Unit III:

3-D geometric primitives-

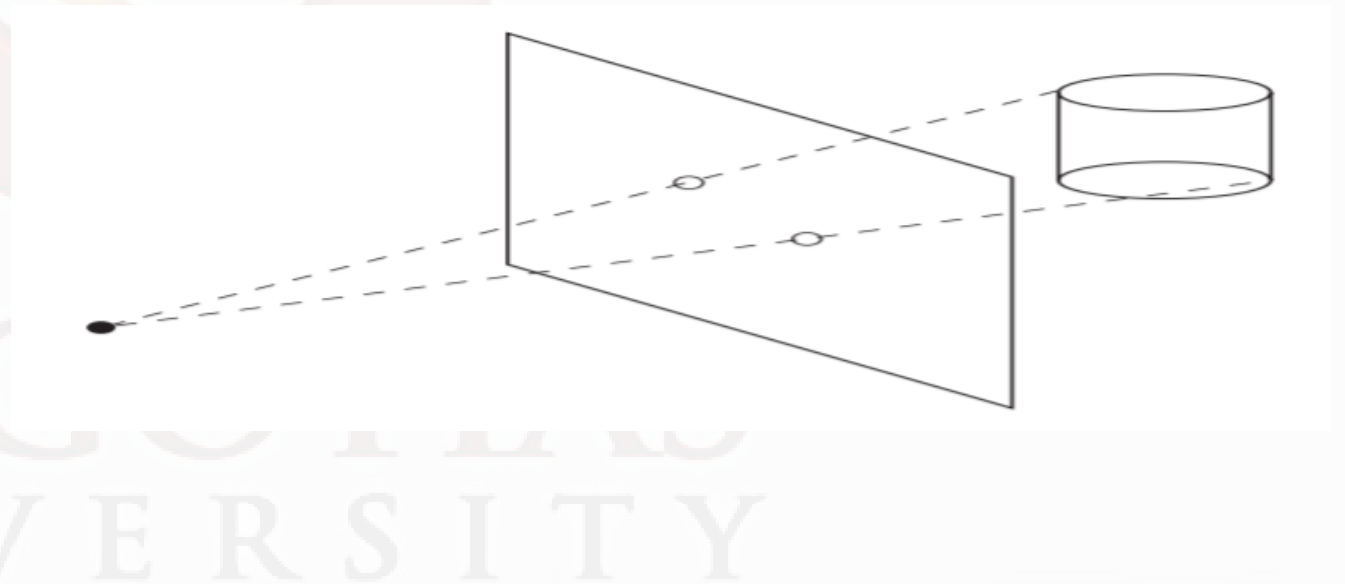Parallel Projection, Perspective Projection,

PROJECTION

Projections transform points in n-space to m-space, where m < n.

In 3D, we map points from 3-space to the **projection plane (PP)** along **projectors** emanating from the **center of projection (COP).**

There are two basic types of projections:

- **Perspective** - distance from COP to PP finite
- **Parallel** - distance from COP to PP infinite

Perspective vs. parallel projections

Perspective projections pros and cons:

+ Size varies inversely with distance-looks realistic

– Distance and angles are not (in general) preserved

– Parallel lines do not (in general) remain parallel

Parallel projection pros and cons:

– Less realistic looking

+ Good for exact measurements

+ Parallel lines remain parallel

– Angles not (in general) preserved

PROJECTION

Types of perspective drawing

Perspective drawings are often classified by the number of principal vanishing points.

- One-point perspective — simplest to draw
- Two-point perspective — gives better impression of depth
- Three-point perspective — most difficult to draw

All three types are equally simple with computer graphics

Parallel projections

For parallel projections, we specify a **direction of projection (DOP)** instead of a COP.

There are two types of parallel projections:

*   **Orthographic projection** — DOP perpendicular to PP
*   **Oblique projection** — DOP not perpendicular to PP

There are two especially useful kinds of oblique projections:

*   **Cavalier projection**
    *   DOP makes 45° angle with PP
    *   Does not foreshorten lines perpendicular to PP
*   **Cabinet projection**
    *   DOP makes 63.4° angle with PP
    *   Foreshortens lines perpendicular to PP by one-half
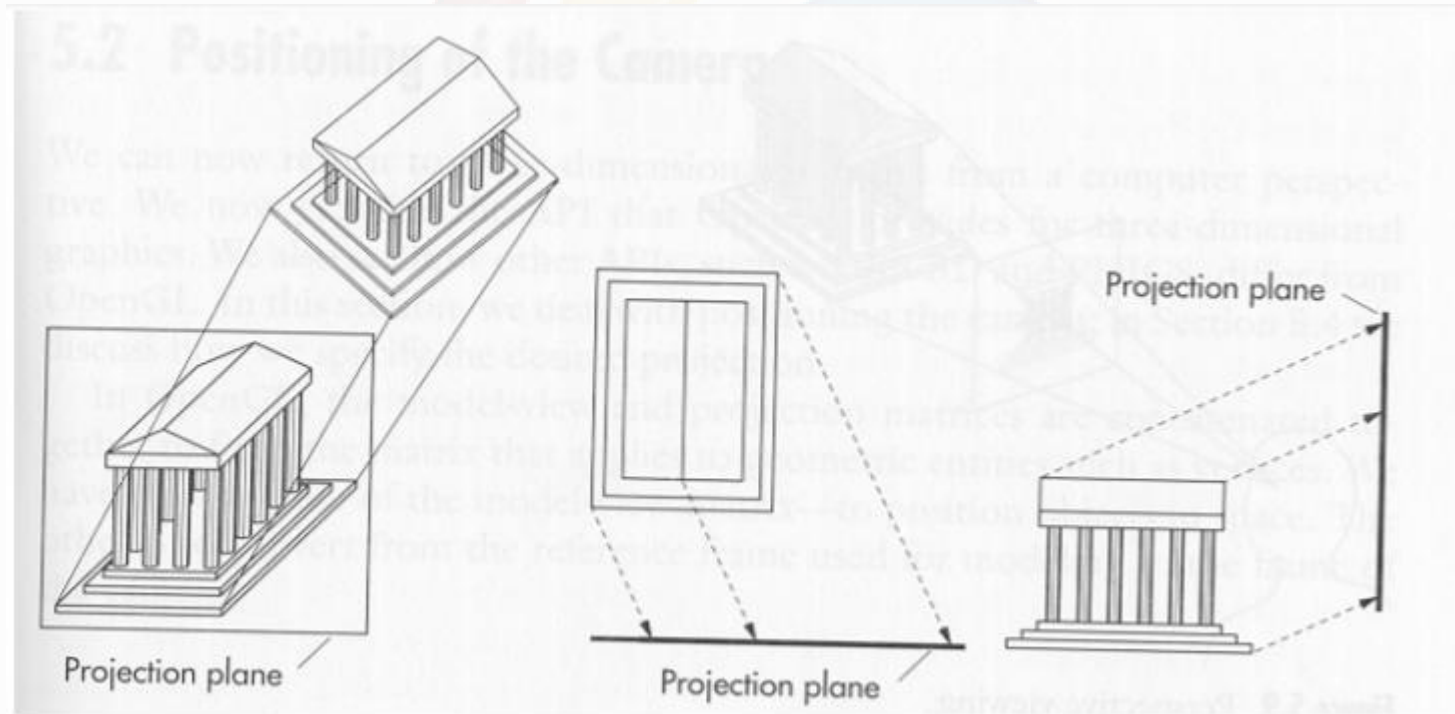
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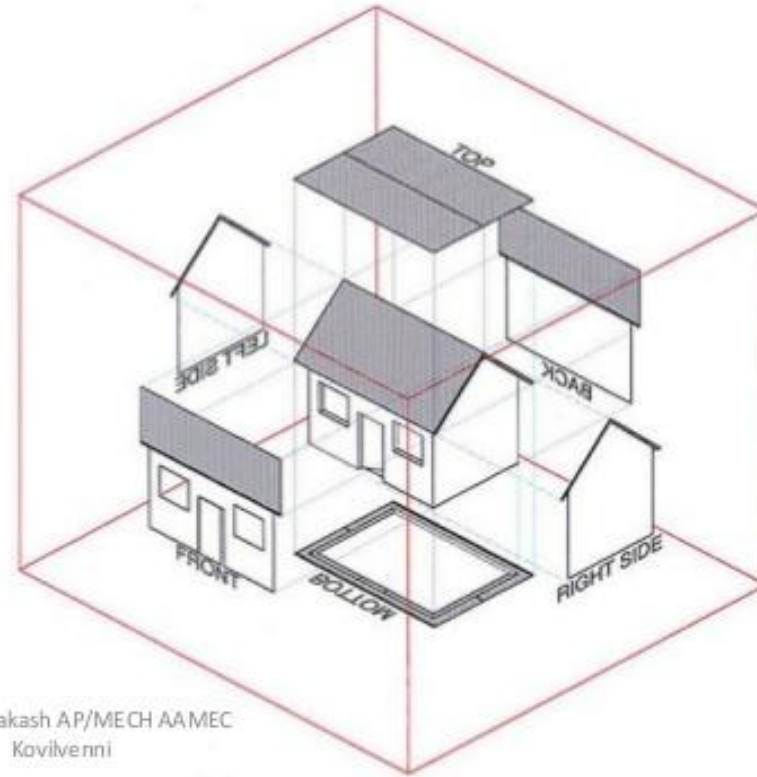
Ravi Sivaprakash AP/MECH AAMEC
Kovilvenni

Oblique Projections

Projection taxonomy
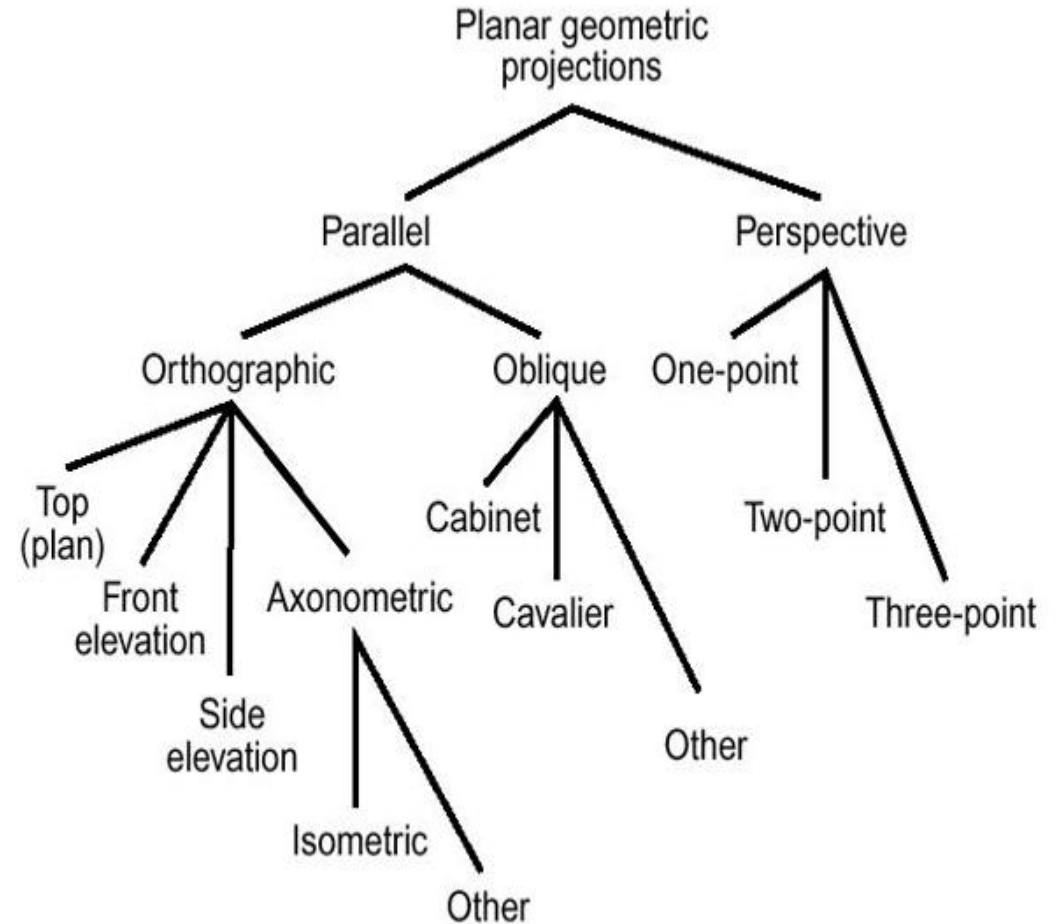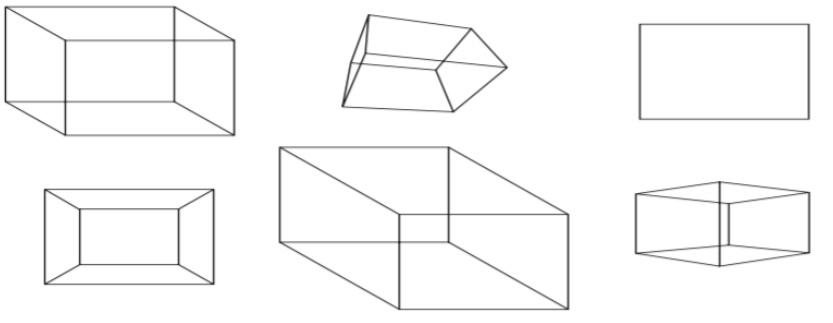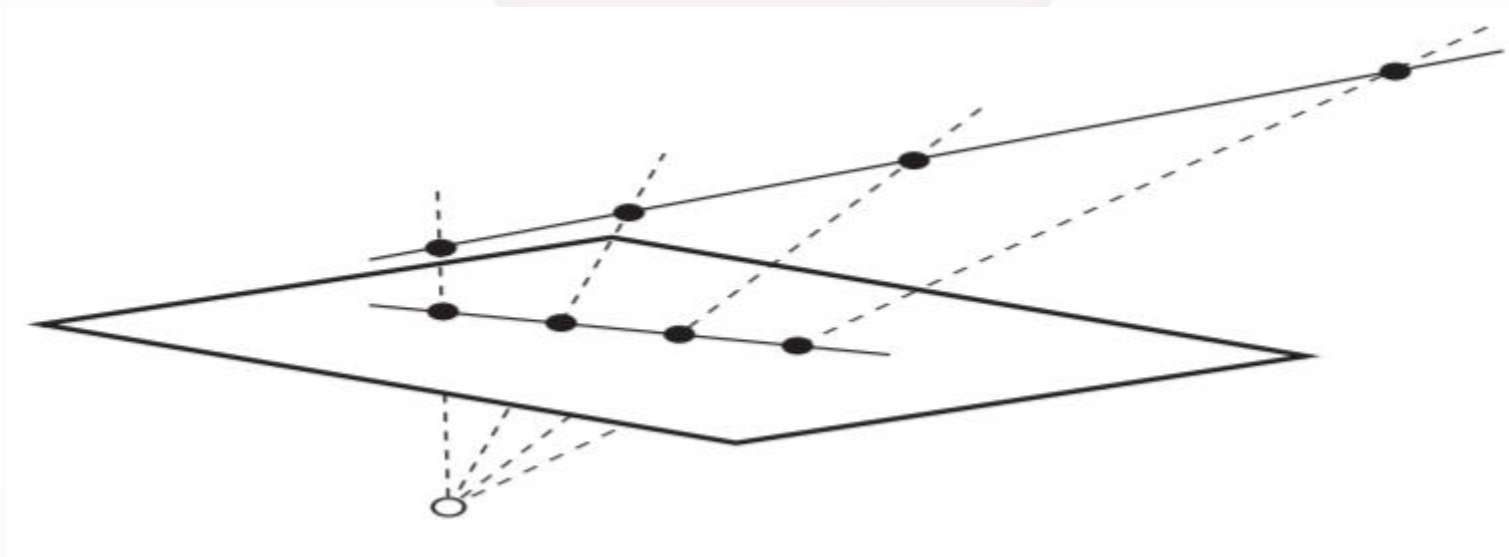
Properties of projections

The perspective projection is an example of a **projective transformation.**

Here are some properties of projective transformations:

- Lines map to lines

- Parallel lines don't necessarily remain parallel

- Ratios are not preserved

Recommended Books

Text books

      1. Donald Hearn and M Pauline Baker, "Computer Graphics C Version", Pearson Education

Reference Books

      1. Amrendra N Sinha and Arun D Udai," Computer Graphics", TMH16

      2. Steven Harrington, "Computer Graphics: A Programming Approach" , TMH

      3. Rogers, " Procedural Elements of Computer Graphics", McGraw Hill

Additional online materials

- https://www.tutorialspoint.com/computer_graphics/

- https://www.inf.ed.ac.uk/teaching/courses/cg/index2018.html

- https://nptel.ac.in/courses/106106090/