COMPUTER GRAPHICS PROCESSING

- Three-dimensional
- Solid modelling
- Hidden line/surface determining
- Z buffer (depth buffer)
- Tessellation
- Voxel
- Lighting/shading
- Space transformation
- Adjusting level of detail

Attributes (surface detail or characteristic, display attributes)

- Texture
- Solid Texture
- Bump map
- Non-planar surface
- Mathematically defined
- MIP map
- Repeating pattern
- Color or intensity
- Gamut clipping or adjustment
- Color processing in perceptual color space
- Transparency (mixing color values)
- Color selection
- Using GUI
- Expert system or AI
- Dither or halftone
- Color
- Spatial
- Spatial

Color bit data modification or conversion

Using look up table

Plural look up tables

Format change (e.g., NTSC to RGB, RGB to composite, XYZ to RGB)

Color space transformation (e.g., RGB to YUV)

Change in number of bits for a designated color (e.g., 4 bits to 8 bits, 8 bits to 4 bits)

Interpolation of attribute values across object surface

In perspective

Tri-linear

Bi-linear

Linear

Anti-aliasing or image smoothing

Save attributes for each object affecting a given pixel

Subpixel processing

Pixel fragment

Convolving technique

Error diffusion

Contrast

Image with abnormal condition

Graphic manipulation (object processing or display attributes)

Clipping

Based on model of objects

Testing or using bounding shape (e.g., bounding box sphere)

Object clipped to view volume

Object clipped to another object

Based on image data

Masking

Non-rectangular array

Rectangular region

Merge or overlay

Combining model representations

Reducing redundancy

Placing generated data in real scene

Augmented reality (real-time)

Image based

Non-overlapping

Character and graphics

Priority based

Insertion of bitmapped moving picture

Weighted

Weights vary across image (e.g., transition from foreground to background)

Fixed overlay pattern

Picking

Arithmetic processing of image data

Matrix calculations

Hierarchy of transformations (e.g., hierarchy of global and local coordinate)

Morphing

Distortion

Affine
CLASS 345 COMPUTER GRAPHICS PROCESSING AND SELECTIVE VISUAL DISPLAY SYSTEMS

Rotation

...Graphical user interface tools

...Alignment functions (e.g., snapping, gravity)

...Constrained manipulations (e.g., movement in less than all dimensions)

...3D manipulations

...2D manipulations

...Object based

...Image based (addressing)

...By 90 degrees increment

...Image rotates in response to display device orientation

Scaling

...Graphical user interface tools

...Alignment functions (e.g., snapping, gravity)

...Constrained manipulations (i.e., movement in less than all dimensions)

...3D manipulations

...2D manipulations

...Object based

...Image based (addressing)

...By arbitrary ratio

...By integer multiples

...Reduction only

...Enlargement only

Translation

...Averaging technique

...Copying data to create additional rows or columns

...Graphical user interface tools

...Alignment functions (e.g., snapping, gravity)

...Constrained manipulations (i.e., movement in less than all dimensions)

...3D manipulations

...2D manipulations

...Object based

...Image based (addressing)

...Scrolling

...Sprite

...Alphanumeric

...Memory addressing

...Smooth or continuous

...Attribute changes during scrolling

Textual entry or display of manipulation information (e.g., enter or display degree of rotation)

Graph generating

...Real-time waveform display

...Bar graph

Shape generating

...Curve

...Straight line

Character generating

...Character geometry processing

...Character generation using control points or hints

Image rotates in response to display device orientation

...Character border

...Generating character fill data from outline data

Alteration of stored font

...Scaling

...Reduction only

...Enlargement only

...Calligraphic

...Motion planning or control

...Temporal interpolation or processing

DISPLAY PERIPHERAL INTERFACE INPUT DEVICE

.Cursor mark position control device

...Including orientation sensors (e.g., infrared, ultrasonic, remotely controlled)

...Having variable cursor speed

...Cursor key

...Joystick

...Positional storage means

...Mouse

...Rotatable ball detector

...Photosensor encoder

...Optical detector

...Trackball

...Including keyboard

...Portable (i.e., handheld, calculator, remote controller)

...Light source associated with each key

...Having foreign language capability (e.g., Japanese, Chinese)

...Having programmable function key

...Touch panel

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CLASS 345 COMPUTER GRAPHICS PROCESSING AND SELECTIVE VISUAL DISPLAY SYSTEMS

174 ..Including impedance detection 175 ..Including optical detection 176 ..Transparent substrate having light entrapment capability (i.e., waveguides) 177 ..Including surface acoustic detection 178 ..With alignment or calibration capability (i.e., parallax problem) 179 .Stylus 180 .Light pen for CRT display 181 .CRT having tracking capability 182 .Light pen for fluid matrix display panel 183 .Light pen for controlling plural light-emitting display elements (e.g., LED, lamps) 184 .Mechanical control (e.g., rotatable knob, slider)

COMPUTER GRAPHIC PROCESSING SYSTEM

501 .Plural graphics processors 502 .Coprocessor (e.g., graphic accelerator) 503 .Master-slave processors 504 .Parallel processors (e.g., identical processors) 505 .Pipeline processors 506 .Integrated circuit (e.g., single chip semiconductor device) 507 .Interface (e.g., controller) 508 .Graphic command processing

COMPUTER GRAPHICS DISPLAY MEMORY SYSTEM


DISPLAY DRIVING CONTROL CIRCUITRY

204 .Physically integral with display elements 205 .Having common base or substrate 206 .Light detection means (e.g., with photodetector) 207 .Intensity or color driving control (e.g., gray scale) 208 .Temporal processing (e.g., pulse width variation over time)


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<td>Controller automatically senses monitor resolution</td>
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<td>...Graphic display</td>
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<td>...Character generator</td>
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<td>...Combined with storage means</td>
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<td>...Addressing</td>
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<td>...Delay line</td>
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**PLURAL PHYSICAL DISPLAY ELEMENT CONTROL SYSTEM (E.G., NON-CRT)**

Physically movable array
Optical means interposed in viewing path (e.g., filters, lens, etc.)
Segmented display elements
Seven segment display
Bar graph
Electroluminescent display elements
Gas discharge display segments (e.g., plasma)
Liquid crystal display segments
Light-emitting diode segments (LEDS)
Plural (e.g., stacked, adjacent)
Fluid light-emitting display elements (e.g., gas, plasma)
Controlling circuitry
Mask or electrode shape
Solid light-emitting display elements
Electroluminescent
Light-emitting diodes
Fluorescent elements
Light-controlling display elements
Electrochromic elements
Liquid crystal elements
Display element selection circuitry
Power supply generating circuitry
Specific waveform (e.g., square waveforms, sinusoidal)
Field period polarity reversal
55 Display elements arranged in matrix (e.g., rows and columns)
56 Image shifting means (i.e., traveling message)
57 Having endless belt or tape reader
58 Crosstalk elimination
59 Matrix for conveying alphanumeric data
60 Fluid light emitter (e.g., gas, liquid, or plasma)
61 Shifting means
62 Specified plasma coupling path
63 Intensity control
64 Liquid light emitter
65 Phosphor excited by fluid response
66 Particular discharge path
67 More than two electrodes per element
68 Means for combining selective and sustain signals
69 Resistor-diode arrangement
70 Including transformer
71 Electrode insulated from fluid medium
72 Color
73 Incandescent
74.1 Cathodoluminescent type
75.1 Vacuum fluorescent
75.2 Field emissive (e.g., FED, Spindt, microtip, etc.)
76 Electroluminescent
77 Brightness or intensity control
78 Having compensating pulse
79 Field period polarity reversal
80 Driving means integral to substrate
81 Optical addressing (e.g., photodetection)
82 Solid body light emitter (e.g., LED)
83 Color
84 Light-controlling display elements
85 Electroscopic (e.g., movable electrodes or electrostatic elements)
86 Magneto-optic
87 Liquid crystal display elements (LCD)
88 Color

89 Gray scale capability (e.g., halftone)
90 Control means at each display element
91 Diode or varistor
92 Thin film transistor (TFT)
93 Redundancy (e.g., plural control elements or electrodes)
94 Waveform generation
95 Three or more voltages
96 Field period polarity reversal
97 Ferroelectric liquid crystal elements
98 Specific display element control means (e.g., latches, memories, logic)
99 Particular timing circuit
100 Particular row or column control (e.g., shift register)
101 Data signal compensation in response to temperature
102 Backlight control
103 Grouped electrodes (e.g., matrix partitioned into sections)
104 Input/output liquid crystal display panel
105 Electrochromic elements
106 Thermochromic elements
107 Particle suspensions (e.g., electrophoretic)
108 Plural mechanically movable display elements
109 Having shutters
110 With motor or rotor driver means
111 With a permanent magnet placed on movable display elements

CROSS-REFERENCE ART COLLECTIONS

901 ELECTRONIC BOOK WITH DISPLAY
902 MENU DISPLAY
903 MODULAR DISPLAY
904 DISPLAY WITH FAIL/SAFE TESTING FEATURE
905 DISPLAY DEVICE WITH HOUSING STRUCTURE
947 FONT CHARACTER EDGE PROCESSING
ALTERATION OF STORED FONTS TO MAINTAIN FEATURE CONSISTENCY THROUGHOUT SCALED FONT

ANIMATION PROCESSING METHOD
..Sprite processing
..Key frame processing
..Simulation
..Geometric processing
..Quaternions
..Morphing
..Language driven animation
..Collision avoidance
..Object path adherence
..Iterative display of preconfigured images

FOREIGN ART COLLECTIONS

FOR 000 CLASS-RELATED FOREIGN DOCUMENTS

Any foreign patents or non-patent literature from subclasses that have been reclassified have been transferred directly to FOR Collections listed below. These Collections contain ONLY foreign patents or non-patent literature. The parenthetical references in the Collection titles refer to the abolished subclasses from which these Collections were derived.

PLURAL PHYSICAL DISPLAY ELEMENT CONTROL SYSTEM (E.G., NON-CRT)
(345/30)
..Display elements arranged in matrix (e.g., rows and columns) (345/55)
FOR 100 ..Cathodoluminescent type (345/74)
FOR 101 ..Vacuum fluorescent (345/75)
FOR 102 ..Memory (345/521)
FOR 103 ..Data manipulation (e.g., masking, interpolation) (345/523)
FOR 104 ..Logical operation (345/524)
FOR 105 ..Bit block transfer (345/525)
FOR 106 ..Data transfer between graphic system components (345/526)
FOR 107 DISPLAY STORAGE DEVICE (345/507)
FOR 108 ..Color memory (345/186)
FOR 109 ..Multiple planes (345/510)
FOR 143 ..Scrolling (345/123)
FOR 144 ..Alphanumeric (345/124)
FOR 145 ..Graphical (345/125)
FOR 146 ..Rotation (345/126)
FOR 147 ..Image size control (345/127)
FOR 148 ..Alphanumeric (345/128)
FOR 149 ..Reduction (345/129)
FOR 150 ..Enlargement (345/130)
FOR 151 ..Graphical (345/131)
FOR 152 ..Defined resolution (e.g., EGA, VGA) (345/132)
FOR 153 ..Graphic display (345/133)
FOR 154 ..Waveform display (e.g., oscilloscope type) (345/134)
FOR 155 ..Vector display (345/135)
FOR 156 ..With image smoothing control (e.g., anti-aliasing) (345/136)
FOR 157 ..Convolving technique (345/137)
FOR 158 ..Averaging technique (345/138)
FOR 159 ..Perspective (345/139)
FOR 160 ..Bar graph (345/140)
FOR 161 ..Character display (345/141)
FOR 162 ..Calligraphic (345/142)

COMPUTER GRAPHICS PROCESSING (345/418)

FOR 163 ..Character generating (345/467)
FOR 164 CURSOR MANIPULATION (345/145)
FOR 165 ..Menu selection (345/146)

DISPLAY ATTRIBUTE CONTROLLER (345/112)

FOR 166 ..Intensity control (e.g., gray scale) (345/147)
FOR 167 ..Temporal processing (e.g., pulse width variation over time) (345/148)
FOR 168 ..Spatial processing (e.g., patterns or subpixel configurations) (345/149)
FOR 169 ..Selectable color attributes (345/150)
FOR 170 ..Including optical means (345/151)
FOR 171 ..Designated subpixel arrangement (345/152)
FOR 172 ..Color bit data modification or conversion (345/153)
FOR 173 ..Format change (e.g., NTSC to RGB, RGB to composite, or XYZ to RGB) (345/154)
FOR 174 ..Change in number of bits for a designated color (e.g., 4 bits to 8 bits, 8 bits to 4 bits) (345/155)