element 31 is a lensing system 38 for magnification of the prints left number in addition to an optical pipe element 39 for piping light from the LED 5 for external display. Turning next to Fig. 22, the assembled unit 90 is then inserted into a front outer case 91 which includes button 4 for activation of printouts. Turning now to Fig. 23, next, the unit 92 is provided with a snap-on back cover 93 which includes a slot 6 and copy print button 7. A wrapper label containing instructions and advertising (not shown) is then wrapped around the outer surface of the camera system and pinch clamped to the cover by means of clamp strip 96 which can comprise a flexible plastic or rubber strip. Subsequently, the preferred embodiment is ready for use as a one time use camera system that provides for instant output images on demand. It will be evident that the preferred embodiment further provides for a refillable camera system. A used camera can be collected and its outer plastic cases removed and recycled. A new paper roll and batteries can be added and the ink cartridge refilled. A series of automatic test routines can then be carried out to ensure that the printer is properly operational. Further, in order to ensure only authorised refills are conducted so as to enhance quality, routines in the on-chip program ROM can be executed such that the camera authenticates the refilling station using a secure protocol. Upon authentication, the camera can reset an internal paper count and an external case can be fitted on the camera system with a new outer label. Subsequent packing and shipping can then take place. It will be further readily evident to those skilled in the art that the program ROM can be modified so as to allow for a variety of digital processing routines. In addition to the digitally enhanced photographs optimised for mainstream consumer preferences, various other models can readily be provided through mere re-progranuning of the program ROM. For example, a sepia classic old fashion style output can be provided through a remapping of the colour mapping function. A further alternative is to provide for black and white outputs again through a suitable colour remapping algorithm. Minimumless colour can also be provided to add a touch of colour to black and white prints to produce the effect that was traditionally used to colourize black and white photographs. Further, passport photo output can be provided through suitable address remappings within the address generators. Further, edge filters can be utilised as is known in the field of image processing to produce sketched art styles. Further, classic wedding borders and designs can be placed around an output image in addition to the provision of relevant clip arts. For examppe, a wedding style camera might be provided. Further, a panoramic mode can be provided so as to output the well known panoramic format of images. Further, a postcard style output can be provided through the printing of postcards including postage on the back of a print roll surface. Further, clip arts can be provided for special events such as Holoween, Christmas etc. Further, kaleidoscopic effects can be provided through address remappings and wild colour effects can be provided through remapping of the colour look-up table. Many other forms of special event cameras can be provided for example, cameras dedicated to the Olympics, movie tie-ins, advertising and other special events. The operational mode of the camera can be prograummed so that upon the depressing of the take photo a first image is sampled by the sensor array to determine irrelevant parameters. Next a second image is again captured which is utilised for the output. The captured image is then manipulated in accordance with any special requirements before being initially output on the paper roll. The LED light is then activated for a predetermined time during which the DRAM is refreshed so as to retain the image. If the print copy button is depressed during this predetermined time interval, a further copy of the photo is output. After the predetermined time interval where no use of the camera has occurred, the onboard CPU shuts down all power to the camera system until such time as the take button is again activated, in this way, substantial power savings can be realised. Jet Technologies The embodiments of the invention us an inkjet printer type device. Of course many different devices could be used However presently popular ink jet printing technologies are unlikely to be suitable. The most significant problem with thermal inkjet is power consumption. This is approximately 100 times that required for high speed, and st ms from the energy-inefficient means of drop ejection. This involves the rapid boiling of water to produce a vapor bubble which expels the ink. Water has a very high heat capacity, and must be superheated in thermal inkjet applications. This leads to an efficiency of around 0.02%, from electricity input to drop momentum (and increased surface area) out. The most significant problem with piezoelectric inkjet is size and cost. Piezoelectric crystals have a very small deflection at reasonable drive voltages, and therefore require a large area for each noszze. Also, each piezolectric actuator must be connected to its drive circuit on a separate substrate. This is not a significant problem at the current limit of around 300 nozzles per print head, but is a major impediment to the fabrication of pagewide print heads with 19,200 nozzles. Ideally, the inkjet technologies used meet the stringent requirements of in-camera digital color printing and other high quaity, high speed, low cost printing applications. To meet the requirements of digital photography, new inkjet technologies have been created. The target features include: low power (less than 10 Watts) high resolution capability (1,6X) dpi or more) photographic quality output low manufacturing cost small size (pagewidth times minimum cross section) high speed 2 seconds per page) ART-END All of these features can be met or exceeded by the inkjet systems described below with differing levels of difficulty. different inkjet technologies have been developed by the Assignee to give a wide range of choices for high volume manufacture. These technologies form part of separate applications assigned to the present Assignee as set out in the table below. The inkjet designs shown here are suitable for a wide range of digital printing systems, from battery powered onerime use digital cameras, through to desktop and network printers, and through to comiercial printing systems For ease of manuficmee using standard process equipment, the print head is designed to be a monolithic 0.5 micron CMOS chip with MEMS post processing. For color photographic applications, the print head is 100 mm long, with a width which depends upon the inkjet type. The smallest prit head designed is U38, which is 0.35 mm wide, giving a chip area of square mm. The print heads each contain 19,200 nozzles plus data and control circuitry. Ink is supplied to the back of the print head by injection molded plastic ink channels. The molding requires 50 micron features, which can be created using a lithographically micmrmachined insert in a standard injection molding tool. Ink flows through holes etched through the wafer to the nozzle chambers fabricated on the fi-ont surface of the wafer. The print head is connected t tthe camera circuitry by tape automated bonding. Cross-Referenced Applications The following table is a guide to cross-referenced patent applications filed concurrently herewith and discussed hereinafter with the reference being utilized in subsequent tables when referring to a particular case: Ink Jet Printing A large nunmber of new forms of ink jet printers have been developed to facilitate alternative inkjet technologies for the image processing and data distribution system. Various combinations of ink jet devices can be included in printer devices incorporated as pa of the present invention. Australian Provisional Patent Applications relating to these ink jets which are specifically incorporated by cross reference include: PP0890 Image Creation Method and Apparatus (IJ38) -US 6,336,710 PP 1398 An Image Creation Method and dApparatus (1339) -W09910368 PP2592 An Image Creation Method and Apparatus (U140) -W099/0368 PP2593 Image Creation Method and Apparatus (IJ41) W099/03681 PP3991 Image Creation Method and Apparatus (142)-US 6,283,581 PP3987 Image Creation Method and Apparatum (IJ43) -W099/03681 PP3985 Image Creation Method and Apparatus (144) -W099/03681 PP3983 Image Creation Method and Apparatus (1J45) -W099/03681 I InkJet Manufacturing Further, the present application may utilize advanced semiconductor fabrication techniques in the construction of large arrays of inkjet prinria. Suitable manufacturing techniques are described in the following Australian provisional patent specifications incorporated here by cross-reference: P08077 A Method of Manufacture of an Image Creation Apparatus (IJM25) -W099/03680 P08058 A Method of Manufacture of an Image Creation Apparatus (1JM26) -W099/03680 P08051 A Merthod of Manufacture of an Image Creation Apparatus (IJM27) -W099/03681 P08045 A Method of Manufacture of an Image Creation Apparatus (IJM28) -W09903681 P07952 A Method of Manufacture of an Image Creation

Apparatus (IJM29) -WO9903681 P08046 A Method of Manufacture of an Image Creation Apparatus (IJM30) -WO99/03681 P08503 A Method of Manufacture of an Image Creation Apparatus (UM30a) -WO99/03681 P09390 A Method of Manufacture of an Image Creation Apparatus (DM31) -WO9903681 P09392 A Method of Manufiacure of an Image Creation Apparatus (IdM32) -WO99/03681 PP0889 A Method of Manufacture of an Image Creation Apparatus (DM35) -WO99/03681 PP0887 A Method of Manufacture of an Image Creation Apparatus (1JM36)-USSN 09/122,801 P08 A Method of Manufacture of an Image Creation Apparatus (IJM37) -WO99/03681 PP0874 A Method of Manufacture of an Image Creation Apparatus (IJM38) -WO99/03681 PP1396 A Method of Manufacture of an Image Creation Apparatus (NM-39 -)WO99/03681 PP2591 A Method of Manufacture of an Image Creation Apparatus (JM4 1) -WO99/03681 PP3989 A Method of Manufacture of an Image Creation Apparatus (JM40) -WO99/03681 PP3990 A Method of Manufacture of an Image Creation Apparatus (1JM42) -WO99/0368 1 PP3986 A Method of Manufacture of an Image Creation Apparatus (JIM43) -WO99/03681 PP3984 A Method of Manufacture of an Image Creation Apparatus (IM44) -WO99/03681 PP3982 A Method of Manufacture of an Image Creation Apparatus (IJM45) -WO99/03680 Fluid Supply Further, the present application may utilize an ink delivery system to the ink jet head Delivery systems relating to the supply of ink to a series of ink jet nozzles are described in the following Australian provisional patent specifications, the disclosure of which are hereby incorporated by cross-refence: P MEMS Technology Further, the present application may utilize advanced semiconductor microclectromnchanical techniques in the construction of large armays of ink jet printers. Suitable microelectromechanical techniques are described in the following Australian provisional patent specifications incorporated here by cross-referenc JR Technologies Further, the present application may include the utilization of a disposable camer system such as those described in dte following.Australian provisionali patent specifications incorporated here bycosrfrne DotCard Technologies Further, the present application may include the utlization of a data distribution system such as Chat described in the following Australian pro-visional patent specifications incorporated here by cosrfrne Austalian Filing Da Provisional NumberI PP2370 I16-Mar-98 jData Processing Method and Apparatus (Dot0l)-USSN 09/112,781 PP2371 Data Processing Method and Apparatus (Dot02-iUSSN 09/113,052 I Artcamn Technologies Further, the present application may include the utilization of camera and data processing techniques such as an ArIcam type device as described in the following Australian provisional patent specifications incorporated here by crossreference: It would be appreciated by a person skilled in the art that numerous variations and'or modifications may be made to the present invention as shown in the specific embodiment wvithout departing from the spirit or scope of the invention as broadly described. The present embodiment is, therefore, to be considered in all respects to be illustrative and not restrictive. Tables of Drop-on-Demand Inkjets Eleven important characteristics of the fundamental operation of individual inkjet nozzles have been identified These characteristics are largely orthogonal, and so can be elucidated as an eleven dimensional matrix, Most of the eleven axes of this matrix include entries developed by the present assignee. The following tables form the axes of an eleven dimensional table of inkjet types. Actuator mechanism (18 types) Basic operation mode (7 types) Auxiliary mechanism (8 types) Actuator amplification or modification method (17 types) Actuator motion (19 types) Nozzle refill method (4 types) Method of restricting back-flow through inlet (10 types) Nozzle clearing method (9 types) Nozzle plate constructonn (9 types) Drop ejection direction (5 types) Ink type (7 types) The complete eleven dimensional table represented by these axes contains 36.9 billion possible configurations of inkjet nozzle. While not all of the possible combinations result in a viable inkjet technology, many million configurations are vable. It is clearly impractical to elucdate all of the possible configurations. Instead, certain inkjet types have been investigated in detail. These are designated 1J01 to IJ45 above. Other inkjet configurations can readily be derived from these 45 examples by substituting alternative configurations along one or more of the 11 axes. Most of the 1301 to 1345 examples can be made into inkjet print heads with characteristics superior to any currently available inkjet technology, Where there are prior art examples known to the inventor, one or more of these examples ar listed in the examples column of the tables below. The 1101 to L45 series are also listed in the examples couinn. In some cases, a printer may be listed more than once in a table, where it shares characteristics with more than one entry Suitable applications include: Home printers, Office network printers, Short run digital printers, Commercial print systems, Fabric print Pprint, rinters, Internet WWW printers, Video printers, Medical imaging, Wide format printers, Notebook PC printers, Fax machines, Industrial printing systems, Photocopiers, Photographic minirabs etc The information associated with the aforementioned i dimensional matrix are set out in the following tables. Actuator mechanism (applied only to selected ink drops) I I Basic operation mode tXmul' I cx AAuuxxiillliiaarryy m meecchhaannissmm ((appppllied to all nozzles)) Actuator amplification or modification method Diffe ail i i A il d i Actuator motion Actuator motion Lsescnpnton Advantages Disadvantages Volume expansion The volume of the actuator changes, pushing Simple construction in the case of High energy is typically required to achieve volume the ink in all directions, thermal ink jet expansion. This leads to thermal stress, cavitation, and kogation in thermal inkjet implementations Linear, normal to chip The actuator moves in a direction normal to the Efficient coupling to ink drops ejected High fabrication complexity may be required to surface print head surface. The nozzle is typically in the normal to the surface achieve perpendicular motion line of movement. Linear, parallel to chip The actuator moves parallel to the print head Suitable for planar fabrication Fabrication complexity surface surface. Drop ejection may still be nonmai to Friction the surface. Stiction Membran t An actuator with a high force but small area is The effective area of the actuato Fabrication complexity used to push a stiff membrane that is in contact becomes the membrane area Actuator size with the ink. Difficulty of integration in a VLSI process Rotary I The actuator cau Rotary levers may be used to ircrase Devi element, such a travel May ~IIIIIll~-i-----lll~ll~__ll1111111~a---- Small chip area requirements i ~I N ozzle refill method M ethod of restricting back-flow through inlet N ozze Clearing Method a I I i N ozzle plate construction D rop ejection direction An ink jet printhead assembly for a camera printer unit has a capping mechanism to prevent ink drying out employing mmbranes moved into place by a solenoid actuated arm.

2. WO/2022/047581 PARKING SENSOR DEVICE FOR DETERMINING OCCUPANCY OF A PARKING SPACE

WO - 10.03.2022

Int.Class G08G 1/14 **Appl.No** PCT/CA2021/051211 **Applicant** ELEVEN-X INCORPORATED **Inventor** CLEMMER, Jeff

Disclosed is a parking sensor device for determining occupancy of a parking space. The parking sensor device has a magnetometer sensor configured to detect a magnetic field, and a radar sensor configured to perform at least one radar scan to detect presence of an object. In accordance with an embodiment of the disclosure, the parking sensor device has control circuitry configured to determine occupancy of the parking space based on the magnetic field and the at least one radar scan. Utilizing this particular combination of sensor input can help to improve accuracy and reliability of determining occupancy of the parking space, especially when compared to existing approaches that utilize a single sensor such as a magnetometer sensor. The parking sensor device also has an output for conveying occupancy of the parking space.

3. 20220076576 PARKING SENSOR DEVICE FOR DETERMINING OCCUPANCY OF A PARKING SPACE

US - 10.03.2022

Int.Class G08G 1/14 **Appl.No** 17446705 **Applicant** Eleven-X Incorporated **Inventor** Jeff CLEMMER

Disclosed is a parking sensor device for determining occupancy of a parking space. The parking sensor device has a magnetometer sensor configured to detect a magnetic field, and a radar sensor configured to perform at least one radar scan to detect presence of an object. In accordance with an embodiment of the disclosure, the parking sensor device has control circuitry configured to determine occupancy of the parking space based on the magnetic field and the at least one radar scan. Utilizing this particular combination of sensor input can help to improve accuracy and reliability of determining occupancy of the parking space, especially when compared to existing approaches that utilize a single sensor such as a magnetometer sensor. The parking sensor device also has an output for conveying occupancy of the parking space.

1 / 1