

# **CS421: Computer Graphics**



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# Computer Graphics

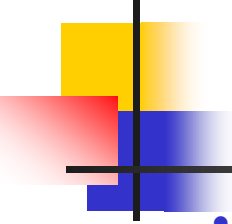
## Topics that we want to cover:

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- **Computer Graphics**
- Introduction: A Survey of Computer Graphics
- Definition
- Applications of Computer Graphics
  - CAD
  - Presentation Graphics
  - Computer Art
  - Entertainment
  - Education and Training
  - Visualization
  - Image Processing
  - GUI – Graphical User Interface

**Let us Start**

# Computer Graphics

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- Computer Graphics is the use of Computers
    - to **display** and **manipulate information** in graphical or
    - **pictorial form**,
    - either on a visual-display unit or
    - via a printer or a plotter.

## **Applications of Computer Graphics:**

- CAD (**C**omputer **A**ided **D**esign)
- Presentation Graphics
- Computer Art
- Entertainment
- Education and Training
- Visualization
- Image Processing
- GUI – **G**raphical **U**ser **I**nterface, etc.

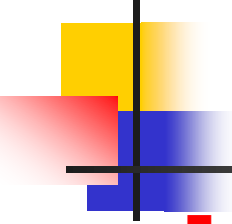


# Computer Aided Design (CAD)

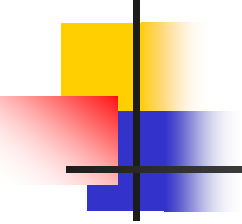
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- Animations are often used in **CAD applications**.
- **Real-time animations** using wire frame displays are useful for testing performance of a vehicle.
- **Wire frame models** allow the designer to see the interior parts of the vehicle during motion.
- When object designs are complete, **realistic lighting models** and **surface rendering** are applied.
- **Manufacturing process** of object can also be controlled through CAD (Computer Aided Design).
- **Interactive graphics methods** are used to layout the buildings.
- **3-D interior layouts** and **lighting** also provided.
- With **virtual-reality systems**, the designers can go for a simulated walk inside the building.

# Graphics Presentations

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- It is used to **produce illustrations for reports** or
    - to generate slide for with projections.
  - Examples of presentation graphics are:
    - **bar charts,**
    - **line graphs,**
    - **surface graphs,**
    - **pie charts** and
      - displays showing relationships between parameters.
  - **3-D graphics** can provide more attraction to the presentation.

# Computer Art

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- Computer graphics methods are widely used in both **fine art** and **commercial art** applications.
  - The artist uses a combination of
    - **3D modeling packages,**
    - **texture mapping,**
    - **drawing programs** and
    - **CAD software.**
  - “**Mathematical Art**” can be produced using mathematical functions, fractal procedures.
  - **Photorealistic techniques** are used to render images of a product.
  - **Animations** are also used frequently in advertising, and television commercials are produced frame by frame.



# Entertainment

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- Computer Graphics methods are now commonly used in making
  - **motion pictures,**
  - **music videos** and
  - **television shows.**
- Many TV series regularly employ computer graphics method.
- Graphics objects can be combined with a live action.



# Education and Training

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- Computer-generated models of
  - **physical,**
  - **financial** and
  - **economic systems** are often used as educational aids.
- For some **training applications, special systems are designed.** e.g. Training of ship captains, aircraft pilots etc.,
- Some simulators have no video screens, but most simulators provide graphics screen for visual operation.





# Visualization

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- The numerical and scientific data are converted
  - to a visual form for analysis and
  - to study the behavior called visualization.
- Producing graphical representation for scientific data sets are called **scientific visualization**.
- And **business visualization** is used to represent the data sets related to commerce and industry.
- The visualization can be either 2D or 3D.

# Image Processing



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- Computer graphics are used to create a picture.
- Image processing applies techniques to **modify** or **interpret** existing pictures.
- To apply image processing methods, the image must be digitized first.
- Medical applications also make extensive use of image processing techniques for
  - picture enhancements,
  - simulations of operations, etc.



# Graphical User Interface (GUI)

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- Now-a-days software packages provide **Graphics User Interface (GUI)** for the user to work easily.
- A major component in GUI is a **window**.
- Multiple windows can be opened at a time.
- To activate any one of the window, the user needs just to check on that window.
- **Menus** and **icons** are used for fast selection of processing operations.
- Icons are used as shortcut to perform functions.
- The advantages of icons are which takes less screen space.
- And some other interfaces like **text box**, **buttons**, and **list** are also used.



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**Thank you**