1

1

7

7

1

7

7

ڪ

100

· Computer Graphics: is the science & art of Communicating visually via a computer's display & its interaction devices. · visual aspect of communication is usually in the Computer - to-human direction. in the human-to-computer direction is beginning to change visual duta is beginning to flow back to computer. · Building a graphics application: OUI work @ Some amount @ Rendering :

of modeling: making a picture

representation of shapes of Shapes.

fields play important role in Computer Corraphics. (1) Physics: modeling the way light interacts. (2 Mathematics: Describing shape & other things. 3 Human perception: understanding the visual System y Human - Computer interaction: " How people interact with pc. 5 Engineering: understanding & applying the Constraints of bandwidth, men_ 6 Graphic Design: Shares graphic's aim of Communication. * Caraphics (Area: O modeling: deals with mathematical specification of shapes & appearance properties in a way that Can be stored to pc. & Rendering: the creation of 3D models & shaded images 3 Animation: Create motion through sequences of images. (4) User interaction: interface between input devices & other Sen Sorge feedback-

E visualization: gives user insight into complex informations. Via visual display. E image processing: manipulation of 20 images prophics. B 3D Scanning: Uses range finding technology to create. Measured 2D Hodels. * Applications of Computer Graphics. G video games: 30 models & rendering Algorithms. B cartoons: 3D Models. G visual effects & animated films: use all Computer graphics test. G CAN /CAD: Computer aided manufacturing computer aided design. OUTELL * Simulation: used to simulate different systems. Providing design directing fault requirements. * Images: every image & figure displayed on any screen is made up of a group of small dots termed as pixel. - imaging can be 20 or 30 I mages captured by 3 ways.	(3) visual effects & animated films: use all Computer graphics teels (4) CAN /CAD: Computer - aided manufacturing Computer - aided design. oviol1 * Simulation: used to Simulate different Systems providing design detecting fault requirements. * Images: every image & figure displayed on any screen is made up of a group of Small dots termed as pixel. - imaging Can be 2D or 30		
E) 3D Scanning: Uses range finding technology to create measured 3D Hodols. ** Applications of Computer Graphics: (I video games: 3D models & rendering Algorithms. (E) Cartoons: 3D Models (E) Visual effects & animated films: use all Computer graphics technology. (E) CAM / CAD: (Computer - aided manufacturing. Computer - aided design. (Oviolation: used to simulate different systems providing design design design design design. - Enayes: - every image & figure displayed on any screen is made up of a group of small dots termed as pixel. - imaging Can be 2D or 3D - I mages captured by 3 ways.	(8) 3D Scanning: Uses range_finding technology to create measured 2D Hodols. * Applications of Computer Ciraphics. G video games: 3D models & rendering Algorithms. G Cartoons: 3D Models G visual effects & animated films: Use all Computer graphics tech a CAN /CAD: Computer aided manufacturing Computer aided design. ov[51] * Simulation: Used to Simulate different Systems providing design detecting fault requirements. * Images: every image & figure displayed on any screen is made up of a group of Small dots termed as pixel. imaging Can be 2D or 3D I mages captured by 3 ways optical objects Natural objects digital images.	5) virtual reality:	immerse the user into a 30 virtual world.
E) 3D Scanning: Uses range finding technology to create measured 3D Hodols. ** Applications of Computer Graphics: (I video games: 3D models & rendering Algorithms. (E) Cartoons: 3D Models (E) Visual effects & animated films: use all Computer graphics technology. (E) CAM / CAD: (Computer - aided manufacturing. Computer - aided design. (Oviolation: used to simulate different systems providing design design design design design. - Enayes: - every image & figure displayed on any screen is made up of a group of small dots termed as pixel. - imaging Can be 2D or 3D - I mages captured by 3 ways.	(8) 3D Scanning: Uses range_finding technology to create measured 2D Hodols. * Applications of Computer Ciraphics. G video games: 3D models & rendering Algorithms. G Cartoons: 3D Models G visual effects & animated films: Use all Computer graphics tech a CAN /CAD: Computer aided manufacturing Computer aided design. ov[51] * Simulation: Used to Simulate different Systems providing design detecting fault requirements. * Images: every image & figure displayed on any screen is made up of a group of Small dots termed as pixel. imaging Can be 2D or 3D I mages captured by 3 ways optical objects Natural objects digital images.	6 visualization	gives users insight into Complex information
E) 3D Scanning: Uses range finding technology to create measured 3D Hodols. ** Applications of Computer Graphics: (I video games: 3D models & rendering Algorithms. (E) Cartoons: 3D Models (E) Visual effects & animated films: use all Computer graphics technology. (E) CAM / CAD: (Computer - aided manufacturing. Computer - aided design. (Oviolation: used to simulate different systems providing design design design design design. - Enayes: - every image & figure displayed on any screen is made up of a group of small dots termed as pixel. - imaging Can be 2D or 3D - I mages captured by 3 ways.	(B) 3D Scanning: Uses range_finding technology to create measured 2D Hodols. * Applications of Computer Corraphics. G video games: 3D models & rendering Algorithms. G Cartoons: 3D Models G visual effects & animated films: Use all Computer graphics tech G CAN / CAD: Computer_aided manufacturing Computer_aided design. outsil * Simulation: Used to Simulate different systems providing design detecting fault requirements. * Images: every image & figure displayed on any screen is made up of a group of small dots termed as pixel. imaging Can be 2D or 3D I mages captured by 3 ways optical objects Natural objects digital images.	3 image processing:	manipulation of 20 images - graphics.
Applications of Computer Creaphics. C video games: 30 models & rendering Algorithms. C cartoons: 3D Models C visual effects & animated films: use all Computer Graphics teels C CAM/CAD: Computer-aided manufacturing Computer-aided design. oviall * Simulation: used to simulate different systems providing design detecting fault requirements. * Images: every image & figure displayed on any screen is made up of a group of small dots termed as pixel. imaging can be 20 or 30 I mages captured by 3 ways	Applications of Computer Coraphics. C video games: 30 models & rendering Algorithms. G Cartoons: 30 Models G visual effects & animated films: use all Computer graphics teels G CAM/CAD: Computer-aided manufacturing Computer-aided design. oviall * Simulation: used to simulate different systems providing design desocting fault requirements. * Images: every image & figure displayed on any screen is made up of a group of small dots termed as pixel. imaging can be 20 or 30 I mages captured by 3 ways optical objects Natural objects digital images	8 30 Scanning:	Uses range finding technology to create
(2) Cartoons: 3D Modets (3) visual effects & animated films: use all computer graphics tech (4) CAN / CAD: (5) Computer-aided manufacturing: Computer-aided design. (6) Outself: Outself: Computer-aided design. (7) Outself: Outsel	(3) visual effects & animated films: use all Computer graphics teels (4) CAM/CAD: (5) Computer - aided manufacturing computer - aided design. (6) CAM/CAD: (7) Computer - aided manufacturing computer - aided design. (8) Computer - aided manufacturing computer - aided design. (8) Computer - aided manufacturing computer - aided design. (8) Computer - aided design. (9) Computer - aided des		neasured 30 Hodels.
(2) Cartoons: 3D Modets (3) visual effects & animated films: use all computer graphics tech (4) CAN / CAD: (5) Computer-aided manufacturing: Computer-aided design. (6) Outself: Outself: Computer-aided design. (7) Outself: Outsel	(3) visual effects & animated films: use all Computer Graphics teels (3) visual effects & animated films: use all Computer Graphics teels (4) CAM/CAD: (5) Computer - aided manufacturing computer - aided design. (6) CAM/CAD: (7) Computer - aided design. (8) Computer - aided design. (8) Computer - aided design. (8) Computer - aided design. (9) Computer - ai	* Applications of C	emputer Graphics
(2) Cartoons: 3D Modets (3) visual effects & animated films: use all computer graphics tech (4) CAN / CAD: (5) Computer-aided manufacturing: Computer-aided design. (6) Outself: Outself: Computer-aided design. (7) Outself: Outsel	(3) visual effects & animated films: use all Computer Graphics teels (3) visual effects & animated films: use all Computer Graphics teels (4) CAM / CAD: (5) Computer - aided manufacturing Computer - aided design. (6) Outputer - aided manufacturing Computer - aided design. (7) Outputer - aided manufacturing Computer - aided design. (8) Outputer - aided manufacturing Computer - aided design. (8) Outputer - aided manufacturing Computer - aided design. (8) Outputer - aided manufacturing Computer - aided design. (9) Outputer - aided manufacturing Computer - aided design.	a video games:	30 models & rendering Algorithms.
(3) visual effects & animated films: use all Computer Graphics tech. (4) CAY /CAD: (5) Computer - aided manufacturing Computer - aided design. (6) ONDIT (7) Simulation: used to simulate different systems. (6) providing design detecting fault require ments. (7) I mages: (8) every inage & figure displayed on any screen is made up of a group of small dots termed as pixel. (8) imaging can be 2D or 3D I mages captured by 3 ways	(3) visual effects & animated films: use all Computer graphics tech. (4) CAN / CAD: Computer-aided manufacturing. Computer-aided design. oviall * Simulation: used to simulate different systems. providing design desecting fault requirements. * Images: every image & figure displayed on any screen is made up of a group of small dots termed as pixel. - imaging Can be 2D or 3D - Images captured by 3 ways optical objects Natural objects digital images.	(a) On Tanias	20 Modell
Computer-aided manufacturing Computer-aided design. oviall Simulation: used to simulate different systems. providing design design design design fault requirements. Finages: every image & figure displayed on any screen is made up of a group of small dots termed as pixel. imaging can be 20 or 30 I mages captured by 3 ways	Computer-aided manufacturing Computer-aided design. ov[5] ** Simulation: used to Simulate different Systems providing design detecting fault requirements. ** Images: every image & figure displayed on any screen is made up of a group of Small dots termed as pixel. - imaging can be 2D or 3D - Images captured by 3 ways optical objects Natural objects digital images	3 visual effects	& animated films: use all Computer graphics teel
Computer-aided manufacturing Computer-aided design. ov10-11 * Simulation: used to simulate different Systems providing design desociting fault requirements. * Images: every image & figure displayed on any screen is made up of a group of small dots termed as pixel. - imaging can be 20 or 30 I mages captured by 3 ways	Computer-aided manufacturing Computer-aided design. ovious * Simulation: used to simulate different systems. providing design desecting fault requirements. * Images: every image & figure displayed on any screen is made up of a group of small dots termed as pixel. imaging can be 20 or 30 I mages captured by 3 ways optical objects Natural objects digital images	W CON LOND.	
Simulation: used to Simulate different Systems. providing design descript fault requirements. Timages: every image & figure displayed on any screen is made up of a group of small dots termed as pixel. imaging can be 20 or 30 I mages captured by 3 ways	* Simulation: used to simulate different systems. providing design descript fault requirements. * Images: every image & figure displayed on any screen is made up of a group of small dots termed as pixel. imaging can be 20 or 30 Images captured by 3 ways optical objects Natural objects digital images	Computer - sided me	envlacturing computer-aided design.
- Images: - every image & figure displayed on any screen is made up of a group of small dots termed as pixel imaging can be 20 or 30 - Images captured by 3 ways	* Images: - every image & figure displayed on any screen is made up of a group of small dots termed as pixel. - imaging can be 2D or 3D - Images captured by 3 ways optical objects Natural objects digital important optical objects and objects.		
- Images: - every image & figure displayed on any Screen is made up of a group of small dots termed as pixel imaging can be 20 or 30 - Images captured by 3 ways	* Images: - every image & figure displayed on any screen is made up of a group of small dots termed as pixel. - imaging can be 2D or 3D - Images captured by 3 ways optical objects Natural objects digital implements.	* Simulation: Use	d to simulate different systems
- Images: - every image & figure displayed on any Screen is made up of a group of small dots termed as pixel imaging can be 20 or 30 - Images captured by 3 ways	* Images: - every image & figure displayed on any screen is made up of a group of small dots termed as pixel. - imaging can be 2D or 3D - Images captured by 3 ways optical objects Natural objects digital implements.		providing design detecting fault
- Images: - every image & figure displayed on any Screen is made up of a group of small dots termed as pixel imaging can be 20 or 30 - Images captured by 3 ways	* Images: - every image & figure displayed on any screen is made up of a group of small dots termed as pixel. - imaging can be 2D or 3D - Images captured by 3 ways optical objects Natural objects digital implements.		requirements.
- imaging can be 2D or 3D - Images captured by 3 ways	- imaging can be 20 or 30 - Images captured by 3 ways optical objects Natural objects digital images	and the silbert in the species of the state	
- imaging can be 2D or 3D - Images captured by 3 ways	- imaging can be 20 or 30 - Images captured by 3 ways optical objects Natural objects digital images	* Images:	
- imaging can be 2D or 3D - Images captured by 3 ways	- imaging can be 20 or 30 - Images captured by 3 ways optical objects Natural objects digital images	every image &	figure displayed on any screen is made
- I mages captured by 3 ways	- I mages captured by 3 ways optical objects Natural objects digital impe	up of a group	of small dots termed as pixel.
optical objects Natural objects digital impo	optical objects Natural objects digital impl	- imaging can b	ne 20 pr 30
optical objects Natural objects digital impl	optical objects Natural objects digital impl	- I mayes captur	ed by 3 ways
optical objects Natural objects digular imp	- 17 m		Nt al hista lists to
성으로 보다는 이 회장에서 이 경로 이 이 생활된 세종의 사용하면 시간 하는 이번 보다는 것이 되었다. 그런 이 사용을 통해 없는 것 <mark>하는 것이</mark> 다.	(Light)	optical objects	Natural objects digual imp

two types	
· digital images is a pictor	id representation of a 20 image or mat (Sequence of ones & Zeros).
in binary fo	ormat (Sequence of ones & Zeros).
The Confession Control of the Contro	the second secon
a vector	(i) Raster
- are created with vector	- are created with pixel-based
Soft-ware and are Common for	programs or Captured with a
images that will be applied onto	Camera or a Scanner
a physical product	more Common
- Used in CAD, engineering,	ipg, gif, png , used in w
30 graphics.	The state of the s
O'vector displays	2) Raster dis plays
(vector graphic)	(Raster graphics)
. Show images as a list of	show images as reclargular
the geometric shapes I lines,	arrays of pixels.
circles, triangles, rectangles 3	i flat-panel Computer or television
1- image Composed as Shapes	1 image composed as pixels
2 flicker when the number	2 Refresh process is independent
of primitives in the image	of the complexity of the
be Come too large	image.
3 Scan Conversion isn't	3 specified end points and
required.	must be Scan Converted int
4. Draw Continous & Smoth	4. Can draw Curves, polygons
lines	only by pixel approximati
5. Cost is higher	5_ less Cost
6 occupy less space	6 occupy more space > quality
7 SVG1, Eps. pdf, DXF	7. BMP, Tif, gif, JpG1

raster image. - are normally arranged in a regular 20 grid & are often represented using dots or squares. - identified by a pair integers giving Column number & row number (C, r) from left to - top to buttom
raster image. - are normally arranged in a regular 20 grid & are often represented using dots or Squares. - identified by a pair integers giving Column number & row number (C, r) from left to - top to buttom right (o) - bottom to top (operCal).
raster image. - are normally arranged in a regular 20 grid & are often represented using dots or Squares. - identified by a pair integers giving Column number & row number (C, r) from left to - top to buttom right (o) - bottom to top (operCal).
a regular 20 grid & are often represented using dots or Squares. identified by a pair integers giving Column number & row number (C, r) from left to
a regular 20 grid & are often represented using dots or Squares. identified by a pair integers giving Column number & row number (C, r) from left to
often represented using dots or Squares. identified by a pair integers giving Column number & row number (C, r) from left to
or Squares. identified by a pair integers giving Column number & row number (C, r) from left to -top to buttom ight (o) -bottom to top (operCal)
- identified by a pair integers giving column number & row number (C, r) from left to button ight (o) bottom to top (operCal)
giving Column number & row number (C, r) from left to -top to buttom right (o) -bottom to top (operCal).
rom left to top to buttom ight (o) - bottom to top (operCal).
right (o) - bottom to top (operCal).
right (0) - bottom to top (operCal).
* Rows & Columns numbers
identify a pixel, not a point.
x pixel contains many points.
5,2
> The intensity of each pixel is variable in Color Systems.
each pixel has red blue green.
- The resolution of a picture is based on the pixel counts of
that image
How Can we compute the coordinate of pixels from real
Coordinates of objects?
for XY Coordinate System are XL, XR, YT& YB. Left kight Top bottom
left Right Top bottom
PXL, PXR, PYT, PYB.
$*PXQ = PXL + \left(\frac{X_1 - XL}{XR - XL}\right) * (PXR - PXL)$
$px_2 = pyT + \left(\frac{y_1 - y_T}{y_B - y_T}\right) + \left(\frac{y_1 - y_T}{y_B - y_T}\right).$
/ Viens

$\frac{ex}{c}$
Suppose that you want to transform the point (3,5) from
XY Coordinates to the pixel Coordinates given that the horizontal & vertical limits: - L R T B
* For the pixel Coordinates are: 0,800,0 & 600
* for the XY coordinates are: 0,50,0 & 40
$X_{1} = 3$ $Y_{1} = 5$ $PXL = 0$ $PXR = 800$ $PYT = 0$ $PYB = 600$
$XL = 0 \qquad XR = 50 \qquad YT = 0 \qquad YB = 40$
$P_{XI} = P_{XL} + \left(\frac{X_{I} - X_{L}}{XR - X_{L}}\right) + \left(\frac{P_{XR} - P_{XL}}{P_{XR}}\right)$
$= 0 + \left(\frac{3-0}{50-0}\right) + \left(\frac{800-0}{2}\right) = \left[\frac{48}{3}\right]$
PX2 = PYT + (\frac{\fir}{\fin}}}}}}{\frac{\frac{\frac{\frac}\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac
= 0 + 150 - 01 + (600 - 0) = 75
$\frac{2}{40-0} + \frac{50-0}{40-0} + \frac{600-0}{275}$
(Px, Pxz) = (48, 75)
Coall