(54) Title: GLOVE MERCHANDISING APPARATUS

(57) Abstract: A merchandising apparatus for gloves has a hand replica, a monitor and hand measuring apparatus. The monitor is carried by the human hand replica and the ahnd measurement apparatus includes an imaging device connected through a microprocessor to the monitor. A charge coupled device chip records light along various pixels which corresponds to an image of the human hand. The data is processed and filtered to provide a silhouette of the hand. Next, a microprocessor determines various measurements of the human hand. These measurements are compared to data for providing a specific glove size. Alternatively, the data may be utilized to provide a custom fitting glove. The glove size is then displayed on the monitor for the consumer.
GLOVE MERCHANDISING APPARATUS

BACKGROUND OF THE INVENTION

This invention relates to the merchandising of gloves through a kiosk or stand which includes a replica of a gloved hand that contains in its palm a monitor, and includes a hand imager which transmits data to computer apparatus for converting the data to measure critical dimensions of the hand and to determine the appropriate glove size which is then displayed on the monitor.

In the merchandising of sports gloves such as golf gloves, racquetball gloves and baseball batting gloves, a potential purchaser must either rely on prior glove sizing information or either places his or her hand on a sizing template on the glove package or a separate sizing template or tries on the gloves to determine the fit. In the former instance, i.e., that is, using previous glove size information, the results can be extremely unreliable since various manufacturers may have differing fits and because even with the same size various runs or cuts of gloves may produce different sizes depending on where in a stack the material to make a particular glove is positioned. The template method may be limited by various factors and environmental changes including the printing of the template on the package and thus inaccurate sizing may result. In the last instance, i.e., trying on the glove, the packaging must be opened and reclosed if the glove is not purchased and thus presents a previously opened package for another potential purchaser with the inherit disadvantages thereof. Thus, there is a need to provide an accurate glove size measuring system which ideally is located at a merchandising display that is attractive to potential purchasers of such gloves.
SUMMARY OF THE INVENTION

Accordingly, it is a primary object of the present invention to provide a method and apparatus wherein a potential purchaser of a glove may position his or her hand on a measuring station and have a readout made of the size of a properly fitting glove.

It is a further object of the present invention to provide a display for attracting a potential purchaser of a glove which includes a surface on which the potential purchaser may position his or her hand and which preferably includes a screen for visibly displaying the glove size for that person.

It is a further object of the present invention to provide a display stand for merchandising gloves including an enlarged replica of a gloved hand for attracting potential customers, the replica having a visual and/or audio display in the palm portion or associated with the replica and there being an imager associated with the replica on which a potential customer may place his or her hand and have the size reported visibly or audibly on the display.

It is a still further object of the present invention to provide a display stand for merchandising gloves including an enlarged replica of a gloved hand for attracting potential customers, the replica having a monitor in the palm portion, and there being an imager associated with the replica on which a potential customer may place his or her hand and have the size displayed on the monitor.

Accordingly, the present invention provides an enlarged replica of a gloved hand which may be located in a kiosk or the like for attracting potential customers for purchasing gloves, the gloved
replica preferably having a monitor in the palm portion thereof and having associated therewith an imager on which a potential customer may place his or her hand. Computing apparatus connected between the imager and the monitor determines the proper glove size by measuring the length of each finger, the width of the palm, the length of the fingers from the wrist, the width of the fingers and other relevant factors. This information is utilized by software for determining the proper glove size for that potential customer. This information may be displayed on the monitor or alternatively, may be displayed audibly associated with the monitor.

BRIEF DESCRIPTION OF THE DRAWINGS

The particular features and advantages of the invention as well as other objects will become apparent from the following description taken in connection with the accompanying drawings in which:

Figure 1 is a front perspective view of a glove merchandising display constructed in accordance with the principles of the present invention;

Figure 2 is a schematic view of the display of Figure 1; and

Figure 3 is a flow diagram illustrating steps for calculating and displaying the glove size of a purchaser; and

Figure 4 is an outline of a human hand illustrating one method of determining several locations along the outline.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Accordingly, Figure 1 is a front view of a glove merchandising display 10. The display 10 includes a base 12, preferably in the form of a pedestal or table, which supports a human hand
replica 14 supporting a display monitor 16. Although the human hand replica 14 which may be constructed from fiberglass, plastic, wood or the like, is the preferred carrier or support of the display monitor 16, other carriers or supports could also be utilized. The monitor 16 as illustrated is mounted into a palm portion 18 of the hand replica 14. Other mounting techniques of the monitor 16 could also be employed, such as holding by the fingers 20. Figure 1 also shows an imaging device 22 or imager that is a portion of the combination forming the preferred embodiment of the display 10. The imaging device 22 allows a user to have his or her hand size measured in order to obtain the proper size glove for that individual. Although the imaging device 22 is illustrated as a separate component apart from the monitor 16, the two components, if desired, may be portions of a single unit.

The hand replica 14 is useful in attracting a potential customer’s attention in a shopping mall or the like, providing support for the monitor 16, and possibly for fitting with a demonstrator glove. Of course, the replica is substantially larger than a human hand since the monitor preferably is a conventional monitor such as used with a desk top personal computer.

The imaging device 22 is illustrated in schematic form in Figure 2 and includes a transparent window 24 supported by the base 12 which allows light to pass through. As light passes through the window 24, a CCD (charge couple device) imager imaging chip utilized as a recorder 26 detects the light passing through the window. CCD chips suitable for this purposed are manufactured by both Sony Corp. and Eastman Kodak and are relatively widely available. Other manufacturers likely manufacture similar products. Alternatively, other recorders 26 including digital cameras like the Kodak 1600 may be utilized.
The preferred embodiment includes a recorder 26 which utilizes a CCD chip and has the capability of recording about 1.5 million pixels. Along each of the pixel storage locations is a photon collector which measures light entering the pixel. Illumination energy is detected by the photon collector associated with a particular pixel to determine how much light enters that particular cell over a particular period of time. A shutter 28 may control the collection of light in the recorder 26.

The CCD chip of the recorder 26 stores raw data which may be in a 16 bit data format. Each cell effectively forms a well which records a number of photons typically between 0 a maximum which may be 65,000. Thus, one CCD chip records cell values between 0 and 65,000 and will be used for example purposes. At 65,000, the value represents white. At 32,500, the number represents a gray exactly between white and black. At 0 the cell is black. Other chips may have other maximum values per cell other than 65,000.

When a person places his or her hand upon the window 24, at least some of the ambient light is blocked from entering the window 24 by the hand, while light around the fingers and the palm will be detected by the recorder 26 at the location of the hand. Some light, such as light shaded partly by the hand at the edges will also be detected and read as a lower quality value. Accordingly, the recorder 26 may effectively image or take a picture of the hand and store the image in a suitable format.

The light collection process may begin with a start command in which the recorder 26 begins to collect light or otherwise obtain an image. At a stop command, the CCD imager will cease collecting light. It is expected that the time collection period will be approximately 0.1 to 1.0
second in order to collect the correct amount of light to distinguish a hand from the ambient background. Shorter or longer light collection times may also be utilized. It is believed that ten times as much ambient light would be collected in 1.0 second as will be collected in 0.1 second.

As a CCD imager collects photons and a particular cell obtains over 65,000 photons, or whatever is the maximum counted, photons effectively spill over into adjacent cells causing a blooming effect. This causes the adjacent cells to collect photons from the cell which has effectively overflowed. This generally is not a desired effect for an imaging device 22 of the preferred embodiment as it distorts the image obtained. Thus, the collection period is controlled or the ambient light is controlled to prevent this from occurring.

A calibration step may be necessary for setting up of the display 10 in order to most effectively take advantage of any ambient light while preventing blooming or other undesirable effects. During calibration the ambient light about the display 10 may affect shutter speed or other variables. Additionally, another consideration is to minimize the time a person is required to maintain their hand in a stationary position on the imaging device 22. The location of the display 10 or lighting proximate the display are other considerations.

When the CCD imager chip of the preferred embodiment records light, it collects data in a grid system defined by rows and columns of x- and y- coordinates. Accordingly, an image may be composed in a gridlike fashion based on the information obtained from the CCD imaging chip. Each pixel with a recorded value based on the photons received is arranged in a gridlike fashion to provide an image. This image may have various shades of gray corresponding to portions of the hand of the background. In order to remove shades of gray, the contrast may be adjusted through a
filter 30. Specifically, an amount is selected wherein if the pixel data reflecting a number of photons is greater than a selected amount, such as 2,000 for illustration purposes, then the pixel data will be raised to or be converted to the maximum limit, i.e., 65,000, which defines white. Additionally, any value below the selected amount will be adjusted down to be 0 which is black. In this way black and white may be provided for further processing. The black and white image is effectively a silhouette wherein the background is white and is represented by a maximum photon value for the recorded pixels. The remainder of pixels are represented as 0 photons or black. A bitmap image results from the filtered data which may more easily be translated into data for measuring the physical dimensions of the person’s hand. For example, black and white may be converted to a digital representation of 0’s and 1’s, plus and minus, or other representations.

With the filtered data, one or more micro processors 32 may analyze the data to determine the location of the fingers and the palm. Once the fingers and the palm are located, the processor may then calculate distances such as the length of fingers, the length from any of the fingers to the base of the palm, the width of the hand, etc. for providing a glove size.

One procedure for providing measurements for a glove size includes reading the well count of the image array along rows and columns. Pixels below a preselected value if not already done by filter 30, if utilized, are changed to 0 while pixels above that value are raised to maximum, e.g., 65,000, or any other suitable value. The pixel counts along both axes are used to determine a mean of the pixel counts and also the terminal points of the hand. The mean of the 0 pixel counts along both axes and the terminal points of the 0 pixel counts of both axes are determined and the peaks of the 5 fingers may then be determined as well as the valleys between them. This
information is compared by processor with information stored in memory 34 for various glove sizes to determine the correct glove size for the hand measured. Of course, a glove could also be custom made for this individual using the dimensions of the person’s hand as obtained by the display 10.

One method of processing the data involves using a roll call sequence. The processor is programmed to sequentially read each of the pixels to determine whether or not a portion of the human hand is located at a corresponding pixel. Since the physical dimensions which correspond to locations on the grid are known, the width and length of a human hand may be determined by the processor by knowing which pixels correspond to the human hand. The processor can recognize spaces between fingers and determine the end points of the fingers. Next, the processor can determine the web portion of the palm where the fingers extend from the palm. Thus, lengths corresponding to the fingers may be determined. Next, the processor may determine the width of the hand across the palm as well as the length from a tip of the finger to the base of the palm depending on which lengths are necessary for use in providing specific dimensions for use by the processor for determining a specific glove size for that individual. Typically, a variety of measurements are compared to measurements of known glove sizes and a glove which fits is selected. The processor outputs the glove size information to the monitor 16 for display.

Presently a large number of calculations are utilized to determine the measurements of the hand. As aforesaid, a mean of both the x- and y- coordinates are first determined for the 0 pixel counts. The edge or terminal points of the hand are then recorded based on whether or not the 0 pixel count is adjacent to a maximum value pixel count. With the mean determined and an outline circled, the outline may be evaluated relative to the x-, y- point of the mean. The point of the
outline the farthest distance away from the mean corresponds to a tip of a finger, probably the middle finger since it is a person’s longest.

In Fig. 4, the point on the outline 98 the farthest distance away from the mean location is point 100. The mean of the x-, and y- coordinates of the points of the hand within the outline 98 is illustrated as mean location 102. The distance between the mean location 102 and the point 100 is distance 104 along first axis 106.

In order to locate the valleys adjacent to the finger which length has been measured relative to the mean, a series of calculations and evaluations may be performed. A second point 108 on the outline 98 is selected. The second point 108 is a predetermined number of pixels away from the first point 100 along the outline 98. The second point 108 is located along a second axis 110 relative to the mean location 102. An angle between the first axis 106 and a second axis 110 is illustrated as angle 103. A distance along a second axis 110 from the mean location 102 to the second point 108 is less than the distance along the first axis to the first point 100 (since the distance to the first point was the farthest from the mean location 102).

The processor verifies that the distance to point 108 from the mean 102 is less than the distance from the mean 102 to the first point 100. Next, a third point 112 on the outline 98 a predetermined number of pixels from the second point 108 is evaluated. The third point 112 is located along a third axis 114. The angle between the third axis 114 and the first axis 106 is second angle 113. The distance from the mean 102 to the third point 112 is compared to the distance from the mean 102 to the second point 108. If the distance to the third point 112 is less than the
distance to the second point 108, then the process can continue to find a fourth point, a fifth point and so on.

Eventually, the location of the valley point 116 along valley axis 118 is discovered as a relative minimum distance from the mean location 102. The valley angle 120 is the angle between the valley axis 118 and the first axis 106. The next position 122 evaluated along the outline 98 has a greater distance from the mean 102 than the valley position 116. The next axis 124 connects the next position 122 and the mean location 102. The angle between the next axis 124 and the first axis 106 is the next angle 130.

The angle between the first axis and the last evaluated axis will eventually begin to decrease, for instance, angle 132 is less than angle 130. This can assist the processor in determining whether the valley position 116 is properly located. As long as the angle evaluated is increasing from the first axis 102, the valley can be determined as the next shortest distance discovered along the outline such as valley position 116. Once the angle starts to decrease such as evidenced by the decrease between angles 130 and 132, the processor can then determine the beginning of the next adjacent finger. Angles 130 and 132 are the angles between the axis lines 124, 128 respectively with the first axis 106.

After the valley 116 is located, the next fingertip may be determined in a similar fashion by comparing angles and distances from the mean location 102 and an axis, such as first axis 106. Although the process is illustrated proceeding in a clockwise manner, the process could also proceed in a counter clockwise manner or otherwise so that all of the fingertips and valleys are located if necessary to provide information for fitting with a glove. As the valleys and finger tip
positions are determined, distances between these points and/or the mean or other locations to
determine measurements of the hand may be calculated. At least some of these distances may be
useful in providing a glove size.

After the five fingers and four valleys are located, the base of the palm may be located by
extending the first axis 106 to a second location opposite the mean 102 to another point along the
outline 134. The distance between points 134 and 100 can correspond to a length between the base
of the palm and the tip of the middle finger. This length may be used for some glove sizing
techniques, if desired.

The width of the hand may be determined by using the first axis 106 and the location 136 of
the valley beside the thumb. A width line 138 may be constructed perpendicular to the first axis
106 such that the width line 138 intersects the thumb valley location 136. The end point 140 of the
width line 138 on the outline may be used to determine the width of the hand by measuring the
distance between points 136, 140.

The above location techniques are one way of measuring various dimensions of a hand.
Other techniques may be simpler, or more complex, and may be directed to finding similar or other
dimensions of the hand.

Once the appropriate dimensions are calculated, the dimensions may be compared to a
database in memory 34 for providing a recommended size. The recommended size is outputted,
preferably visually displayed on the monitor 16. A print out or other indication such as selecting
the appropriate glove may also result.
The preferred display 10 may operate according to the flow chart of Figure 3. Specifically, the monitor 16 may display a continuous running video or provide other information at step 40. If a passing consumer desires to interrupt the video at step 42, then the consumer may be provided with a plurality of options at step 44. The options provided at step 44 may include displaying information about the company, the company’s products, the company history and product design, product testimonials, other customer’s glove sizes (so one could buy a present for another person), or other information.

At step 46 the consumer may request information to be displayed. At step 48 information about a particular subject may be selected to be displayed if the customer desires to see that information, it may be displayed on the monitor 16 as illustrated at step 50. After displaying information at step 50, the consumer may be provided with the opportunity to return to information at step 40 or options at step 44 at step 52. If the consumer elects not to have information displayed at step 46, the consumer may have his or her hand measured at step 54. If the consumer elects not to have his hand measured, then the process may return to step 52 where information options may be selected or chosen for the consumer. If the consumer elects to have his or her hand measured at step 54 information may be displayed on how to measure the hand on the monitor 16 at step 56. Once the consumer has read the instructions, if provided, the consumer may place his/her hand for measurement on the imaging device 22 at step 58. Shutter 26 may control the activation of the imager 26 to record the image at step 60.

After the image is recorded at step 60 as described above, the image may be filtered at step 62 with the filter 30. The image then proceeds to the processor 32 at step 64 where the image is
processed and measurements are obtained. Since the processor 32 may be programmed or otherwise provided with a physical dimension corresponding to any particular pixel distance, measurements obtained through the imaging device 22 may be converted into an appropriate glove size at step 66 for use by the consumer.

After the glove size has been provided to the customer at step 66, the display 10 may return to step 52 to provide information or options to the potential consumer.

Numerous alternations of the structure herein disclosed will suggest themselves to those skilled in the art. However, it is to be understood that the present disclosure relates to the preferred embodiment of the invention which is for purposes of illustration only and not to be construed as a limitation of the invention. All such modifications which do not depart from the spirit of the invention are intended to be included within the scope of the appended claims.
Having thus set forth the nature of the invention, what is claimed herein is:

1. A merchandising display comprising:
   a human hand replica;
   a monitor supported by the human hand replica; and
   a hand measuring device adapted to receive an image of a human hand and determine a
glove size for display on the monitor.

2. A merchandising display as recited in claim 1, wherein said display includes a panel having
   a window on which a human hand may be placed and imaged.

3. A hand measuring device comprising:
   an imaging window, a recorder space from the window and capable of recording an image
   of a hand in juxtaposition with said window;
   means in communication with the recorder for converting the image obtained from the
   recorder to a processed image in the form of a silhouette of a hand; and
   a microprocessor for receiving the processed image and determining at least one physical
   measurement from the data contained in the silhouette;
   and an output device for receiving and displaying said measurement.

4. The hand measuring device of claim 3, wherein said recorder includes a charge coupled
device.
5. The hand measuring device of claim 3, wherein the output device is a video monitor.

6. The hand measuring device of claim 3, wherein said means includes a filter for removing shades of gray from said image.

7. Hand measuring apparatus for a human hand, said apparatus comprising:
an image recorder including a window on which a hand may be placed, said image recorder having a charge coupled device for measuring illumination energy of light entering said window and for providing an image of a hand placed on said window, a filter for converting the image into signals representing a silhouette of a hand, a microprocessor for receiving said signals and for determining the size of the hand on said window, and an output device for receiving and displaying information relating to said size.

8. The hand measurement device of claim 7, wherein the display is a monitor.

9. The hand measurement device of claim 7, wherein the processor outputs a recommended glove size to the monitor.
10. A method of determining a glove size of a human hand comprising:
   placing the hand on an imaging window,
   recording an image of the hand by light measuring apparatus,
   converting said image into digital signals,
   selecting a glove size from said digital signals, and
   displaying said glove size on a monitor.
Fig. 2
FIG 3