

## EXHIBIT 4.18

19



Europäisches Patentamt  
European Patent Office  
Office européen des brevets



11 Publication number: **0 546 704 A3**

12

### EUROPEAN PATENT APPLICATION

21 Application number: **92310595.1**

51 Int. Cl.<sup>5</sup>: **G06F 3/033, G07C 9/00,  
A61B 5/117**

22 Date of filing: **20.11.92**

30 Priority: **13.12.91 US 807524**

71 Applicant: **AMERICAN TELEPHONE AND  
TELEGRAPH COMPANY  
32 Avenue of the Americas  
New York, NY 10013-2412(US)**

43 Date of publication of application:  
**16.06.93 Bulletin 93/24**

84 Designated Contracting States:  
**DE FR GB IT SE**

72 Inventor: **Speeter, Thomas H.  
429 Ely Harmony Road  
Freehold, New Jersey 07728(US)**

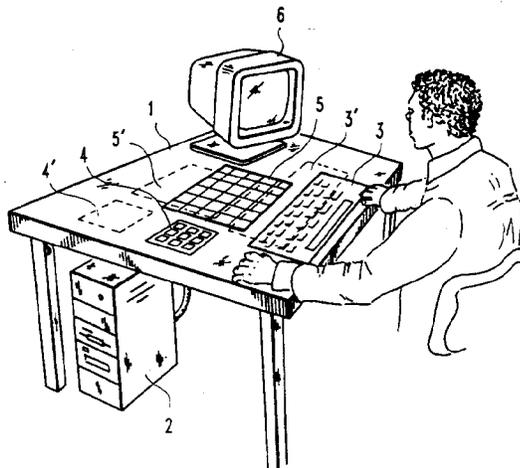
88 Date of deferred publication of the search report:  
**25.08.93 Bulletin 93/34**

74 Representative: **Johnston, Kenneth Graham et  
al  
AT&T (UK) Ltd. 5 Morningson Road  
Woodford Green Essex, IG8 OTU (GB)**

54 **Intelligent work surfaces.**

57 Methods and apparatus for implementing intelligent work surfaces are provided. Work surfaces, such as desktops and floors, are covered with a tactile sensing array to provide tactile data to a processor. Regions on the sensing arrays may be defined to include predetermined sensing elements of the sensing array and may be specified to function as input devices, such as a keyboard, a mouse, or the like. Once defined, regions may be redefined to reposition a specified input device. Regions also may be respecified to function as a different input device. The arrays also may collect data at predetermined intervals for analysis, such as for identifying an individual or an object. For example, the force-image of an individual's handprint or footprint could be taken, analyzed, and compared against data representing the force-images of known individuals.

FIG. 2



EP 0 546 704 A3



| DOCUMENTS CONSIDERED TO BE RELEVANT  |  |   |   |
|--|--|---|---|
| Category   | Citation of document with indication, where appropriate, of relevant passages  | Relevant to claim   | CLASSIFICATION OF THE APPLICATION (Int. Cl.5) |
| X  | US-A-4 716 542 (C.L. PELTZ ET AL.)<br>* abstract; figure 1; column 3, line 39<br>- line 53; column 4, line 1 - line 15;<br>column 6, line 39 - line 62; column 30,<br>line 55 - column 31, line 45 * | 1-3,6,9<br>-14,17   | G 06 F 3/033<br>G 07 C 9/00<br>A 61 B 5/117   |
| Y  | ---  | 4,5,15,<br>16   |   |
| Y  | GB-A-2 033 632 (THE SECRETARY OF STATE<br>FOR DEFENCE)<br>* abstract *   | 4,5,15,<br>16   |   |
| A  | PATENT ABSTRACTS OF JAPAN vol. 013, no.<br>456 (P-945)16 October 1989<br>& JP-A-11 78 836 ( ANIMA KK ) *<br>abstract *<br>-----  | 8   |   |
|  |  |   | TECHNICAL FIELDS<br>SEARCHED (Int. Cl.5)      |
|  |  |   | G 06 F  |
| The present search report has been drawn up for all claims   |  |   |   |
| Place of search<br>THE HAGUE   |  | Date of completion of the search<br>01-04-1993  | Examiner<br>BRAVO P                           |
| CATEGORY OF CITED DOCUMENTS  |  | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or<br>after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>-----<br>& : member of the same patent family, corresponding<br>document |   |
| X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another<br>document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document |  |   |   |

EPO FORM 1503 03.92 (P0401)



### CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid.  
namely claims:
- No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

### LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions,  
namely:

See Sheet B.

- All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid.  
namely claims:
- None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims.  
namely claims: 1-9, 10-17, 21.



European Patent  
Office

EP 92 31 0595.1 - B -

### LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims 1-9, 10-17, 21 : Worksurface implementing input devices.
2. Claims 22-28 : Identification by pressure-print analysis.  
(a priori).
3. Claims 18-20 : Emulation of mouse by using a digitizer.  
(a posteriori).

|   |   |    |   |                          |  |
|---|---|----|---|--------------------------|--|
| Substitute for form 1449/PTO<br><br><b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b><br><br>(Use as many sheets as necessary) |   |    |   | <b>Complete if Known</b> |  |
|   |   |    |   | Application Number       | 11/677,958                                 |
|   |   |    |   | Filing Date              | February 22, 2007                          |
|   |   |    |   | First Named Inventor     | Wayne WESTERMAN                            |
|   |   |    |   | Art Unit                 | 2629                                       |
|   |   |    |   | Examiner Name            | Koosha Sharifi-Tafreshi                    |
| Sheet   | 1 | of | 2 | Attorney Docket Number   | 106842508604<br>Client Ref. No. P3950USC13 |

| U.S. PATENT DOCUMENTS |                       |  |  |                                |   |   |
|-----------------------|-----------------------|--|--|--------------------------------|---|---|
| Examiner Initials*    | Cite No. <sup>1</sup> | Document Number                          |  | Publication Date<br>MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear |
|                       |                       | Number-Kind Code <sup>2</sup> (if known) |  |                                |   |   |
|                       | 1.                    | US-2009/0244031-A1                       |  | 10-01-2009                     | Westerman et al.                                |   |
|                       | 2.                    | US-2009/0244032-A1                       |  | 10-01-2009                     | Westerman et al.                                |   |
|                       | 3.                    | US-2009/0244033-A1                       |  | 10-01-2009                     | Westerman et al.                                |   |
|                       | 4.                    | US-2009/0249236-A1                       |  | 10-01-2009                     | Westerman et al.                                |   |
|                       | 5.                    | US-2009/0251435-A1                       |  | 10-08-2009                     | Westerman et al.                                |   |
|                       | 6.                    | US-2009/0251438-A1                       |  | 10-08-2009                     | Westerman et al.                                |   |
|                       | 7.                    | US-2009/0251439-A1                       |  | 10-08-2009                     | Westerman et al.                                |   |
|                       | 8.                    | US-4,290,061                             |  | 09-15-1981                     | Serrano   |   |
|                       | 9.                    | US-5,327,161-A                           |  | 07-05-1994                     | Logan et al.                                    |   |
|                       | 10.                   | US-5,369,228-A                           |  | 11-29-1994                     | Faust   |   |
|                       | 11.                   | US-5,379,057-A                           |  | 01-03-1995                     | Clough et al.                                   |   |
|                       | 12.                   | US-5,581,276-A                           |  | 12-03-1996                     | Cipolla et al.                                  |   |
|                       | 13.                   | US-5,581,484-A                           |  | 12-03-1996                     | Prince  |   |
|                       | 14.                   | US-5,675,362-A                           |  | 10-07-1997                     | Clough et al.                                   |   |
|                       | 15.                   | US-5,729,249-A                           |  | 03-17-1998                     | Yasutake  |   |
|                       | 16.                   | US-5,837,947-A                           |  | 11-17-1998                     | Teterwalk                                       |   |
|                       | 17.                   | US-6,061,177-A                           |  | 05-09-2000                     | Fujimoto  |   |
|                       | 18.                   | US-7,084,859-B1                          |  | 08-01-2006                     | Pryor   |   |

| FOREIGN PATENT DOCUMENTS |                       |   |  |                                |   |   |                |
|--------------------------|-----------------------|---|--|--------------------------------|---|---|----------------|
| Examiner Initials*       | Cite No. <sup>1</sup> | Foreign Patent Document   |  | Publication Date<br>MM-DD-YYYY | Name of Patentee or Applicant of Cited Document | Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear | † <sup>6</sup> |
|                          |                       | Country Code <sup>3</sup> -Number <sup>4</sup> -Kind Code <sup>5</sup> (if known) |  |                                |   |   |                |
|                          | 19.                   | EP-0 546 704-A2, A3   |  | 06-16-1993                     | American Telephone & Telegraph                  |   |                |
|                          | 20.                   | JP-06-083523-A  |  | 03-25-1994                     | American Telephone & Telegraph                  | Translation of Abstract Only  |                |
|                          | 21.                   | JP-06-332620-A  |  | 12-02-1994                     | Brother Ind. Ltd.                               | Translation of Abstract Only  |                |
|                          | 22.                   | JP-07-057103-A  |  | 03-03-1995                     | Toshiba Corp.                                   | Translation of Abstract Only  |                |
|                          | 23.                   | JP-08-286830-A  |  | 11-01-1996                     | Fuji Xerox Co. Ltd.                             | Translation of Abstract Only  |                |
|                          | 24.                   | WO-96/007981-A1   |  | 03-14-1996                     | Synaptics, Inc.                                 |   |                |

|                    |  |                 |  |
|--------------------|--|-----------------|--|
| Examiner Signature |  | Date Considered |  |
|--------------------|--|-----------------|--|

|   |   |    |   |                          |   |
|---|---|----|---|--------------------------|---|
| Substitute for form 1449/PTO<br><br><b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b><br><br>(Use as many sheets as necessary) |   |    |   | <b>Complete if Known</b> |   |
|   |   |    |   | Application Number       | 11/677,958  |
|   |   |    |   | Filing Date              | February 22, 2007                                 |
|   |   |    |   | First Named Inventor     | Wayne WESTERMAN                                   |
|   |   |    |   | Art Unit                 | 2629  |
|   |   |    |   | Examiner Name            | Koosha Sharifi-Tafreshi                           |
| Sheet   | 2 | of | 2 | Attorney Docket Number   | 106842508604<br><b>Client Ref. No. P3950USC13</b> |

\*EXAMINER: Initial if information considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. <sup>1</sup> Applicant's unique citation designation number (optional). <sup>2</sup> See Kinds Codes of USPTO Patent Documents at [www.uspto.gov](http://www.uspto.gov) or MPEP 901.04. <sup>3</sup> Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup> Applicant is to place a check mark here if English language Translation is attached.

| NON PATENT LITERATURE DOCUMENTS |                       |   |                |
|---------------------------------|-----------------------|---|----------------|
| Examiner Initials               | Cite No. <sup>1</sup> | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published. | T <sup>2</sup> |
|                                 | 25.                   | CUI, Y. et al. (1996). "Hand Segmentation Using Learning-Based Prediction and Verification for Hand Sign Recognition," <i>Proceedings of the 1996 IEEE Computer Society Conference on Computer Vision and Pattern Recognition</i> , pp. 88-93.                  |                |
|                                 | 26.                   | Final Office Action mailed November 19, 2009, for U.S. Patent Application No. 11/428,515, filed July 3, 2006, 14 pages.   |                |
|                                 | 27.                   | Non-Final Office Action mailed August 25, 2009, for U.S. Patent Application No. 11/428,522, filed July 3, 2006, six pages.  |                |
|                                 | 28.                   | Non-Final Office Action mailed September 2, 2009, for U.S. Patent Application No. 11/559,736, filed November 14, 2006, 12 pages.  |                |
|                                 | 29.                   | Non-Final Office Action mailed October 5, 2009, for U.S. Patent Application No. 11/559,799, filed November 14, 2006, 14 pages.  |                |
|                                 | 30.                   | Non-Final Office Action mailed October 6, 2009, for U.S. Patent Application No. 11/559,763, filed November 14, 2006, 24 pages.  |                |
|                                 | 31.                   | Non-Final Office Action mailed October 14, 2009, for U.S. Patent Application No. 11/428,501, filed July 3, 2006, six pages.   |                |
|                                 | 32.                   | Non-Final Office Action mailed October 29, 2009, for U.S. Patent Application No. 11/559,822, filed November 14, 2006, 11 pages.   |                |
|                                 | 33.                   | Non-Final Office Action mailed October 30, 2009, for U.S. Patent Application No. 11/428,503, filed July 3, 2006, nine pages.  |                |
|                                 | 34.                   | Non-Final Office Action mailed December 22, 2009, for U.S. Patent Application No. 11/559,833, filed November 14, 2006, six pages.   |                |
|                                 | 35.                   | Non-Final Office Action mailed January 27, 2010, for U.S. Patent Application No. 11/428,522, filed July 3, 2006, five pages.  |                |
|                                 | 36.                   | Notice of Allowability mailed September 2, 2009, for U.S. Patent Application No. 11/428,506, filed July 3, 2006, five pages.  |                |
|                                 | 37.                   | RUBINE, D.H. (December 1991). "The Automatic Recognition of Gestures," CMU-CS-91-202, Submitted in Partial Fulfillment of the Requirements of the Degree of Doctor of Philosophy in Computer Science at Carnegie Mellon University, 285 pages.                  |                |

|                    |  |                 |  |
|--------------------|--|-----------------|--|
| Examiner Signature |  | Date Considered |  |
|--------------------|--|-----------------|--|

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> Applicant's unique citation designation number (optional). <sup>2</sup> Applicant is to place a check mark here if English language Translation is attached.

# Hand Segmentation Using Learning-Based Prediction and Verification for Hand Sign Recognition

Yuntao Cui and John J. Weng  
Department of Computer Science  
Michigan State University  
East Lansing, MI 48824, USA  
E-mail: {cui,weng}@cps.msu.edu

## Abstract

*This paper presents a prediction-and-verification segmentation scheme using attention images from multiple fixations. A major advantage of this scheme is that it can handle a large number of different deformable objects presented in complex backgrounds. The scheme is also relatively efficient since the segmentation is guided by the past knowledge through a prediction-and-verification scheme. The system has been tested to segment hands in the sequences of intensity images, where each sequence represents a hand sign. The experimental result showed a 95% correct segmentation rate with a 3% false rejection rate.*

## 1 Introduction

The ability to interpret hand signs is essential for human machine interface. Recently, there is a significant amount of research on vision-based hand sign recognition (e.g. [1, 3, 4, 7, 11, 13]). One of the major difficulties faced by the vision-based approach is segmentation of the moving hand from sometimes complex backgrounds. To avoid the above problem, some of the systems rely on markers. The others use restrictive setups such as uniform background.

In this paper, we present a learning-based approach to perform the task of hand segmentation. In the case of analyzing temporal sequence, motion is an obvious choice of visual cue for visual attention. If we assume that the object of interest is moving in a stationary environment, it is not very difficult to roughly determine the position of a moving object in the image using motion information. However, it is not simple if the task is to extract the contour of the object from various backgrounds. Several motion segmentation methods have been proposed. These approaches fall into two categories. Approaches in the first category are designed to deal with rigid moving objects (e.g. [2, 8]). This type of approaches achieves a segmentation by either build-

ing a reference image of the static background [8], or extracting the motion entity based on 3-D motion models or 2-D velocity-field models [2]. The second type of approaches fit a shape to deformable moving objects (e.g. [9]). These models typically need a good initial position to converge. They also need a relatively clean background since the external forces are defined by the image gradient.

In order to overcome the difficulties faced by the segmentation methods for deformable objects mentioned above, we have proposed an eigen-subspace learning approach [5]. In that approach, the object was assumed to position in a rectangular attention image together with the background. The attention image went through a reconstruction based on learning which can reduce the background interference to a certain degree. However, the reconstruction is not able to fully get rid of the background interference.

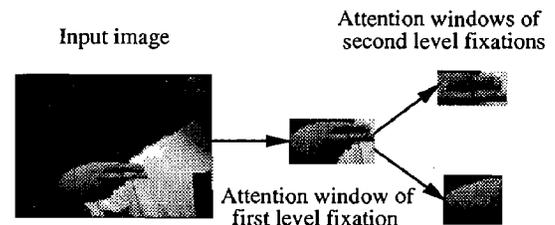


Figure 1: An illustration of two level fixations of an input hand image.

One attention window from a single fixation can not solve the segmentation problem completely. Similar to human vision, multiple fixations are needed. This kind of multiple fixations has a hierarchical structure. As shown in Fig. 1, the first level of the fixation concentrates on the entire hand, while the next level of the fixation takes care of different parts of the hand. The attention window of the first level fixation usually contains a part of the background. But as we continue zooming in the object from different fixations, the at-

tention windows become focusing on different parts of the object. One important feature of these attention windows is that they typically contain much less background than the attention window of the first level fixation. These attention images from multiple fixations can be used as important visual cues to segment the object of interest from the input image. In this paper, we present a learning-based approach which efficiently utilizes the attention images obtained from the multiple fixations through a prediction-and-verification scheme to perform the task of hand segmentation.

## 2 Valid Segmentation

In this section, we define the verifier  $f$  to evaluate the segmentation using function interpolation based on training samples. Given an input image, we can construct an attention image of the hand as shown in Fig. 2.

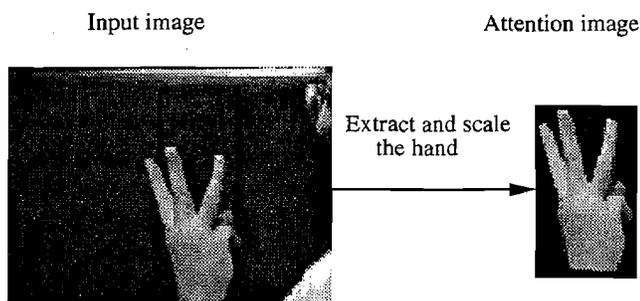


Figure 2: The illustration of constructing attention images.

### 2.1 The Most Expressive Features (MEF)

Let an attention image  $F$  of  $m$  rows and  $n$  columns be an  $(mn)$ -dimensional vector. For example, the set of image pixels  $\{f(i, j) \mid 0 \leq i < m, 0 \leq j < n\}$  can be written as a vector  $\mathbf{V} = (v_1, v_2, \dots, v_d)$  where  $v_{mi+j} = f(i, j)$  and  $d = mn$ . Typically  $d$  is very large. The Karhunen-Loeve projection [12] is a very efficient way to reduce a high-dimensional space to a low-dimensional subspace. The vectors produced by the Karhunen-Loeve projection are typically called the principle components. We call these vectors the *most expressive features* (MEF) in that they best describe the sample population in the sense of linear transform [4].

### 2.2 Approximation as Function Interpolation

After projecting hand attention images to a low-dimensional MEF space, we are now ready to approximate the verifier  $f$  using function interpolation.

**Definition 1** Given a training vector  $\mathbf{X}_{k,i}$  of gesture  $k$  in the MEF space, a Gaussian basis function  $s_i$  is  $s_i(\mathbf{X}) = e^{-\frac{\|\mathbf{x} - \mathbf{x}_{k,i}\|^2}{\sigma}}$ , where  $\sigma$  is a positive damping factor, and  $\|\cdot\|$  denotes the Euclidean distance.

A very small  $\sigma$  tends to reduce the contribution of neighboring training samples.

**Definition 2** Given a set of  $n$  training samples  $L_k = \{\mathbf{X}_{k,1}, \mathbf{X}_{k,2}, \dots, \mathbf{X}_{k,n}\}$  of gesture  $k$ , the confidence level of the input  $\mathbf{X}$  belongs to class  $k$  is defined as:  $g_k(\mathbf{X}) = \sum_{i=1}^n c_i s_i(\mathbf{X})$ , where the  $s_i$  is a Gaussian basis function and the coefficients  $c_i$ 's are to be determined by the training samples.

The coefficients  $c_i$ 's are determined as follows. Given  $n$  training samples, we have  $n$  equations

$$g_k(\mathbf{X}_{k,i}) = \sum_{i=1}^n c_i s_i(\mathbf{X}_{k,i}), \quad (1)$$

which are linear with respect to the coefficients  $c_i$ 's. If we set  $g_k(\mathbf{X}_{k,i})$  equal to 1, we can solve the above equations for  $c_i$  using Gauss-Jordan elimination method.

The confidence level defined in Definition 2 can be used to verify a segmentation result.

**Definition 3** Given a segmentation result  $\mathbf{S}$  and a confidence level  $l$ , the verifier  $f$  outputs valid segmentation for gesture  $k$  if  $g_k(\mathbf{S}) > l$ .

Intuitively, a segmentation result  $\mathbf{S}$  is valid if there is a training sample that is sufficiently close to it.

## 3 Predication for Valid Segmentation

This section investigates the problem how to find a valid segmentation. Our approach is to use the attention images from multiple fixations of training hand images. Given a hand attention image, a fixation image is determined by its fixation position  $(s, t)$  and a scale  $r$ . Fig. 3 shows the attention images of the 19 fixations from one training sample.

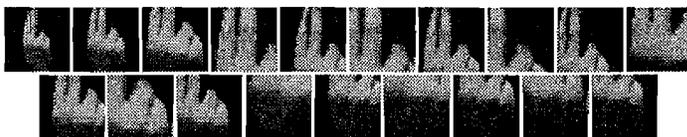


Figure 3: The attention images from 19 fixations of a training sample. The first one is the same as the original hand attention image.

### 3.1 Overview

Given a training set, we obtain a set of attention images from multiple fixations for each image in the set. Each attention image from a fixation is associated with the segmentation mask of original hand attention image, the scale  $r$  and the position of the fixation  $(s, t)$ . These information is necessary to recover the segmentation for the entire object.

During the segmentation stage, we first use the motion information to select visual attention. Then, we

try different fixations on the input image. An attention image from a fixation of an input image is used to query the training set. The segmentation mask associated with the query result is the predication. The predicted segmentation mask is then applied to the input image. Finally, we verify the segmentation result to see if the extracted subimage corresponds to a hand gesture that has been learned. If the answer is yes, we find the solution. This solution can further go through a refinement process. Fig. 4 gives the outline of the scheme.

### 3.2 Organization of Attention Images from Fixations

In order to achieve a fast retrieval, we build a hierarchical structure to organize the data.

**Definition 4** A hierarchical quasi-Voronoi diagram  $P$  of  $S$  is a set of partitions  $P = \{P_1, P_2, \dots, P_m\}$ , where every  $P_i = \{P_{i,1}, \dots, P_{i,n_i}\}$ ,  $i = 1, 2, \dots, m$  is a partition of  $S$ .  $P_{i+1} = \{P_{i+1,1}, \dots, P_{i+1,n_{i+1}}\}$  is a finer Voronoi diagram partition of  $P_i$  in the sense that corresponding to every element  $P_{i,k} \in P_i$ ,  $P_{i+1}$  contains a Voronoi partition  $\{P_{i+1,s}, \dots, P_{i+1,t}\}$  of  $P_{i,k}$ .

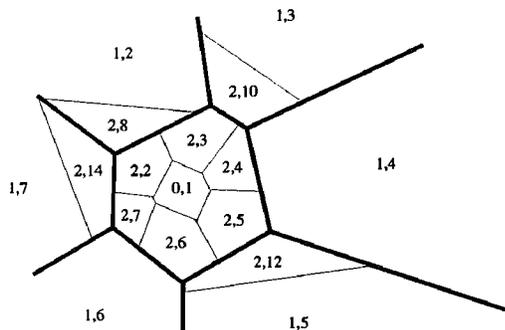


Figure 5: A 2-D illustration of a hierarchical quasi-Voronoi diagram.

The graphic description in Fig. 5 gives an simplified but intuitive explanation of the hierarchical quasi-Voronoi diagram. The structure is a tree. The root corresponds to the entire space of all the possible inputs. The children of the root partition the space into large cells, as shown by thick lines in Fig. 5. The children of a parent subdivide the parent's cell future into smaller cells, and so on.

### 3.3 Prediction as Querying the Training Set

Given a training set  $L$ , a hierarchical quasi-Voronoi diagram  $P = \{P_1, P_2, \dots, P_n\}$  corresponding to  $L$  and a query sample  $\mathbf{X}$ , the prediction problem is to find a training sample  $\mathbf{X}' \in L$ , such that  $\|\mathbf{X} - \mathbf{X}'\| \leq \|\mathbf{X} - \mathbf{X}''\|$  for any  $\mathbf{X}'' \in L$  with  $\mathbf{X}'' \neq \mathbf{X}'$ . The type of query mentioned above is a nearest neighbor problem, also known

as *post-office* problem [10]. There still lacks of efficient solutions for the case with dimension higher than three. In this section, we will present an efficient algorithm when the training set is  $d$ -supportive as defined below.

**Definition 5** Let  $S$  be a set which contains all possible samples. A training set  $L = \{L_1, L_2, \dots, L_n\}$  is a  $d$ -supportive training set if for any test sample  $\mathbf{X} \in S$ , there exist  $i$  such that  $\|\mathbf{X} - L_i\| < d$ , where  $\|\cdot\|$  is the Euclidean distance.

Next two theorems show how to prune the search paths when the training set is  $d$ -supportive.

**Theorem 1** We have a set of  $d$ -supportive training set  $L = \{L_1, L_2, \dots, L_n\}$ , a hierarchical quasi-Voronoi diagram  $P = \{P_1, P_2, \dots, P_n\}$  corresponding to  $L$  and a query sample  $\mathbf{X} \in S$ . Let the  $i$ th partition be  $P_i = \{P_{i,1}, P_{i,2}, \dots, P_{i,n_i}\}$  and  $C = \{C_1, C_2, \dots, C_{n_i}\}$  be the corresponding centers of regions in  $P_i$ . Assume  $C_1$  be the center to  $\mathbf{X}$  such that  $\|C_1 - \mathbf{X}\| \leq \|C_i - \mathbf{X}\|$  for any  $i \neq 1$ . Let  $C_2$  be any other center and  $P_1$  be a boundary hyperplane between regions represented by  $C_1$  and  $C_2$  as illustrated in Fig. 6. Then the region of  $C_2$  does not contain the nearest training sample to  $\mathbf{X}$  if the distance between  $\mathbf{X}$  and the hyperplane  $P_1$  is greater than  $d$ .

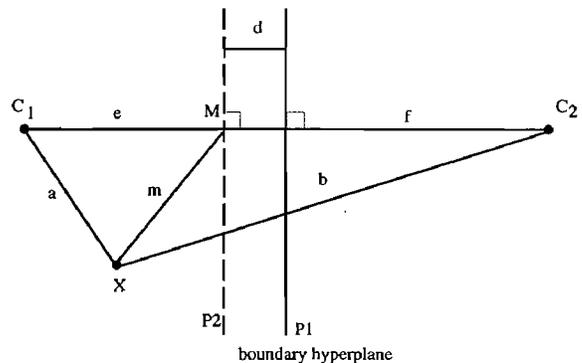


Figure 6: A 2D illustration of nearest neighbor query theorems.

In order to avoid to calculate the point to hyperplane distance in a high dimensional space, we can use following equivalent theorem.

**Theorem 2** Let  $\|C_1 - C_2\| = r$ ,  $f = \frac{r}{2}$ ,  $e = \frac{r}{2} - d$ ,  $\|C_1 - \mathbf{X}\| = a$  and  $\|C_2 - \mathbf{X}\| = b$  as shown in Fig. 6. The region of  $C_2$  does not contain the nearest training sample to  $\mathbf{X}$  if  $a^2 - e^2 < b^2 - f^2$ .

For the proof Theorem 1 and Theorem 2, the reader is referred to [6].

## 4 Experiments

We have applied our segmentation scheme to the task of hand segmentation in the experiments. The number of gestures we used in our experiment is 40. These gestures have appeared in the signs which have been used

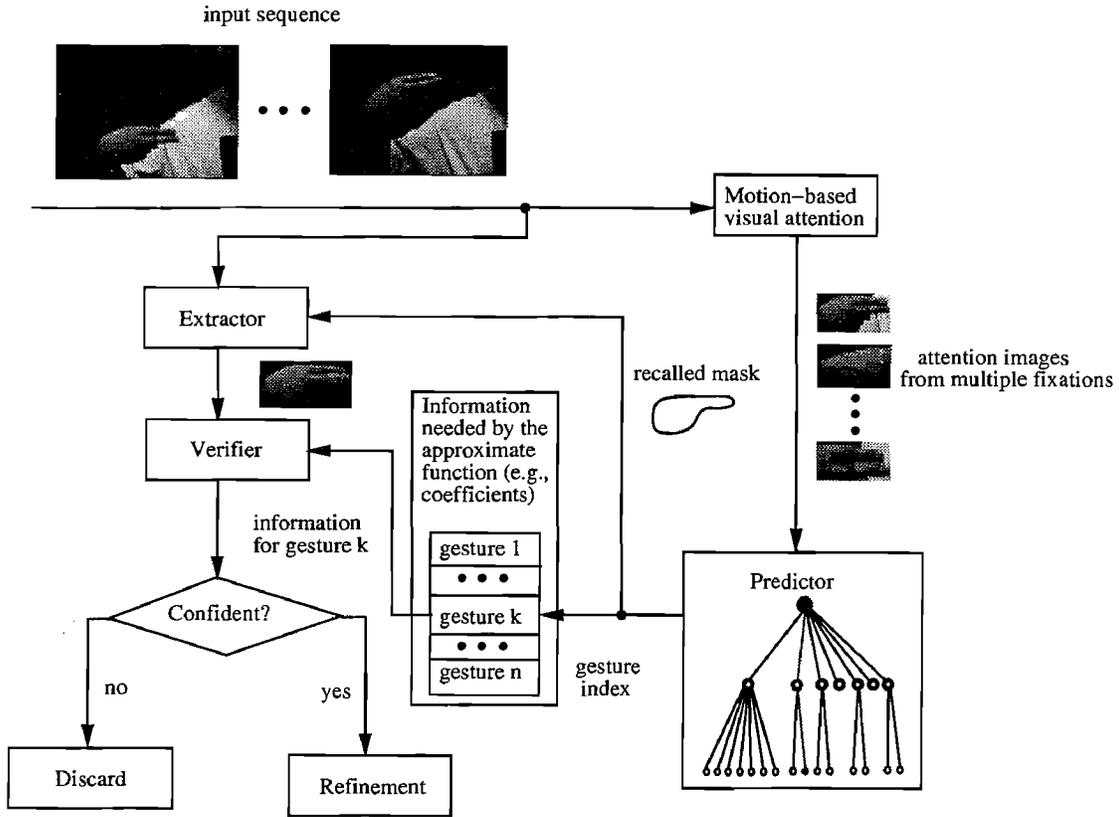


Figure 4: Overview of the segmentation scheme.

to test the hand sign recognition system [4]. They are illustrated in Fig. 7. The size of attention window used in the experiment is  $32 \times 32$  pixels.

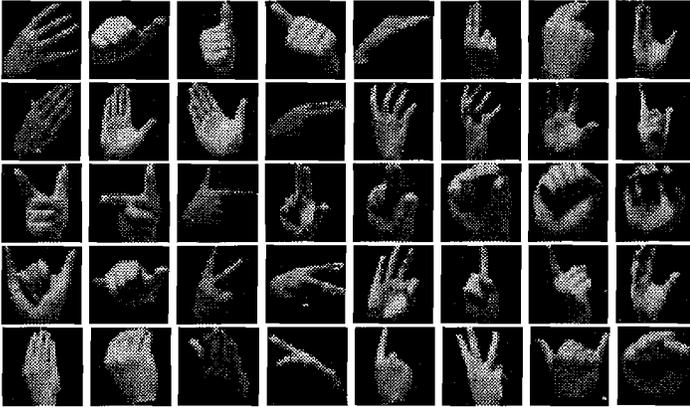


Figure 7: 40 hand gestures used in the experiment.

#### 4.1 Training

Two types of training were conducted in the experiments. The first type of training is to get the approximation for verifier  $f$  which would be used later to check the validation of the segmentation. For each gesture, a number between (27 and 36) of training sam-

ples were used to obtain the approximation of the verifier  $f$  for that gesture. Given a set of training samples  $L = \{\mathbf{X}_1, \mathbf{X}_2, \dots, \mathbf{X}_n\}$  for gesture  $k$ , we empirically determined the damping factor  $\sigma$  in the interpolation function as follows:

$$\sigma = \frac{0.2 \sum_{i=1}^{n-1} \|\mathbf{X}_i - \mathbf{X}_{i+1}\|}{n-1}. \quad (2)$$

The second type of training was to generate the attention images from multiple fixations of training samples. In the current implementation, the selection of the fixations is mechanical. Totally 19 fixations were used for each training sample as shown in Fig. 3. The attention images with more than 30% background pixels presented in the attention window would be discarded. The total number of training attention images is 1742.

#### 4.2 Hand Segmentation

The trained system was tested to perform the segmentation task from a temporal sequence of intensity images. Each sequence represents a complete hand sign. Fig. 8 (a) shows two sample sequences.

In order to speed up the process of the segmentation, we utilize motion information to find a motion attention window. The attention algorithm can detect the rough



Figure 8: The samples of the experimental results. (a) The input testing sequences; (b) The results of motion-based visual attention are shown using dark rectangular; (c) The results of the segmentation are shown after masking off the background.

position of a moving object, but the accuracy is not guaranteed as shown in Fig. 8(b). We solve this problem by doing some limited search based on the motion attention window. In the current implementation, given a motion attention window with  $m$  rows and  $n$  columns, we try the candidates with size from  $(0.5m, 0.5n)$  to  $(2m, 2n)$  using step size  $(0.5m, 0.5n)$ .

We tested the system with 802 images (161 sequences) which were not used in the training. A result was rejected if the system could not find a valid segmentation with a confidence level  $l$ . The segmentation was considered as a correct one if the correct gesture segmentation  $C$  was retrieved and placed in the right position of the test image. For the case of  $l = 0.2$ , we have achieved 95% correct segmentation rate with 3% false rejection rate. Fig. 8(c) shows some segmentation results. We summarize the experimental results in Table 1. The time was obtained on a SGI-INDIGO 2 workstation.

Table 1: Summary of the experimental data

| Number of test images | Correct segmentation | False rejection | Time per image |
|-----------------------|----------------------|-----------------|----------------|
| 805                   | 95%                  | 3%              | 58.3 sec.      |

## 5 Conclusions and Future Work

A segmentation scheme using attention images from multiple fixations is presented in this paper. The major advantage of this scheme is that it can handle a large number of different deformable objects presented in various complex backgrounds. The scheme is also relatively efficient since the search of the segmentation is guided by the past knowledge through a predication-and-verification scheme.

In the current implementation, the fixations are generated mechanically. The number of fixations and the positions of fixations are the same regardless of the types of gestures. This is not very efficient. Some gestures may be very simple so that a few fixations are enough to recognize them. Nevertheless, in order to achieve the optimal performance, different gestures may require different positions of fixations. In the future, we plan to investigate the generation of the fixations also based on learning. The previous fixations are used to guide the next action. The next action could be (a) termination of the process of generating fixation if the gesture has already been recognized; or (b) finding the appropriate position for next fixation.

## Acknowledgements

The authors would like to thank Yu Zhong, Kal Rayes, Doug Neal, and Valerie Bolster for making themselves available for the experiments. This work was sup-

ported in part by NSF grant No. IRI 9410741 and ONR grant No. N00014-95-1-0637.

## References

- [1] A. Bobick and A. Wilson, "A state-based technique for the summarization and recognition of gesture", in *Proc. 5th Int'l Conf. Computer Vision*, pp. 382-388, Boston, 1995.
- [2] P. Bouthemy and E. Francois, "Motion segmentation and qualitative dynamic scene analysis from an image sequence", in *International Journal of Computer Vision*, vol. 10, pp. 157-182, 1993.
- [3] R. Cipolla, Y. Okamoto and Y. Kuno, "Robust structure from motion using motion parallax", in *IEEE Conf. Computer Vision and Pattern Recog.*, pp. 374-382, 1993.
- [4] Y. Cui, D. Swets and J. Weng, "Learning-based hand sign recognition using SHOSLIF-M", in *Proc. 5th Int'l Conf. Computer Vision*, pp. 631-636, Boston, 1995.
- [5] Y. Cui and J. Weng, "2D object segmentation from fovea images based on eigen-subspace learning", *Proc. IEEE Int'l Symposium on Computer Vision*, Coral Gables, FL, Nov. 20-22, 1995.
- [6] Y. Cui and J. Weng, "A learning-based prediction-and-verification segmentation scheme for hand sign image sequences", Technical Report CPS-95-43, Computer Science Department, Michigan State University, Dec., 1995.
- [7] T. Darrell and A. Pentland, "Space-time gestures", in *IEEE Conf. Computer Vision and Pattern Recog.*, pp.335-340, 1993.
- [8] G. W. Donohoe, D. R. Hush and N. Ahmed, "Change detection for target detection and classification in video sequences", in *Proc. Int'l Conf. Acoust., Speech, Signal Processing*, pp. 1084-1087, 1988.
- [9] M. Kass, A. Witkin and D. Terzopoulos, "Snakes: active contour models", in *Proc. 1st ICCV*, pp. 259-268, 1987.
- [10] D. Knuth, *The Art of Computer Programming III: Sorting and Searching*, Addison-Wesley, Reading, Mass., 1973.
- [11] J. J. Kuch and T. S. Huang, "Vision based hand modeling and tracking", in *Proc. International Conference on Computer Vision*, June, 1995.
- [12] M.M. Loeve, *Probability Theory*, Princeton, NJ: Van Nostrand, 1955.
- [13] T.E. Starner and A. Pentland, "Visual recognition of American sign language using hidden markov models", in *Proc. International Workshop on Automatic Face- and Gesture- Recognition*, June 1995.

Proceedings

# 1996 IEEE Computer Society Conference on Computer Vision and Pattern Recognition

June 18–20, 1996

San Francisco, California

*Sponsored by*

IEEE Computer Society Technical Committee  
on Pattern Analysis and Machine Intelligence



IEEE Computer Society Press  
Los Alamitos, California

Washington • Brussels • Tokyo

---



---

IEEE Computer Society Press  
10662 Los Vaqueros Circle  
P.O. Box 3014  
Los Alamitos, CA 90720-1264

---

Copyright © 1996 by The Institute of Electrical and Electronics Engineers, Inc.  
All rights reserved.

*Copyright and Reprint Permissions:* Abstracting is permitted with credit to the source. Libraries may photocopy beyond the limits of US copyright law, for private use of patrons, those articles in this volume that carry a code at the bottom of the first page, provided that the per-copy fee indicated in the code is paid through the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

Other copying, reprint, or republication requests should be addressed to: IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331.

*The papers in this book comprise the proceedings of the meeting mentioned on the cover and title page. They reflect the authors' opinions and, in the interests of timely dissemination, are published as presented and without change. Their inclusion in this publication does not necessarily constitute endorsement by the editors, the IEEE Computer Society Press, or the Institute of Electrical and Electronics Engineers, Inc.*

IEEE Computer Society Press Order Number PR07258

IEEE Order Plan Catalog Number 96CB35909

ISBN 0-8186-7258-7

IEEE Order Plan ISBN 0-8186-7259-5

Microfiche ISBN 0-8186-7260-9

ISSN 1063-6919

Kurt F. Wood's Library  
University of Wisconsin - Madison  
215 N. Randall Street  
Madison, WI 53706-1683

*Additional copies may be ordered from:*

IEEE Computer Society Press  
Customer Service Center  
10662 Los Vaqueros Circle  
P.O. Box 3014  
Los Alamitos, CA 90720-1314  
Tel: +1-714-821-8380  
Fax: +1-714-821-4641  
Email: cs.books@computer.org

IEEE Service Center  
445 Hoes Lane  
P.O. Box 1331  
Piscataway, NJ 08855-1331  
Tel: +1-908-981-1393  
Fax: +1-908-981-9667  
misc.custserv@computer.org

IEEE Computer Society  
13, Avenue de l'Aquilon  
B-1200 Brussels  
BELGIUM  
Tel: +32-2-770-2198  
Fax: +32-2-770-8505  
euro.ofc@computr.org

IEEE Computer Society  
Ooshima Building  
2-19-1 Minami-Aoyama  
Minato-ku, Tokyo 107  
JAPAN  
Tel: +81-3-3408-3118  
Fax: +81-3-3408-3553  
tokyo.ofc@computer.org

Editorial production by Penny Storms  
Cover by Joseph Daigle / Studio Productions  
Printed in the United States of America by KNI, Inc.



The Institute of Electrical and Electronics Engineers, Inc.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

|  |                      |  |
|--|----------------------|--|
| <b>TRANSMITTAL FORM</b><br><br><i>(to be used for all correspondence after initial filing)</i> | Application Number   | 11/677,958   |
|  | Filing Date          | February 22, 2007  |
|  | First Named Inventor | Wayne WESTERMAN  |
|  | Art Unit             | 2629   |
|  | Examiner Name        | Koosha Sharifi-Tafreshi  |
| Total Number of Pages in This Submission   | 547                  | Attorney Docket Number<br>106842508604<br><b>Client Ref. No.: P3950USC13</b> |

| ENCLOSURES (Check all that apply)  |   |  |
|--|---|--|
| <input type="checkbox"/> Fee Transmittal Form<br><br><input type="checkbox"/> Fee Attached<br><br><input checked="" type="checkbox"/> Amendment/Reply – (13) Pages<br><br><input type="checkbox"/> After Final<br><br><input type="checkbox"/> Affidavits/declaration(s)<br><br><input type="checkbox"/> Extension of Time Request<br><br><input type="checkbox"/> Express Abandonment Request<br><br><input checked="" type="checkbox"/> Information Disclosure Statement (5) Pages<br><br><input type="checkbox"/> Certified Copy of Priority Document(s)<br><br><input type="checkbox"/> Reply to Missing Parts/Incomplete Application<br><br><input type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53 | <input type="checkbox"/> Drawing(s)<br><br><input type="checkbox"/> Licensing-related Papers<br><br><input type="checkbox"/> Petition<br><br><input type="checkbox"/> Petition to Convert to a Provisional Application<br><br><input type="checkbox"/> Power of Attorney, Revocation<br>Change of Correspondence Address<br><br><input type="checkbox"/> Terminal Disclaimer<br><br><input type="checkbox"/> Request for Refund<br><br><input type="checkbox"/> CD, Number of CD(s) _____<br><br><input type="checkbox"/> Landscape Table on CD | <input type="checkbox"/> After Allowance Communication to TC<br><br><input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences<br><br><input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)<br><br><input type="checkbox"/> Proprietary Information<br><br><input type="checkbox"/> Status Letter<br><br><input checked="" type="checkbox"/> Other Enclosure(s) (please identify below): (6) Foreign Refs.; (13) NPLs – (529) Pages |
| Remarks  |   |  |

| SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT |  |          |        |
|--|--|----------|--------|
| Firm Name                                  | MORRISON & FOERSTER LLP (Customer No. 69753) |          |        |
| Signature                                  | /Gregory S. Weaver, #53,751/                 |          |        |
| Printed name                               | Gregory Weaver                               |          |        |
| Date                                       | February 24, 2010                            | Reg. No. | 53,751 |

## Electronic Acknowledgement Receipt

|   |  |
|---|--|
| <b>EFS ID:</b>                              | 7082277                                  |
| <b>Application Number:</b>                  | 11677958                                 |
| <b>International Application Number:</b>    |  |
| <b>Confirmation Number:</b>                 | 1844                                     |
| <b>Title of Invention:</b>                  | Ellipse Fitting for Multi-Touch Surfaces |
| <b>First Named Inventor/Applicant Name:</b> | Wayne Westerman                          |
| <b>Customer Number:</b>                     | 69753                                    |
| <b>Filer:</b>                               | Gregory Scott Weaver/Lisa Bronk          |
| <b>Filer Authorized By:</b>                 | Gregory Scott Weaver                     |
| <b>Attorney Docket Number:</b>              | 10684-25086.04                           |
| <b>Receipt Date:</b>                        | 24-FEB-2010                              |
| <b>Filing Date:</b>                         | 22-FEB-2007                              |
| <b>Time Stamp:</b>                          | 18:52:19                                 |
| <b>Application Type:</b>                    | Utility under 35 USC 111(a)              |

### Payment information:

|  |                 |
|--|-----------------|
| Submitted with Payment                   | yes             |
| Payment Type                             | Deposit Account |
| Payment was successfully received in RAM | \$180           |
| RAM confirmation Number                  | 6086            |
| Deposit Account                          | 031952          |
| Authorized User                          |                 |

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

| <b>File Listing:</b>   |  |                               |   |                         |                         |
|------------------------|--|-------------------------------|---|-------------------------|-------------------------|
| <b>Document Number</b> | <b>Document Description</b>                                | <b>File Name</b>              | <b>File Size(Bytes)/<br/>Message Digest</b>         | <b>Multi Part /.zip</b> | <b>Pages (if appl.)</b> |
| 1                      | Miscellaneous Incoming Letter                              | 2508604TRANS22410.pdf         | 43166<br>f696afc6b4f28ab11ff472a6adf8658ad45335b5   | no                      | 1                       |
| <b>Warnings:</b>       |  |                               |   |                         |                         |
| <b>Information:</b>    |  |                               |   |                         |                         |
| 2                      |  | 2508604AMEND22410.pdf         | 592585<br>7ef7aed8c3824a9e26aba37f98e7bfe389708c91  | yes                     | 13                      |
|                        | <b>Multipart Description/PDF files in .zip description</b> |                               |   |                         |                         |
|                        | <b>Document Description</b>                                |                               | <b>Start</b>  | <b>End</b>              |                         |
|                        | Amendment/Req. Reconsideration-After Non-Final Reject      |                               | 1   | 1                       |                         |
|                        | Claims   |                               | 2   | 7                       |                         |
|                        | Applicant Arguments/Remarks Made in an Amendment           |                               | 8   | 13                      |                         |
| <b>Warnings:</b>       |  |                               |   |                         |                         |
| <b>Information:</b>    |  |                               |   |                         |                         |
| 3                      |  | 2508604SIDSWFEE22410.pdf      | 245184<br>90d41282119894837ce2a527f8f8c54ea869b998  | yes                     | 5                       |
|                        | <b>Multipart Description/PDF files in .zip description</b> |                               |   |                         |                         |
|                        | <b>Document Description</b>                                |                               | <b>Start</b>  | <b>End</b>              |                         |
|                        | Transmittal Letter   |                               | 1   | 3                       |                         |
|                        | Information Disclosure Statement (IDS) Filed (SB/08)       |                               | 4   | 5                       |                         |
| <b>Warnings:</b>       |  |                               |   |                         |                         |
| <b>Information:</b>    |  |                               |   |                         |                         |
| 4                      | Foreign Reference  | 19_EP0546704A2A3.pdf          | 1305701<br>aaf9aee879887759c46f48a1ff87af8bc635d06e | no                      | 27                      |
| <b>Warnings:</b>       |  |                               |   |                         |                         |
| <b>Information:</b>    |  |                               |   |                         |                         |
| 5                      | Foreign Reference  | 20_JP06083523A_w_Abstract.pdf | 1268428<br>3476fa3382ec257f3071ca3ffbb9a5e6c4fdef60 | no                      | 19                      |
| <b>Warnings:</b>       |  |                               |   |                         |                         |
| <b>Information:</b>    |  |                               |   |                         |                         |

|                     |                   |                               |   |    |    |
|---------------------|-------------------|-------------------------------|---|----|----|
| 6                   | Foreign Reference | 21_JP06332620A_w_Abstract.pdf | 991123<br>98606b5fcc22198a9b15c49caba68f3d15114a51  | no | 14 |
| <b>Warnings:</b>    |                   |                               |   |    |    |
| <b>Information:</b> |                   |                               |   |    |    |
| 7                   | Foreign Reference | 22_JP07057103A_w_Abstract.pdf | 570001<br>ed2700d23307e61b6e24dd98726d2ff9c34c7de1  | no | 8  |
| <b>Warnings:</b>    |                   |                               |   |    |    |
| <b>Information:</b> |                   |                               |   |    |    |
| 8                   | Foreign Reference | 23_JP08286830A_w_Abstract.pdf | 598551<br>39832b72834970eedd6eb6f32321af0d2b1bc5a7  | no | 9  |
| <b>Warnings:</b>    |                   |                               |   |    |    |
| <b>Information:</b> |                   |                               |   |    |    |
| 9                   | Foreign Reference | 24_WO96007981A1.pdf           | 2408614<br>b2a6b277055683c217212938d3009a3ef83de454 | no | 50 |
| <b>Warnings:</b>    |                   |                               |   |    |    |
| <b>Information:</b> |                   |                               |   |    |    |
| 10                  | NPL Documents     | 25_CUI_1996.pdf               | 668495<br>2f057d626d747c4b8e2460f64df4af8d47d7ce1c  | no | 8  |
| <b>Warnings:</b>    |                   |                               |   |    |    |
| <b>Information:</b> |                   |                               |   |    |    |
| 11                  | NPL Documents     | 26_FOA_11_19_09.pdf           | 476611<br>155148bdf6ab6f40a37f30f84e33f3d8401e04e9  | no | 14 |
| <b>Warnings:</b>    |                   |                               |   |    |    |
| <b>Information:</b> |                   |                               |   |    |    |
| 12                  | NPL Documents     | 27_OA_8_25_09.pdf             | 216147<br>cdfb850c2f553800ef7366b9b2faec8223697a96  | no | 6  |
| <b>Warnings:</b>    |                   |                               |   |    |    |
| <b>Information:</b> |                   |                               |   |    |    |
| 13                  | NPL Documents     | 28_OA_9_2_09.pdf              | 387926<br>503d4b5ce37a80e8a44cda58c10cd0b2eed2ef5f  | no | 12 |
| <b>Warnings:</b>    |                   |                               |   |    |    |
| <b>Information:</b> |                   |                               |   |    |    |
| 14                  | NPL Documents     | 29_OA_10_5_09.pdf             | 465625<br>078a9d58d14866989b6af28cee773aa11159b9b8  | no | 14 |
| <b>Warnings:</b>    |                   |                               |   |    |    |
| <b>Information:</b> |                   |                               |   |    |    |

|                                     |                         |                    |  |    |    |
|-------------------------------------|-------------------------|--------------------|--|----|----|
| 15                                  | NPL Documents           | 30_OA_10_06_09.pdf | 756545<br>3882047206f5ae2ac4d94841fd2f724bbfe7d24    | no | 23 |
| <b>Warnings:</b>                    |                         |                    |  |    |    |
| <b>Information:</b>                 |                         |                    |  |    |    |
| 16                                  | NPL Documents           | 31_OA_10_14_09.pdf | 215277<br>9702edf67aecb7220b1b0323a3ebfe1759408de5   | no | 6  |
| <b>Warnings:</b>                    |                         |                    |  |    |    |
| <b>Information:</b>                 |                         |                    |  |    |    |
| 17                                  | NPL Documents           | 32_OA_10_29_09.pdf | 363246<br>34b008856bf1bfff25822c455f6560ab6738cf0a18 | no | 11 |
| <b>Warnings:</b>                    |                         |                    |  |    |    |
| <b>Information:</b>                 |                         |                    |  |    |    |
| 18                                  | NPL Documents           | 33_OA_10_30_09.pdf | 303714<br>07c1995f4ea51e4b40ced455c158c9297afd3956   | no | 9  |
| <b>Warnings:</b>                    |                         |                    |  |    |    |
| <b>Information:</b>                 |                         |                    |  |    |    |
| 19                                  | NPL Documents           | 34_OA_12_22_09.pdf | 181146<br>a32f1341804c7308498656b3794d00706b2ba5ff   | no | 6  |
| <b>Warnings:</b>                    |                         |                    |  |    |    |
| <b>Information:</b>                 |                         |                    |  |    |    |
| 20                                  | NPL Documents           | 35_OA_1_27_10.pdf  | 166516<br>5dlb58347ae960aa5e07c262455d974abaca947af  | no | 5  |
| <b>Warnings:</b>                    |                         |                    |  |    |    |
| <b>Information:</b>                 |                         |                    |  |    |    |
| 21                                  | NPL Documents           | 36_NOA_9_2_09.pdf  | 256346<br>efcd378b891e1f60ead0e654a4bfe6a41b3504de   | no | 5  |
| <b>Warnings:</b>                    |                         |                    |  |    |    |
| <b>Information:</b>                 |                         |                    |  |    |    |
| 22                                  | Fee Worksheet (PTO-875) | fee-info.pdf       | 30019<br>7387f51e647ad867a31a378d00051a7b41d57a78    | no | 2  |
| <b>Warnings:</b>                    |                         |                    |  |    |    |
| <b>Information:</b>                 |                         |                    |  |    |    |
| <b>Total Files Size (in bytes):</b> |                         |                    | 12510966   |    |    |

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

## Electronic Patent Application Fee Transmittal

|  |  |                 |               |                             |
|--|--|-----------------|---------------|-----------------------------|
| <b>Application Number:</b>                     | 11677958                                 |                 |               |                             |
| <b>Filing Date:</b>                            | 22-Feb-2007                              |                 |               |                             |
| <b>Title of Invention:</b>                     | Ellipse Fitting for Multi-Touch Surfaces |                 |               |                             |
| <b>First Named Inventor/Applicant Name:</b>    | Wayne Westerman                          |                 |               |                             |
| <b>Filer:</b>                                  | Gregory Scott Weaver/Lisa Bronk          |                 |               |                             |
| <b>Attorney Docket Number:</b>                 | 10684-25086.04                           |                 |               |                             |
| Filed as Large Entity                          |  |                 |               |                             |
| <b>Utility under 35 USC 111(a) Filing Fees</b> |  |                 |               |                             |
| <b>Description</b>                             | <b>Fee Code</b>                          | <b>Quantity</b> | <b>Amount</b> | <b>Sub-Total in USD(\$)</b> |
| <b>Basic Filing:</b>                           |  |                 |               |                             |
| <b>Pages:</b>                                  |  |                 |               |                             |
| <b>Claims:</b>                                 |  |                 |               |                             |
| <b>Miscellaneous-Filing:</b>                   |  |                 |               |                             |
| <b>Petition:</b>                               |  |                 |               |                             |
| <b>Patent-Appeals-and-Interference:</b>        |  |                 |               |                             |
| <b>Post-Allowance-and-Post-Issuance:</b>       |  |                 |               |                             |
| <b>Extension-of-Time:</b>                      |  |                 |               |                             |

| Description                             | Fee Code | Quantity | Amount | Sub-Total in USD(\$) |
|---|----------|----------|--------|----------------------|
| <b>Miscellaneous:</b>                   |          |          |        |                      |
| Submission- Information Disclosure Stmt | 1806     | 1        | 180    | 180                  |
| <b>Total in USD (\$)</b>                |          |          |        | <b>180</b>           |



NOTICE OF ALLOWANCE AND FEE(S) DUE

69753 7590 09/02/2009

APPLE C/O MORRISON AND FOERSTER ,LLP
LOS ANGELES
555 WEST FIFTH STREET SUITE 3500
LOS ANGELES, CA 90013-1024

EXAMINER
SHENG, TOM V
ART UNIT PAPER NUMBER

2629
DATE MAILED: 09/02/2009

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.

11/428,506 07/03/2006 WAYNE WESTERMAN 106842008604 4122

TITLE OF INVENTION: USER INTERFACE GESTURES

Table with 7 columns: APPLN. TYPE, SMALL ENTITY, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE

nonprovisional NO \$1510 \$300 \$0 \$1810 12/02/2009

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

- A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.
B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

- A. Pay TOTAL FEE(S) DUE shown above, or
B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

**PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
 Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
 or Fax (571)-273-2885**

**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

69753                      7590                      09/02/2009

**APPLE C/O MORRISON AND FOERSTER ,LLP  
 LOS ANGELES  
 555 WEST FIFTH STREET SUITE 3500  
 LOS ANGELES, CA 90013-1024**

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

|                    |
|--------------------|
| (Depositor's name) |
| (Signature)        |
| (Date)             |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 11/428,506      | 07/03/2006  | WAYNE WESTERMAN      | 106842008604        | 4122             |

TITLE OF INVENTION: USER INTERFACE GESTURES

| APPLN. TYPE    | SMALL ENTITY | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE   |
|----------------|--------------|---------------|---------------------|----------------------|------------------|------------|
| nonprovisional | NO           | \$1510        | \$300               | \$0                  | \$1810           | 12/02/2009 |

| EXAMINER     | ART UNIT | CLASS-SUBCLASS |
|--------------|----------|----------------|
| SHENG, TOM V | 2629     | 345-173000     |

|   |   |
|---|---|
| <p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. <b>Use of a Customer Number is required.</b></p> | <p>2. For printing on the patent front page, list</p> <p>(1) the names of up to 3 registered patent attorneys or agents OR, alternatively, _____ 1</p> <p>(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. _____ 2</p> <p>_____ 3</p> |
|---|---|

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE \_\_\_\_\_ (B) RESIDENCE: (CITY and STATE OR COUNTRY) \_\_\_\_\_

Please check the appropriate assignee category or categories (will not be printed on the patent) :  Individual  Corporation or other private group entity  Government

|   |   |
|---|---|
| <p>4a. The following fee(s) are submitted:</p> <p><input type="checkbox"/> Issue Fee</p> <p><input type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p> | <p>4b. Payment of Fee(s): (<b>Please first reapply any previously paid issue fee shown above</b>)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).</p> |
|---|---|

5. **Change in Entity Status** (from status indicated above)

a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.       b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

**NOTE:** The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature \_\_\_\_\_ Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_ Registration No. \_\_\_\_\_

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.**

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P. O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
11/428,506 07/03/2006 WAYNE WESTERMAN 106842008604 4122

Table with 1 column: EXAMINER

SHENG, TOM V

Table with 2 columns: ART UNIT, PAPER NUMBER

2629

DATE MAILED: 09/02/2009

69753 7590 09/02/2009
APPLE C/O MORRISON AND FOERSTER ,LLP
LOS ANGELES
555 WEST FIFTH STREET SUITE 3500
LOS ANGELES, CA 90013-1024

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 0 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 0 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

**Notice of Allowability**

|                                      |   |  |
|--------------------------------------|---|--|
| <b>Application No.</b><br>11/428,506 | <b>Applicant(s)</b><br>WESTERMAN ET AL. |  |
| <b>Examiner</b><br>TOM V. SHENG      | <b>Art Unit</b><br>2629                 |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

- 1.  This communication is responsive to amendment of 6/19/09.
- 2.  The allowed claim(s) is/are 3-10, 12-15 and 17-19.
- 3.  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a)  All    b)  Some\*    c)  None    of the:
    - 1.  Certified copies of the priority documents have been received.
    - 2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    - 3.  Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

- 4.  A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
  - 5.  CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
    - (a)  including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
      - 1)  hereto or 2)  to Paper No./Mail Date \_\_\_\_\_.
    - (b)  including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
- 6.  DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- 1.  Notice of References Cited (PTO-892)
- 2.  Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3.  Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date See Continuation Sheet
- 4.  Examiner's Comment Regarding Requirement for Deposit of Biological Material
- 5.  Notice of Informal Patent Application
- 6.  Interview Summary (PTO-413), Paper No./Mail Date \_\_\_\_\_.
- 7.  Examiner's Amendment/Comment
- 8.  Examiner's Statement of Reasons for Allowance
- 9.  Other \_\_\_\_\_.

/Richard Hjerpe/  
Supervisory Patent Examiner, Art Unit 2629

Continuation of Attachment(s) 3. Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date: 3/20/09,6/25/09,8/4/09,8/19/09.



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P. O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 11/428,522      | 07/03/2006  | WAYNE WESTERMAN      | 10684-20086.06      | 4146             |

69753 7590 01/27/2010  
APPLE C/O MORRISON AND FOERSTER ,LLP  
LOS ANGELES  
555 WEST FIFTH STREET SUITE 3500  
LOS ANGELES, CA 90013-1024

|          |
|----------|
| EXAMINER |
|----------|

SHAPIRO, LEONID

|          |              |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
|----------|--------------|

2629

|           |               |
|-----------|---------------|
| MAIL DATE | DELIVERY MODE |
|-----------|---------------|

01/27/2010

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                                      |   |  |
|------------------------------|--------------------------------------|---|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>11/428,522 | <b>Applicant(s)</b><br>WESTERMAN ET AL. |  |
|                              | <b>Examiner</b><br>Leonid Shapiro    | <b>Art Unit</b><br>2629                 |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 18 November 2009.
- 2a)  This action is **FINAL**.                      2b)  This action is non-final.
- 3)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4)  Claim(s) 1 and 3-20 is/are pending in the application.  
4a) Of the above claim(s) 11-15 is/are withdrawn from consideration.
- 5)  Claim(s) \_\_\_\_\_ is/are allowed.
- 6)  Claim(s) 1,3-10,16-22 is/are rejected.
- 7)  Claim(s) \_\_\_\_\_ is/are objected to.
- 8)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9)  The specification is objected to by the Examiner.
- 10)  The drawing(s) filed on \_\_\_\_\_ is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11)  The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a)  All    b)  Some \*    c)  None of:
1.  Certified copies of the priority documents have been received.
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 1,3-10,16-22 are rejected under 35 U.S.C. 102(e) as being anticipated by Bisset et al. (5,825,352).

As to claims 1,16-17,20, Bisset et al. teaches a method for tracking and identifying contacts on a touch surface in a sequence of proximity images (col. 1, lines 12-15), the method comprising:

scanning electrodes of a touch surface sensor panel (figs. 1-2, items 30,45, col. 5, lines 20-55, fig. 5, item 410) to form a proximity image of multiple touch contacts on the touch surface (fig. 3, items 85,90,95, col. 6, lines 26-37);

segmenting the proximity image a plurality of groups of electrodes, each group representing a distinguishable contact (fig. 5, items X,Y,430-440, col. 7, lines 10-47);

extracting from at least one group position from each group of electrodes (col. 7, lines 34-47);

scanning the electrodes of the touch surface sensor panel to form one or more successive proximity images of multiple touch contacts on the touch surface (figs. 3-4, items 85,90,95,100,105,110, col. 6, lines 27-58); and

tracking paths for the plurality of groups through the successive proximity images (fig. 5, items X,Y,460-495, from col. 7, line 57 to col. 8, line 3).

As to claims 3-6,8-9,18,22 Bisset et al. teaches tracking group paths through successive proximity images further comprises detection of one or more path endpoints corresponding to a contact touchdown or liftoff (fig. 5, items 460-495, col.7, lines 57-65).

As to claims 7,10,19,21 Bisset et al. teaches the estimates of contact positions provide feedback to segmentation and contact identification of future images (figs. 3-4, items 85,90,95,100,105,110, col. 6, lines 27-58).

### ***Response to Arguments***

2. Applicant's arguments with respect to claims 1,3-10,16-22 have been considered but are moot in view of the new ground(s) of rejection.

### ***Telephone inquire***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonid Shapiro whose telephone number is 571-272-7683. The examiner can normally be reached on 8 a.m. to 5 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Hjerpe can be reached on 571-272-7691. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

01/20/10  
/L. S./  
Examiner, Art Unit 2629

/Richard Hjerpe/  
Supervisory Patent Examiner, Art Unit 2629



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
11/559,833 11/14/2006 Wayne Westerman 106842508603 4733

69753 7590 12/22/2009
APPLE C/O MORRISON AND FOERSTER ,LLP
LOS ANGELES
555 WEST FIFTH STREET SUITE 3500
LOS ANGELES, CA 90013-1024

EXAMINER

AMADIZ, RODNEY

ART UNIT PAPER NUMBER

2629

MAIL DATE DELIVERY MODE

12/22/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

|                              |                                      |   |  |
|------------------------------|--------------------------------------|---|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>11/559,833 | <b>Applicant(s)</b><br>WESTERMAN ET AL. |  |
|                              | <b>Examiner</b><br>RODNEY AMADIZ     | <b>Art Unit</b><br>2629                 |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 14 November 2006.
- 2a)  This action is **FINAL**.                      2b)  This action is non-final.
- 3)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4)  Claim(s) 1-11 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5)  Claim(s) \_\_\_\_\_ is/are allowed.
- 6)  Claim(s) 1-5,8 and 9 is/are rejected.
- 7)  Claim(s) 6,7,10 and 11 is/are objected to.
- 8)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9)  The specification is objected to by the Examiner.
- 10)  The drawing(s) filed on 14 November 2006 is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11)  The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a)  All    b)  Some \*    c)  None of:
1.  Certified copies of the priority documents have been received.
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____.                                     |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>12/12/08, 3/27/09, 7/22/09, 9/28/09, 10/28/09</u> .           | 6) <input type="checkbox"/> Other: _____.                         |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-5, 8 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Prince (U.S. Patent 5,581,484—hereinafter “Prince”).

As to **Claim 1**, Prince teaches a method of computing a hand position offset from measured positions of individual hand parts on or near a multi-touch surface, the method comprising:

identifying each hand part (***Col. 7, lines 2-11 & Col. 8, lines 15-37***); and  
computing a hand position offset as an average of a difference between a measured position of each hand part and a default position of the hand part (***Col. 11, line 58—Col. 12, line 3 and Col. 14, lines 33-61***).

As to **Claim 2**, Prince teaches establishing an offset weighting for each hand part (***Col. 12, lines 48-62***); and

wherein computing the hand position offset comprises computing the hand position offset as a weighted average of a difference between a measured position of each hand part and a default position of the hand part (***Col. 11, line 58—Col. 12, line 3, Col. 12, lines 48-62 and Col. 14, lines 33-61***).

As to **Claim 3**, Prince teaches computing a finger position offset by subtracting a predetermined default position of the hand part and the hand position offset from a measured position of the hand part (**Col. 8, lines 39-47, Col. 11, line 58—Col. 12, line 3 and Col. 14, lines 33-61**).

As to **Claims 4 and 8**, Prince teaches computing an average of individual hand part velocities (**Col. 10, lines 12-43, Col. 11, lines 34-39 and Col. 14, lines 33-61**);

predicting current hand offset from one or more previous offsets and the computed average velocity (**Col. 10, lines 12-43 and Col. 14, lines 33-61**); and

updating the predicted hand offset to an average of the predicted offset and the computed offsets (**Col. 8, line 64—Col. 9, line 37 and Col. 14, lines 33-61**).

As to **Claims 5 and 9**, Prince teaches that one or more of the computed averages are weighted averages (**Col. 11, line 58—Col. 12, line 3, Col. 12, lines 48-62 and Col. 14, lines 33-61**).

#### **Allowable Subject Matter**

3. Claims 6, 7, 10 and 11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

4. The following is a statement of reasons for the indication of allowable subject matter: As to Claims 6 and 10, the prior art fails to teach or suggest, either alone or in combination " computing a confidence in hand part identifications; and giving increasing

Art Unit: 2629

weight to the computed offset used in updating the predicted hand offset as the computed confidence increases.”

### ***Inquiries***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RODNEY AMADIZ whose telephone number is (571)272-7762. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sumati Lefkowitz can be reached on (571) 272-3638. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2629

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Sumati Lefkowitz/  
Supervisory Patent Examiner, Art Unit 2629

/R. A./  
Examiner, Art Unit 2629  
12/5/09



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P. O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 11/428,503      | 07/03/2006  | WAYNE WESTERMAN      | 10684-20086.03      | 4119             |

69753 7590 10/30/2009  
APPLE C/O MORRISON AND FOERSTER ,LLP  
LOS ANGELES  
555 WEST FIFTH STREET SUITE 3500  
LOS ANGELES, CA 90013-1024

|          |
|----------|
| EXAMINER |
|----------|

AMADIZ, RODNEY

|          |              |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
|----------|--------------|

2629

|           |               |
|-----------|---------------|
| MAIL DATE | DELIVERY MODE |
|-----------|---------------|

10/30/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                                      |   |  |
|------------------------------|--------------------------------------|---|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>11/428,503 | <b>Applicant(s)</b><br>WESTERMAN ET AL. |  |
|                              | <b>Examiner</b><br>RODNEY AMADIZ     | <b>Art Unit</b><br>2629                 |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 01 July 2009.
- 2a)  This action is **FINAL**.                      2b)  This action is non-final.
- 3)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4)  Claim(s) 1-14 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5)  Claim(s) \_\_\_\_\_ is/are allowed.
- 6)  Claim(s) 1-14 is/are rejected.
- 7)  Claim(s) \_\_\_\_\_ is/are objected to.
- 8)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9)  The specification is objected to by the Examiner.
- 10)  The drawing(s) filed on \_\_\_\_\_ is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11)  The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a)  All    b)  Some \*    c)  None of:
1.  Certified copies of the priority documents have been received.
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |  |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date: _____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                        |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>7/1/09, 8/4/09, 8/19/09, 9/23/09</u> . | 6) <input type="checkbox"/> Other: _____.  |

## DETAILED ACTION

### *Claim Objections*

1. Claim 14/6 is objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim can not depend from any other multiple dependent claim (i.e. claim 6). See MPEP § 608.01(n). Accordingly, the claim has not been further treated on the merits.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Edwards (U.S. Patent 5,194,862—hereinafter “Edwards”).

As to **Claim 1**, Edwards teaches a multi-touch surface apparatus comprising:

a substrate (**Col. 4, lines 12-15**);

a two-dimensional array of sensing electrodes arranged on the substrate (**Fig. 1, 15**);

at least one power supply (**Fig. 1, 33**) connectable to a plurality of the sensing electrodes along a first direction of the two-dimensional array (**note orientation in Figure 1**);

at least one capacitor (**Fig. 3, 21**) connectable to a plurality of the sensing electrodes along a second direction of the two-dimensional array (**note orientation in Figure 3 and note that a plurality of sensing electrode are connected to each other**), the at least one capacitor arranged to accumulate charge transferred from the at least one power supply via one of the plurality of sensing electrodes (**Col. 5, lines 13-68**).

As to **Claim 2**, Edwards teaches control circuitry for energizing and reading each of the sensing electrodes (**Fig. 1, 33, 40, 41 and 43 and Fig. 7**).

As to **Claim 3**, Edwards teaches measurement circuitry to convert the transferred charge at each sensing electrode to a digital code representative of the capacitance of each sensing electrode (**Col. 7, line 52—Col. 8, line 6**).

As to **Claim 4**, Edwards teaches a multi-touch surface apparatus comprising:  
a substrate (**Col. 4, lines 12-15**);  
a two-dimensional array of sensing devices arranged on the substrate (**Fig. 1, 15**), each sensing device comprising:

two series connected switches (**switches 25 and 26**) having a common node (**Fig. 3, node B**), an input node (**node connecting to line 23**), and an output node (**node connecting to line 24**); and

a dielectric-covered sensing electrode (**15 and Col. 5, lines 50-55**) connected to the common node (**node B**);

wherein the input nodes of a plurality of sensing devices are coupled together along a first dimension of the two-dimensional array (**Fig. 1, note the input nodes of**

***the sensing devices are couple together through line 23)*** and the output nodes of a plurality of sensing devices are coupled together along a second dimension of the array ***(Fig. 1, note the output nodes of the sensing devices are couple together through line 24).***

As to **Claim 5**, Edwards teaches a multi-touch surface apparatus comprising:

a substrate ***(Col. 4, lines 12-15)***;

a two-dimensional array of sensing devices arranged on the substrate ***(Fig. 1, 15)***, each sensing device comprising:

a first switch ***(Fig. 3, switch 25)*** having first terminal ***(node connecting to line 23 and switch 25)*** and second terminals ***(node B)***, the first terminal being an input node adapted for connection to a power supply ***(Fig. 1, 33)***;

a second switch ***(Fig. 3, 26)*** having first terminal ***(node B)*** and second terminals ***(terminal at intersection of switch 26 and line 24)***, the first terminal being coupled to the second terminal of the first switch ***(See Fig. 3)***, and the second terminal being an output node adapted for connection to an output circuit ***(See Fig. 3)***;

wherein the input nodes of a plurality of sensing devices are coupled together along a first dimension of the two dimensional array ***(Fig. 1, note the input nodes of the sensing devices are couple together through line 23)*** and the output nodes of a plurality of sensing devices are coupled together along a second dimension of the array ***(Fig. 1, note the output nodes of the sensing devices are couple together through line 24).***

As to **Claim 6/4 and 6/5**, Edwards teaches a power supply (**Fig. 1, 33**) adapted for connection to the input nodes of the plurality of sensing devices coupled along the first dimension of the two dimensional array (**Fig. 1, note the input nodes of the sensing devices are couple together through line 23**); and a capacitor (**Fig. 3, 21**) coupled to the output node (**note orientation in Figure 3 and note that a plurality of sensing electrode are connected to each other through line 24 in Figure 1**) to accumulate charge transferred from the sensing electrode during multiple cycles of the switches (**Col. 5, lines 13-68**).

As to **Claim 7**, Edwards teaches control circuitry for sequentially enabling each of the sensor devices (**Fig. 1, 33, 40, 41 and 43 and Fig. 7**).

As to **Claim 8**, Edwards teaches measurement circuitry to convert charge transferred from each sensing device to a digital code representative of the capacitance at the sensing device (**Col. 7, line 52—Col. 8, line 6**).

As to **Claim 9/1, 9/4 and 9/5**, Edwards teaches the multi-touch surface being fabricated on or integrated with a display device (**See Abstract**).

As to **Claim 10**, Edwards teaches that the display device comprises one of a liquid crystal display (LCD) or a light-emitting polymer display (LPD) (**See Abstract**).

As to **Claim 11**, Edwards teaches the multi-touch surface being fabricated on or integrated with a display device (**See Abstract**).

As to **Claim 12**, Edwards teaches that the display device comprises one of a liquid crystal display (LCD) or a light-emitting polymer display (LPD) (**See Abstract**).

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Edwards in view of Faust (U.S. Patent 5,369,228—hereinafter “Faust”).

As to **Claim 13**, Edwards teaches a compliant dielectric layer disposed proximate the plurality of sensing electrodes (**15 and Col. 5, lines 50-55**). Edwards, however, fails to teach a multi-layer cover, the multi-layer cover comprising a deformable conductive layer disposed adjacent the compliant dielectric layer opposite the plurality of sensing electrodes; and a touch layer disposed adjacent the conductive layer opposite the compliant dielectric layer. Examiner cites Faust to teach a deformable conductive layer (**Fig. 1, 1**) disposed adjacent the compliant dielectric layer (**4**) opposite of sensing electrodes (**Fig. 1, 2, 13 and 15**); and a touch layer (**40**) disposed adjacent the conductive layer opposite the compliant dielectric layer (**See Fig. 1**). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to incorporate a multi-layer cover comprising a deformable conductive layer disposed adjacent the compliant dielectric layer opposite the plurality of sensing electrodes; and a touch layer disposed adjacent the conductive layer opposite the compliant dielectric

layer as taught by Faust in the multi-touch surface apparatus taught by Edwards in order to better protect the apparatus.

4. Claim 14/10-12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Edwards.

As to **Claim 14/10, 14/11 or 14/12**, Edwards fails to teach that the display device is configured to display visual indicators of hand configuration. Examiner takes Official Notice that display devices configured to display visual indicators of hand configurations are old and well-known. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have the display visual indicators of hand configurations in the multi-touch surface apparatus taught by Edwards in order to show the user how and/or where to place his/her hands.

### ***Inquiries***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RODNEY AMADIZ whose telephone number is (571)272-7762. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sumati Lefkowitz can be reached on (571) 272-3638. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/R. A./  
Examiner, Art Unit 2629  
10/23/09

/Sumati Lefkowitz/  
Supervisory Patent Examiner, Art Unit 2629



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P. O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 11/559,822      | 11/14/2006  | WAYNE WESTERMAN      | 106842508602        | 4716             |

69753 7590 10/29/2009  
APPLE C/O MORRISON AND FOERSTER ,LLP  
LOS ANGELES  
555 WEST FIFTH STREET SUITE 3500  
LOS ANGELES, CA 90013-1024

|          |
|----------|
| EXAMINER |
|----------|

AMADIZ, RODNEY

|          |              |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
|----------|--------------|

2629

|           |               |
|-----------|---------------|
| MAIL DATE | DELIVERY MODE |
|-----------|---------------|

10/29/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                                      |   |  |
|------------------------------|--------------------------------------|---|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>11/559,822 | <b>Applicant(s)</b><br>WESTERMAN ET AL. |  |
|                              | <b>Examiner</b><br>RODNEY AMADIZ     | <b>Art Unit</b><br>2629                 |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 10 December 2008.
- 2a)  This action is **FINAL**.
- 2b)  This action is non-final.
- 3)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4)  Claim(s) 43-67 is/are pending in the application.
  - 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5)  Claim(s) \_\_\_\_\_ is/are allowed.
- 6)  Claim(s) 43-67 is/are rejected.
- 7)  Claim(s) \_\_\_\_\_ is/are objected to.
- 8)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9)  The specification is objected to by the Examiner.
- 10)  The drawing(s) filed on 14 November 2006 is/are: a)  accepted or b)  objected to by the Examiner.
  - Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
  - Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11)  The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a)  All    b)  Some \*    c)  None of:
    - 1.  Certified copies of the priority documents have been received.
    - 2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    - 3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1)  Notice of References Cited (PTO-892)
- 2)  Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3)  Information Disclosure Statement(s) (PTO/SB/08)
  - Paper No(s)/Mail Date 12/12/08, 3/27/09, 7/21/09, 9/28/09.
- 4)  Interview Summary (PTO-413)
  - Paper No(s)/Mail Date. \_\_\_\_\_.
- 5)  Notice of Informal Patent Application
- 6)  Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Specification***

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

### ***Claim Objections***

2. Claim 60 is objected to because of the following informalities: On page 5, line 1, please change "indentifying" to "identifying". Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 52-59 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The disclosure provides no support for "A computer readable storage medium having stored therein instructions". The specification does not include a clear explanation of what the medium in the "computer readable medium having stored therein instructions" actually is. At best, the

specification describes a host computer system; however, the computer system is not said to have a computer readable medium having stored therein instructions".

***Claim Rejections - 35 USC § 101***

5. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 52-59 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The "computer readable medium" is not defined in the specification. Therefore, the specification does not limit the "computer readable medium" to only statutory subject matter and thus, the "computer readable medium" can encompass non-statutory subject matter.

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 43-64, 66 and 67 are rejected under 35 U.S.C. 102(b) as being anticipated by Yasutake (U.S. Patent 5,483,261--hereinafter "Yasutake").

As to **Claim 43**, Yasutake teaches a method of processing touch inputs on or near a touch sensitive surface (**Fig. 1, 105**), the surface having an associated array of sensors (**110**), the method comprising:

reading data from the touch surface to obtain at least a shape and position of at least two touch devices on or near the surface wherein the data is read to enable simultaneous detection of multiple distinguishable touch devices on the surface (**Col. 3, line 40—Col. 4, line 23**);

based on the data, simultaneously identifying and tracking contacts corresponding to the at least two touch devices (**Col. 4, lines 4-23**);

based on the identified contacts, determining at least one multi-point touch event (**Col. 4, lines 4-23, Col. 5, line 39—Col. 6, line 19**).

As to **Claim 44**, Yasutake teaches performing a computing operation associated with the touch event (**Col. 5, line 39—Col. 6, line 19**).

As to **Claim 45**, Yasutake teaches that the computing operation is associated with at least one of the operations of generating symbols, performing commands, and performing manipulation operations (**Col. 8, lines 38-47**).

As to **Claim 46**, Yasutake teaches that the at least two contacts occur synchronously upon the surface (**Fig. 4a-4c, i.e. two fingers**).

As to **Claim 47**, Yasutake teaches associating a graphical object to the touch event (**Fig. 2, 270, Fig. 4a, 420, 425, 430, 435, Fig. 4b, 465, 470, 475, Fig. 4c, 484, 486 and 488**).

As to **Claim 48**, Yasutake teaches displaying the graphical object (**Fig. 2, 270, Fig. 4a, 420, 425, 430, 435, Fig. 4b, 465, 470, and 475, Fig. 4c, 484, 486 and 488**).

As to **Claim 49**, Yasutake teaches displaying a graphical object and subsequently manipulating the graphical object based on the touch event (**Col. 5, line 39—Col. 6, line 19**).

As to **Claim 50**, Yasutake teaches determining at least two touch events based on the identified contacts (**Fig. 4a-4c and Col. 5, line 39—Col. 6, line 19**).

As to **Claim 51**, Yasutake teaches performing one of the at least two touch events while performing the other of the at least two touch events (**Fig. 4a and Col. 5, line 39—Col. 6, line 19**).

As to **Claim 52**, Yasutake teaches a computer readable storage medium having stored therein instructions, which when executed by a device with a touch surface, cause the device to (**See Figs. 1, 2 and 6**):

read data from the touch surface to obtain at least a shape and position of at least two touch devices on or near the surface wherein the data is read to enable simultaneous detection of multiple distinguishable touch devices on the surface (**Col. 3, line 40—Col. 4, line 23**);

based on the data, simultaneously identify and track contacts corresponding to the at least two touch devices (**Col. 4, lines 4-23**;

based on the identified contacts, determine at least one multi-point touch event (**Col. 4, lines 4-23, Col. 5, line 39—Col. 6, line 19**).

As to **Claim 53**, Yasutake teaches that the instructions further cause the device to perform a computing operation associated with the touch event (**Col. 5, line 39—Col. 6, line 19**).

As to **Claim 54**, Yasutake teaches that the instructions further cause the device to perform at least one of a computing operation including at least one of an operation for generating symbols, performing commands, and performing manipulation operations (**Col. 8, lines 38-47**).

As to **Claim 55**, Yasutake teaches that the instructions further cause the device to associate a graphical object to the touch event (**Fig. 2, 270, Fig. 4a, 420, 425, 430, 435, Fig. 4b, 465, 470, 475, Fig. 4c, 484, 486 and 488**).

As to **Claim 56**, Yasutake teaches that the instructions further cause the graphical object to be displayed (**Fig. 2, 270, Fig. 4a, 420, 425, 430, 435, Fig. 4b, 465, 470, 475, Fig. 4c, 484, 486 and 488**).

As to **Claim 57**, Yasutake teaches that the instructions further cause a graphical object to be displayed and subsequently cause the graphical object to be manipulated based on the touch event (**Col. 5, line 39—Col. 6, line 19**).

As to **Claim 58**, Yasutake teaches that the instructions further cause the device to determine at least two touch events based on the identified contacts (**Fig. 4a-4c and Col. 5, line 39—Col. 6, line 19**).

As to **Claim 59**, Yasutake teaches that one of the at least two touch events is performed on the touch surface while another of the at least two touch events is performed on the surface (**Fig. 4a and Col. 5, line 39—Col. 6, line 19**).

As to **Claim 60**, Yasutake teaches an apparatus including a touch surface having an associated array of sensors (**Fig. 1, 110**) comprising:

sensor data reader (**Fig. 1, 110**) for obtaining at least shape data and position data of at least two touch devices on or near the surface wherein the data is read to enable simultaneous detection of multiple distinguishable touch devices on the surface (**Col. 3, line 40—Col. 4, line 23**);

identifying and tracking module (**See Fig. 9**) for identifying and tracking contacts based on the data read from the touch surface corresponding to the at least two touch devices (**Fig. 9 and Col. 4, lines 4-23**);

touch event recognizer (**See Figs. 6 and 7**) for determining at least one touch event based on the identified and tracked contacts (**Col. 4, lines 4-23, Col. 5, line 39—Col. 6, line 19**).

As to **Claim 61**, Yasutake teaches that an operation is performed on a computing system in response to the touch event (**Col. 5, line 39—Col. 6, line 19**).

As to **Claim 62**, Yasutake teaches that the operation is associated with at least one of the operations of generating symbols, performing commands, and performing manipulation operations (**Col. 8, lines 38-47**).

As to **Claim 63**, Yasutake teaches that the contacts occur synchronously upon the surface (**Fig. 4a-4c, i.e. two fingers**).

As to **Claim 64**, Yasutake teaches a display screen (**Figs. 4a-4c, 260**) for enabling manipulating of graphical objects on the screen in response to the touch event

Art Unit: 2629

**(Fig. 2, 270, Fig. 4a, 420, 425, 430, 435, Fig. 4b, 465, 470, 475, Fig. 4c, 484, 486 and 488).**

As to **Claim 66**, Yasutake teaches that the recognizer determines at least two touch events based on the identified contacts **(Fig. 4a-4c and Col. 5, line 39—Col. 6, line 19)**.

As to **Claim 67**, Yasutake teaches a computing system **(Figs. 1, 2 and 6)** including a touch surface having an associated array of sensors, the system comprising:  
means for reading data from the touch surface to obtain at least a shape and position of at least two touch devices on or near the surface wherein the data is read to enable simultaneous detection of multiple distinguishable touch devices on the surface **(Col. 3, line 40—Col. 4, line 23)**;

means for simultaneously identifying and tracking contacts corresponding to the at least two touch devices based on the data read from the touch surface **(Col. 4, lines 4-23)**;

means for determining at least one multi-point touch event based on the identified contacts **(Col. 4, lines 4-23, Col. 5, line 39—Col. 6, line 19)**.

### **Claim Rejections - 35 USC § 103**

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 65 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yasutake.

As to Claim 65, Yasutake teaches a display panel displaying a graphical object and a touch surface manipulating the graphical object based on a touch event (**See Figs. 4a-4c**). Yasutake, however, fails to teach that the display means is embedded in the touch. Examiner takes Official notice that embedding a display means in a touch surface is old and well-known in the art (i.e. a touch panel). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to embed the display means with the touch surface in order to provide an integrated, compact apparatus.

### ***Inquiries***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RODNEY AMADIZ whose telephone number is (571)272-7762. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sumati Lefkowitz can be reached on (571) 272-3638. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2629

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Sumati Lefkowitz/  
Supervisory Patent Examiner, Art Unit 2629

/R. A./  
Examiner, Art Unit 2629  
10/23/09



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P. O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 11/428,501      | 07/03/2006  | WAYNE WESTERMAN      | 10684-20086.02      | 4116             |

69753 7590 10/14/2009  
APPLE C/O MORRISON AND FOERSTER ,LLP  
LOS ANGELES  
555 WEST FIFTH STREET SUITE 3500  
LOS ANGELES, CA 90013-1024

|          |
|----------|
| EXAMINER |
|----------|

AMADIZ, RODNEY

|          |              |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
|----------|--------------|

2629

|           |               |
|-----------|---------------|
| MAIL DATE | DELIVERY MODE |
|-----------|---------------|

10/14/2009

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

|                              |                                      |   |  |
|------------------------------|--------------------------------------|---|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>11/428,501 | <b>Applicant(s)</b><br>WESTERMAN ET AL. |  |
|                              | <b>Examiner</b><br>RODNEY AMADIZ     | <b>Art Unit</b><br>2629                 |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 01 July 2009.
- 2a)  This action is **FINAL**.                      2b)  This action is non-final.
- 3)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4)  Claim(s) 1-8 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5)  Claim(s) \_\_\_\_\_ is/are allowed.
- 6)  Claim(s) 1-8 is/are rejected.
- 7)  Claim(s) \_\_\_\_\_ is/are objected to.
- 8)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9)  The specification is objected to by the Examiner.
- 10)  The drawing(s) filed on \_\_\_\_\_ is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11)  The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a)  All    b)  Some \*    c)  None of:
1.  Certified copies of the priority documents have been received.
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |  |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                        |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>3/27/09, 7/1/09, 8/4/09, 8/19/09, 9/23/09</u> . | 6) <input type="checkbox"/> Other: _____.  |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 5 and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Edwards (U.S. Patent 5,194,862—hereinafter “Edwards”).

As to **Claim 1**, Edwards teaches a sensing device comprising: two series connected switches (***switches 25 and 26***) having a common node (***Fig. 3, node B***), an input node (***node connecting to line 23***), and an output node (***node connecting to line 24***); a dielectric-covered sensing electrode (***15 and Col. 5, lines 50-55***) connected to the common node (***node B***); a power supply (***Fig. 1, 33***) connected to the input node (***Fig. 3, 23, Col. 4, line 68—Col. 5, line 4***); and a capacitor (***21***) coupled to the output node to accumulate charge transferred from the sensing electrode during multiple cycles of the switches (***Col. 5, lines 13-68***).

As to **Claim 2**, Edwards teaches a reset switch (***Fig. 3, 19***) coupled across the capacitor (***Col. 5, lines 13-26***).

As to **Claim 5**, Edwards teaches a sensing device comprising: a power supply (***Fig. 1, 33***) coupled to a first terminal (***node connecting to line 23 and switch 25***) of a first switch (***Fig. 3, switch 25***) having a second terminal (***node B***); a second switch (***Fig. 3, 26***) having a first terminal coupled to the second terminal (***node B***) of the first

switch at a dielectric covered electrode **(15)**, the second switch further having second terminal **(node connecting to line 24)**; and a capacitor **(21)** coupled to the second terminal of the second switch to accumulate charge transferred from the power supply by operation of the first and second switches **(Col. 5, lines 13-68)**.

As to **Claim 6**, Edwards teaches a reset switch **(Fig. 3, 19)** coupled across the capacitor **(Col. 5, lines 13-26)**.

### **Claim Rejections - 35 USC § 103**

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 3, 4, 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edwards in view of Serrano (U.S. Patent 4,290,061—hereinafter “Serrano”).

As to **Claim 3**, Edwards fails to teach a translation device connected to the output node and the capacitor that produces an output representative of a proximity of an object to the sensing device. Examiner cites Serrano to teach a translation device connected to the output node of a sensing device **(Fig. 7, elements 118, 120 and 122)**. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to incorporate a translation device connected to the output node of a sensing device as taught by Serrano in the sensing device taught by Edwards in order to produce steady output levels **(Serrano—Col. 7, lines 60-68)**.

As to **Claim 7**, Edwards fails to teach a translation device connected to the capacitor, the translation device producing an output representative of a proximity of an object to the sensing device. Examiner cites Serrano to teach a translation device connected to the output of a sensing device (***Fig. 7, elements 118, 120 and 122***). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to incorporate a translation device connected to the output of a sensing device as taught by Serrano in the sensing device taught by Edwards in order to produce steady output levels (***Serrano—Col. 7, lines 60-68***).

As to **Claims 4 and 8**, Edwards teaches producing an output voltage representative of a charge accumulated on the sensing electrode (***Col. 5, lines 13-68***). Edwards, as modified by Serrano, however, fails to teach that the translation device is an integrator. Examiner takes Official Notice that integrators are old and well known in the art. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to replace the translation device taught by Edwards, as modified by Serrano, with an integrator in order to provide a simple low-pass filter.

***Inquiries***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RODNEY AMADIZ whose telephone number is (571)272-7762. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sumati Lefkowitz can be reached on (571) 272-3638. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Sumati Lefkowitz/  
Supervisory Patent Examiner, Art Unit 2629

/R. A./  
Examiner, Art Unit 2629  
10/8/09



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
11/559,763 11/14/2006 Wayne Westerman 10684-20086.09 4621

69753 7590 10/06/2009
APPLE C/O MORRISON AND FOERSTER ,LLP
LOS ANGELES
555 WEST FIFTH STREET SUITE 3500
LOS ANGELES, CA 90013-1024

EXAMINER

AMADIZ, RODNEY

ART UNIT PAPER NUMBER

2629

MAIL DATE DELIVERY MODE

10/06/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

|                              |                                      |   |  |
|------------------------------|--------------------------------------|---|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>11/559,763 | <b>Applicant(s)</b><br>WESTERMAN ET AL. |  |
|                              | <b>Examiner</b><br>RODNEY AMADIZ     | <b>Art Unit</b><br>2629                 |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 14 November 2006.
- 2a)  This action is **FINAL**.                      2b)  This action is non-final.
- 3)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4)  Claim(s) 1-26 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5)  Claim(s) \_\_\_\_\_ is/are allowed.
- 6)  Claim(s) 1-26 is/are rejected.
- 7)  Claim(s) \_\_\_\_\_ is/are objected to.
- 8)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9)  The specification is objected to by the Examiner.
- 10)  The drawing(s) filed on 14 November 2006 is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11)  The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a)  All    b)  Some \*    c)  None of:
1.  Certified copies of the priority documents have been received.
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |  |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                        |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>12/28/08, 3/27/09, 7/8/09</u> . | 6) <input type="checkbox"/> Other: _____.  |

## DETAILED ACTION

### *Specification*

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

### *Claim Objections*

2. Claim 16 is objected to because of the following informalities: In line 4, please change “velocities” to “velocities”. Appropriate correction is required.

### *Double Patenting*

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims 1-7 and 13-19 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3, 7, 11, 12, 16, 20-22, 26, 30, 31 and 35 of copending Application No. 11/559,799.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

| Claim 1 of Current Application 11/559,763  | Claim 1 of Application 11/559,799   |
|--|---|
| A method for extracting multiple degrees of freedom of hand motion from successive proximity images, the method comprising:    | A method for extracting multiple degrees of freedom of hand motion from successive proximity images, the method comprising: |
| tracking a plurality of contacts associated with a plurality of hand parts across the successive proximity images;             | tracking a plurality of contacts associated with a plurality of hand parts across the successive proximity images;          |
| finding an innermost finger contact and an outermost finger contact for a given hand from the plurality of contacts;           | finding an innermost finger contact and an outermost finger contact for a given hand from the plurality of contacts;        |
| computing a scaling velocity component from a change in a distance between the innermost and outermost finger contacts;<br>and | computing a scaling velocity component from a change in a distance between the innermost and outermost finger contacts;     |
|  | <u>supplementing the computed scaling</u>   |

|  |   |
|--|---|
|  | <u>velocity component with a measure of scaling velocity selective for symmetric scaling about a fixed point between a thumb and other fingers; and</u> |
| transmitting the computed scaling velocity component as a control signal to an electronic or electromechanical device. | transmitting the computed, <u>supplemented</u> scaling velocity component as a control signal to an electronic or electromechanical device.             |

Although the conflicting claims are not identical, they are not patentably distinct from each other because the scope of protection of Claim 1 of the '799 Application encompasses the scope of Claim 1 of '763 Application.

| Claim 5 of Current Application 11/559,763   | Claim 11 of Application 11/559,799  |
|---|---|
| A method for extracting multiple degrees of freedom of hand motion from successive proximity images, the method comprising: | A method for extracting multiple degrees of freedom of hand motion from successive proximity images, the method comprising: |
| tracking a plurality of contacts associated with a plurality of hand parts across the successive proximity images;          | tracking a plurality of contacts associated with a plurality of hand parts across the successive proximity images;          |
| finding an innermost finger contact and an  | finding an innermost finger contact and an  |

|  |   |
|--|---|
| outermost finger contact for a given hand from the plurality of contacts;  | outermost finger contact for a given hand from the plurality of contacts;   |
| computing a rotational velocity component from a change in a vector angle between the innermost and outermost finger contacts; and | computing a rotational velocity component from a change in a vector angle between the innermost and outermost finger contacts;  |
|  | <u>supplementing the computed rotational velocity component with a measure of rotational velocity selective for symmetric rotation about a fixed point between a thumb and other fingers; and</u> |
| transmitting the computed rotational velocity component as a control signal to an electronic or electromechanical device.          | transmitting the computed, <u>supplemented</u> rotational velocity component as a control signal to an electronic or electromechanical device.  |

Although the conflicting claims are not identical, they are not patentably distinct from each other because the scope of protection of Claim 11 of the '799 Application encompasses the scope of Claim 5 of '763 Application.

|   |                                    |
|---|------------------------------------|
| Claim 7 of Current Application 11/559,763 | Claim 16 of Application 11/559,799 |
|---|------------------------------------|

|  |   |
|--|---|
| A method for extracting multiple degrees of freedom of hand motion from successive proximity images, the method comprising:                | A method for extracting multiple degrees of freedom of hand motion from successive proximity images, the method comprising:                     |
| tracking a plurality of contacts associated with a plurality of hand parts across the successive proximity images;                         | tracking a plurality of contacts associated with a plurality of hand parts across the successive proximity images;                              |
| computing a translation weighting for each contact associated with a finger;   | computing a translation weighting for each contact associated with a finger;  |
| computing translational velocity components for each contact associated with a finger;   | computing translational velocity components for each contact associated with a finger;  |
| computing a translational velocity average from the computed translational velocity components and the computed translation weightings and | computing a translational velocity average from the computed translational velocity components and the computed translation weightings and      |
| transmitting the computed translational velocity average as a control signal to an electronic or electromechanical device.                 | transmitting the computed, <u>supplemented</u> translational velocity average as a control signal to an electronic or electromechanical device. |

Although the conflicting claims are not identical, they are not patentably distinct from each other because the scope of protection of Claim 16 of the '799 Application encompasses the scope of Claim 7 of '763 Application.

| Claim 13 of Current Application<br>11/559,763  | Claim 20 of Application 11/559,799   |
|--|--|
| A method for extracting multiple degrees of freedom of hand motion from successive proximity images representing successive scans of a plurality of proximity sensors of a multi-touch surface, the method comprising: | A method for extracting multiple degrees of freedom of hand motion from successive proximity images representing successive scans of a plurality of proximity sensors of a multi-touch surface, the method comprising: |
| tracking, through successive proximity images, a plurality of groups of pixels associated with a plurality of fingers on or near the multi-touch surface;  | tracking, through successive proximity images, a plurality of groups of pixels associated with a plurality of fingers on or near the multi-touch surface;  |
| <u>identifying a group of pixels corresponding to an innermost finger and a group of pixels corresponding to an outermost finger;</u>  | finding an innermost finger and an outermost finger for a given hand;  |
| computing a scaling velocity from a  | computing a scaling velocity from a  |

|  |  |
|--|--|
| change in a distance between the innermost and outermost fingers; and  | change in a distance between the innermost and outermost fingers;  |
|  | <u>supplementing the computed scaling velocity with a measure of scaling velocity selective for symmetric scaling about a fixed point between a thumb and other fingers of the given hand; and</u> |
| transmitting the computed scaling velocity as a control signal to an electronic or electromechanical device. | transmitting the computed, <u>supplemented</u> scaling velocity as a control signal to an electronic or electromechanical device.  |

Although the conflicting claims are not identical, they are not patentably distinct from each other because the scope of protection of Claim 20 of the '799 Application encompasses the scope of Claim 13 of '763 Application.

|   |   |
|---|---|
| Claim 17 of Current Application<br>11/559,763   | Claim 30 of Application 11/559,799  |
| A method for extracting multiple degrees of freedom of hand motion from successive proximity images representing successive scans of a plurality of proximity sensors of a multi-touch surface, the | A method for extracting multiple degrees of freedom of hand motion from successive proximity images representing successive scans of a plurality of proximity sensors of a multi-touch surface, the |

|  |   |
|--|---|
| method comprising:   | method comprising:  |
| tracking, through successive proximity images, a plurality of <u>groups of pixels</u> associated with a plurality of fingers <u>on or near the multi-touch surface</u> ; | tracking, through successive proximity images, a plurality of <u>contacts</u> associated with a plurality of fingers;   |
| <u>identifying a group of pixels corresponding to an innermost finger and a group of pixels corresponding to an outermost finger</u> ;                                   | finding an innermost finger and an outermost finger for a given hand;   |
| computing a rotational velocity from a change in angle between the innermost and outermost fingers; and  | computing a rotational velocity from a change in angle between the innermost and outermost fingers;   |
|  | <u>supplementing the computed rotational velocity with a measure of rotational velocity selective for symmetric rotation about a fixed point between a thumb and other fingers of the given hand; and</u> |
| transmitting the computed rotational velocity as a control signal to an electronic or electromechanical device.  | transmitting the computed, <u>supplemented</u> rotational velocity component as a control signal to an electronic or electromechanical device.  |

Although the conflicting claims are not identical, they are not patentably distinct from each other because the scope of protection of Claim 30 of the '799 Application encompasses the scope of Claim 17 of '763 Application.

| Claim 19 of Current Application<br>11/559,763  | Claim 35 of Application 11/559,799   |
|--|--|
| A method for extracting multiple degrees of freedom of hand motion from successive proximity images representing successive scans of a plurality of proximity sensors of a multi-touch surface, the method comprising: | A method for extracting multiple degrees of freedom of hand motion from successive proximity images representing successive scans of a plurality of proximity sensors of a multi-touch surface, the method comprising: |
| tracking, through successive proximity images, a plurality of <u>groups of pixels</u> associated with a plurality of fingers <u>on or near the multi-touch surface</u> ;   | tracking, through successive proximity images, a plurality of contacts associated with a plurality of fingers;   |
| computing a translation weighting for each finger;   | computing a translation weighting for each finger;   |
| computing a translational velocity for each finger;  | computing a translational velocity for each finger;  |
| computing a translational velocity average   | computing a translational velocity average   |

|  |   |
|--|---|
| from the computed translational velocities and the computed translation weightings;<br>and                                 | from the computed translational velocities and the computed translation weightings;<br>and  |
| transmitting the computed translational velocity average as a control signal to an electronic or electromechanical device. | transmitting the computed, <u>supplemented</u> translational velocity average as a control signal to an electronic or electromechanical device. |

Although the conflicting claims are not identical, they are not patentably distinct from each other because the scope of protection of Claim 35 of the '799 Application encompasses the scope of Claim 19 of '763 Application.

The following table indicates how the claims of the current application match with Application 11/559,799

| Current Application 11/559,763 | Application 11/559,799 |
|--------------------------------|------------------------|
| 2                              | 2                      |
| 3                              | 3                      |
| 4                              | 7                      |
| 6                              | 12                     |
| 14                             | 21                     |
| 15                             | 22                     |
| 16                             | 26                     |

|    |    |
|----|----|
| 18 | 31 |
|----|----|

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-7, 10, 13-19, 21 and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by Yasutake (U.S. Patent 5,483,261—hereinafter “Yasutake”).

As to **Claim 1**, Yasutake teaches a method for extracting multiple degrees of freedom of hand motion from successive proximity images, the method comprising:

tracking a plurality of contacts associated with a plurality of hand parts across the successive proximity images (***Col. 2, lines 15-45, Col. 3, lines 40-53 and Col. 4, lines 4-23***);

finding an innermost finger contact and an outermost finger contact for a given hand from the plurality of contacts (***See Figs. 1, 2 and 4a-4c***);

computing a scaling velocity component from a change in a distance between the innermost and outermost finger contacts (***Fig. 4c and Col. 5, 41-58 and Col. 6, lines 6-19***); and

transmitting the computed scaling velocity component as a control signal to an electronic or electromechanical device (**Col. 6, lines 6-19**).

As to **Claim 2**, Yasutake teaches computing a rotational velocity component from a change in a vector angle between the innermost and outermost finger contacts (**Fig. 4b and Col. 4, line 4-23, Col. 5, lines 5-23 and Col. 5, line 59—Col. 6, line 5**);

and transmitting the computed rotational velocity component as a control signal to an electronic or electromechanical device (**Fig. 4b and Col. 4, line 4-23, Col. 5, lines 5-23 and Col. 5, line 59—Col. 6, line 5**).

As to **Claims 3 and 4**, Yasutake teaches computing a translation weighting for each contact associated with a finger (**Fig. 4a, note that the translation weighting is the same for each contact**);

computing translational velocity components for each contact associated with a finger (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**);

computing a translational velocity average from the computed translational velocity components and the computed translation weightings (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**); and

transmitting the computed translational velocity average as a control signal to an electronic or electromechanical device (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**).

As to **Claim 5**, Yasutake teaches a method for extracting multiple degrees of freedom of hand motion from successive proximity images, the method comprising:

tracking a plurality of contacts associated with a plurality of hand parts across the successive proximity images (**Col. 2, lines 15-45, Col. 3, lines 40-53 and Col. 4, lines 4-23**);

finding an innermost finger contact and an outermost finger contact for a given hand from the plurality of contacts (**See Figs. 1, 2 and 4a-4c**);

computing a rotational velocity component from a change in a vector angle between the innermost and outermost finger contacts (**Fig. 4b and Col. 4, line 4-23, Col. 5, lines 5-23 and Col. 5, line 59—Col. 6, line 5**); and

transmitting the computed rotational velocity component as a control signal to an electronic or electromechanical device (**Fig. 4b and Col. 4, line 4-23, Col. 5, lines 5-23 and Col. 5, line 59—Col. 6, line 5**).

As to **Claim 6**, Yasutake teaches computing a translation weighting for each contact associated with a finger (**Fig. 4a, note that the translation weighting is the same for each contact**);

computing translational velocity components for each contact associated with a finger (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**);

computing a translational velocity average from the computed translational velocity components and the computed translation weightings (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**); and

transmitting the computed translational velocity average as a control signal to an electronic or electromechanical device (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**).

As to **Claim 7**, Yasutake teaches a method for extracting multiple degrees of freedom of hand motion from successive proximity images, the method comprising:

tracking a plurality of contacts associated with a plurality of hand parts across the successive proximity images (***Col. 2, lines 15-45, Col. 3, lines 40-53 and Col. 4, lines 4-23***);

computing a translation weighting for each contact associated with a finger (***Fig. 4a, note that the translation weighting is the same for each contact***);

computing translational velocity components for each contact associated with a finger (***Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58***);

computing a translational velocity average from the computed translational velocity components and the computed translation weightings (***Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58***) and

transmitting the computed translational velocity average as a control signal to an electronic or electromechanical device (***Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58***).

As to **Claim 10/1, 10/2, 10/3, 10/4, 10/5, 10/6 and 10/7**, Yasutake teaches transmitting an orientation of an ellipse fitted to a thumb contact to an electronic or electromechanical device (***See Figs. 7a, 18c, 18g and 18i***).

As to **Claim 13**, Yasutake teaches a method for extracting multiple degrees of freedom of hand motion from successive proximity images representing successive scans of a plurality of proximity sensors of a multi-touch surface, the method comprising:

tracking, through successive proximity images, a plurality of groups of pixels associated with a plurality of fingers on or near the multi-touch surface (**Col. 2, lines 15-45, Col. 3, lines 40-53 and Col. 4, lines 4-23**);

identifying a group of pixels corresponding to an innermost finger and a group of pixels corresponding to an outermost finger (**See Figs. 1, 2 and 4a-4c**);

computing a scaling velocity from a change in a distance between the innermost and outermost fingers (**Fig. 4c and Col. 5, 41-58 and Col. 6, lines 6-19**); and

transmitting the computed scaling velocity as a control signal to an electronic or electromechanical device (**Col. 6, lines 6-19**).

As to **Claim 14**, Yasutake teaches computing a rotational velocity from a change in angle between the innermost and outermost fingers (**Fig. 4b and Col. 4, line 4-23, Col. 5, lines 5-23 and Col. 5, line 59—Col. 6, line 5**); and

transmitting the computed rotational velocity as a control signal to an electronic or electromechanical device (**Fig. 4b and Col. 4, line 4-23, Col. 5, lines 5-23 and Col. 5, line 59—Col. 6, line 5**).

As to **Claims 15 and 16**, Yasutake teaches computing a translation weighting for each finger (**Fig. 4a, note that the translation weighting is the same for each contact**);

computing a translational velocity for each finger (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**);

computing a translational velocity average from the computed translational velocities and the computed translation weightings (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**); and

transmitting the computed translational velocity average as a control signal to an electronic or electromechanical device (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**).

As to **Claim 17**, Yasutake teaches method for extracting multiple degrees of freedom of hand motion from successive proximity images representing successive scans of a plurality of proximity sensors of a multi-touch surface, the method comprising:

tracking, through successive proximity images, a plurality of groups of pixels associated with a plurality of fingers on or near the multi-touch surface (**Col. 2, lines 15-45, Col. 3, lines 40-53 and Col. 4, lines 4-23**);

identifying a group of pixels corresponding to an innermost finger and a group of pixels corresponding to an outermost finger (**See Figs. 1, 2 and 4a-4c**);

computing a rotational velocity from a change in angle between the innermost and outermost fingers (**Fig. 4b and Col. 4, line 4-23, Col. 5, lines 5-23 and Col. 5, line 59—Col. 6, line 5**); and

transmitting the computed rotational velocity as a control signal to an electronic or electromechanical device (**Fig. 4b and Col. 4, line 4-23, Col. 5, lines 5-23 and Col. 5, line 59—Col. 6, line 5**).

As to **Claim 18**, Yasutake teaches computing a translation weighting for each finger (**Fig. 4a, note that the translation weighting is the same for each contact**);

computing a translational velocity for each finger (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**);

computing a translational velocity average from the computed translational velocities and the computed translation weightings (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**); and

transmitting the computed translational velocity average as a control signal to an electronic or electromechanical device (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**).

As to **Claim 19**, Yasutake teaches a method for extracting multiple degrees of freedom of hand motion from successive proximity images representing successive scans of a plurality of proximity sensors of a multi-touch surface, the method comprising:

tracking, through successive proximity images, a plurality of groups of pixels associated with a plurality of fingers on or near the multi-touch surface (**Col. 2, lines 15-45, Col. 3, lines 40-53 and Col. 4, lines 4-23**);

computing a translation weighting for each finger (**Fig. 4a, note that the translation weighting is the same for each contact**);

computing a translational velocity for each finger (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**);

computing a translational velocity average from the computed translational velocities and the computed translation weightings (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**); and

transmitting the computed translational velocity average as a control signal to an electronic or electromechanical device (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**).

As to **Claim 21/13, 21/14, 21/15, 21/16, 21/17, 21/18 and 21/19**, Yasutake teaches transmitting an orientation of an ellipse fitted to a thumb contact to an electronic or electromechanical device (**See Figs. 7a, 18c, 18g and 18i**).

As to **Claim 23/13, 23/14, 23/15, 23/16, 23/17, 23/18 and 23/19**, Yasutake teaches that at least one of the fingers is near but not on the multi-touch surface (**See Figs. 1, 2 and 4a-4c and Col. 2, lines 15-45, Col. 3, lines 40-53 and Col. 4, lines 4-23**).

### **Claim Rejections - 35 USC § 103**

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 8, 9, 11, 12, 20, 22 and 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasutake in view of Teterwak (U.S. Patent 5,837,947—hereinafter “Teterwak”).

As to **Claim 8**, Yasutake fails to teach filtering the computed velocity components prior to transmission. Examiner cites Teterwak to teach filtering the computed velocity components prior to transmission (*See Fig 4, elements 38, 40 and 42 and Col. 2, lines 35-67*). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to utilize the teachings of Teterwak, that is, filtering the computed velocity components prior to transmission in the method taught by Yasutake, in order to remove unwanted noise components (*Col. 2, lines 35-67*).

As to **Claim 9**, Yasutake, as modified by Teterwak, teaches downscaling each velocity component in proportion to a function of its average speed compared to other average component speeds (*Teterwak—Figs. 4-8 and Col. 5, line 31—Col. 8, line 55*); and

dead-zone filtering each downscaled velocity component wherein dead-zone width depends on distribution of current component speeds (*Teterwak—Figs. 4-8 and Col. 5, line 31—Col. 8, line 55*).

As to **Claims 11 and 12**, Yasutake teaches transmitting an orientation of an ellipse fitted to a thumb contact to an electronic or electromechanical device (*See Figs. 7a, 18c, 18g and 18i*).

As to **Claims 20 and 24**, Yasutake fails to teach filtering the computed velocities prior to transmission. Examiner cites Teterwak to teach filtering the computed velocities

prior to transmission (**See Fig 4, elements 38, 40 and 42 and Col. 2, lines 35-67**). At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to utilize the teachings of Teterwak, that is, filtering the computed velocities prior to transmission in the method taught by Yasutake, in order to remove unwanted noise components (**Col. 2, lines 35-67**).

As to **Claims 22, 25 and 26**, Yasutake teaches transmitting an orientation of an ellipse fitted to a thumb contact to an electronic or electromechanical device (**See Figs. 7a, 18c, 18g and 18i**).

### **Conclusion**

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

|                |                       |
|----------------|-----------------------|
| McAvinney      | U.S. Patent 4,746,770 |
| Speeter        | U.S. Patent 5,479,528 |
| Cipolla et al. | U.S. Patent 5,581,276 |
| Yasutake       | U.S. Patent 5,729,249 |
| Korth          | U.S. Patent 5,767,842 |
| Bisset et al.  | U.S. Patent 5,825,352 |
| Ure            | U.S. Patent 5,982,302 |
| Fujimoto       | U.S. Patent 6,061,177 |

***Inquiries***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RODNEY AMADIZ whose telephone number is (571)272-7762. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sumati Lefkowitz can be reached on (571) 272-3638. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Sumati Lefkowitz/  
Supervisory Patent Examiner, Art Unit 2629

/R. A./  
Examiner, Art Unit 2629  
9/26/09



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
11/559,799 11/14/2006 WAYNE WESTERMAN 106842508601 4683

69753 7590 10/05/2009
APPLE C/O MORRISON AND FOERSTER ,LLP
LOS ANGELES
555 WEST FIFTH STREET SUITE 3500
LOS ANGELES, CA 90013-1024

EXAMINER

AMADIZ, RODNEY

ART UNIT PAPER NUMBER

2629

MAIL DATE DELIVERY MODE

10/05/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

|                              |                                      |   |  |
|------------------------------|--------------------------------------|---|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>11/559,799 | <b>Applicant(s)</b><br>WESTERMAN ET AL. |  |
|                              | <b>Examiner</b><br>RODNEY AMADIZ     | <b>Art Unit</b><br>2629                 |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 14 November 2006.
- 2a)  This action is **FINAL**.                      2b)  This action is non-final.
- 3)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4)  Claim(s) 1-38 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5)  Claim(s) \_\_\_\_\_ is/are allowed.
- 6)  Claim(s) 1-38 is/are rejected.
- 7)  Claim(s) \_\_\_\_\_ is/are objected to.
- 8)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9)  The specification is objected to by the Examiner.
- 10)  The drawing(s) filed on 14 November 2006 is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11)  The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a)  All    b)  Some \*    c)  None of:
1.  Certified copies of the priority documents have been received.
2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |  |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                        |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>12/12/08, 3/27/09, 7/21/09</u> . | 6) <input type="checkbox"/> Other: _____.  |

### DETAILED ACTION

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

#### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 3-7, 12-19, 22-26 and 31-38 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 3, 7, 12, 22, 26 and 31 (lines 6 and 7) each state, "transmitting the computed, supplemented translational velocity average as a control signal to an electronic or electro-mechanical device." The claims do not state how the computed translational velocity average was supplemented. It is unclear as to the manner in which the translational velocity average is supplemented. The examiner will interpret "supplemented translational velocity average" as "translational velocity average".

Claim 16, lines 9-10 state, "transmitting the computed, supplemented translational velocity average as a control signal to an electronic or electro-mechanical device." The claim does not state how the computed translational velocity average was supplemented. It is unclear as to the manner in which the translational velocity average is supplemented. The examiner will interpret "supplemented translational velocity average" as "translational velocity average".

Claim 35, lines 10 and 11 state, "transmitting the computed, supplemented translational velocity average as a control signal to an electronic or electro-mechanical device." The claim does not state how the computed translational velocity average was supplemented. It is unclear as to the manner in which the translational velocity average is supplemented. The examiner will interpret "supplemented translational velocity average" as "translational velocity average".

Claims 4-6, 13-15, 17-19, 23-25, 32-34 and 36-38 depend upon claims 3, 12, 16, 22, 31 and 35 respectively and thus are also rejected.

4. Claim 22 recites the limitation "the computed translational velocity components" in lines 4 and 5. There is insufficient antecedent basis for this limitation in the claim. Please delete the word "components".

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3, 7, 11, 12, 16, 20-22, 26, 30, 31 and 35 are rejected under 35 U.S.C. 102(b) as being anticipated by Yasutake (U.S. Patent 5,483,261—hereinafter "Yasutake").

As to **Claim 1**, Yasutake teaches a method for extracting multiple degrees of freedom of hand motion from successive proximity images, the method comprising:

tracking a plurality of contacts associated with a plurality of hand parts across the successive proximity images (**Col. 2, lines 15-45, Col. 3, lines 40-53 and Col. 4, lines 4-23**);

finding an innermost finger contact and an outermost finger contact for a given hand from the plurality of contacts (**See Figs. 1, 2 and 4a-4c**);

computing a scaling velocity component from a change in a distance between the innermost and outermost finger contacts (**Fig. 4c and Col. 5, 41-58 and Col. 6, lines 6-19**); and

supplementing the computed scaling velocity component with a measure of scaling velocity selective for symmetric scaling about a fixed point between a thumb and other fingers (**Col. 8, line 65—Col. 9, line 36**); and

transmitting the computed, supplemented scaling velocity component as a control signal to an electronic or electromechanical device (**Col. 6, lines 6-19**).

As to **Claim 2**, Yasutake teaches computing a rotational velocity component from a change in a vector angle between the innermost and outermost finger contacts (**Fig. 4b and Col. 4, line 4-23, Col. 5, lines 5-23 and Col. 5, line 59—Col. 6, line 5**);

supplementing the computed rotational velocity component with a measure of rotational velocity selective for symmetric rotation about a fixed point between the thumb and other fingers (**Col. 8, line 65—Col. 9, line 36**); and

transmitting the computed, supplemented rotational velocity component as a control signal to an electronic or electromechanical device (**Fig. 4b and Col. 4, line 4-23, Col. 5, lines 5-23 and Col. 5, line 59—Col. 6, line 5**).

As to **Claims 3 and 7**, Yasutake teaches computing a translation weighting for each contact associated with a finger (**Fig. 4a, note that the translation weighting is the same for each contact**);

computing translational velocity components for each contact associated with a finger (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**);

computing a translational velocity average from the computed translational velocity components and the computed translation weightings (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**); and

transmitting the computed, supplemental translational velocity average as a control signal to an electronic or electromechanical device (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**).

As to **Claim 11**, Yasutake teaches a method for extracting multiple degrees of freedom of hand motion from successive proximity images, the method comprising:

tracking a plurality of contacts associated with a plurality of hand parts across the successive proximity images (**Col. 2, lines 15-45, Col. 3, lines 40-53 and Col. 4, lines 4-23**);

finding an innermost finger contact and an outermost finger contact for a given hand from the plurality of contacts (**See Figs. 1, 2 and 4a-4c**);

computing a rotational velocity component from a change in a vector angle between the innermost and outermost finger contacts (**Fig. 4b and Col. 4, line 4-23, Col. 5, lines 5-23 and Col. 5, line 59—Col. 6, line 5**);

supplementing the computed rotational velocity component with a measure of rotational velocity selective for symmetric rotation about a fixed point between a thumb and other fingers (**Col. 8, line 65—Col. 9, line 36**); and

transmitting the computed, supplemented rotational velocity component as a control signal to an electronic or electromechanical device (**Fig. 4b and Col. 4, line 4-23, Col. 5, lines 5-23 and Col. 5, line 59—Col. 6, line 5**).

As to **Claim 12**, Yasutake teaches computing a translation weighting for each contact associated with a finger (**Fig. 4a, note that the translation weighting is the same for each contact**);

computing translational velocity components for each contact associated with a finger (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**);

computing a translational velocity average from the computed translational velocity components and the computed translation weightings (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**); and

transmitting the computed, supplemented translational velocity average as a control signal to an electronic or electromechanical device (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**).

As to **Claim 16**, Yasutake teaches a method for extracting multiple degrees of freedom of hand motion from successive proximity images, the method comprising:

tracking a plurality of contacts associated with a plurality of hand parts across the successive proximity images (**Col. 2, lines 15-45, Col. 3, lines 40-53 and Col. 4, lines 4-23**);

computing a translation weighting for each contact associated with a finger (**Fig. 4a, note that the translation weighting is the same for each contact**);

computing translational velocity components for each contact associated with a finger (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**);

computing a translational velocity average from the computed translational velocity components and the computed translation weightings (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**) and

transmitting the computed, supplemented translational velocity average as a control signal to an electronic or electromechanical device (**Fig. 4a and Col. 4, lines 4-23 and Col. 5, lines 5-25 and 41-58**).

As to **Claim 20**, Yasutake teaches a method for extracting multiple degrees of freedom of hand motion from successive proximity images representing successive scans of a plurality of proximity sensors of a multi-touch surface, the method comprising:

tracking, through successive proximity images, a plurality of groups of pixels associated with a plurality of fingers on or near the multi-touch surface (**Col. 2, lines 15-45, Col. 3, lines 40-53 and Col. 4, lines 4-23**);

finding an innermost finger and an outermost finger for a given hand (**See Figs. 1, 2 and 4a-4c**);