

Introduction to CG (16/01/24) Lecture-2

15 January 2024 13:56

Main Source:

I. Major Applications: Various sources from internet

II. Digital image fundamentals: Digital Image Processing, 4th edition,
Book by Rafael C. Gonzalez and Richard E. Woods

Computer Graphics: Creation and manipulation of images using computers.

I. Major Applications:

1. Visual Effects (VFX):

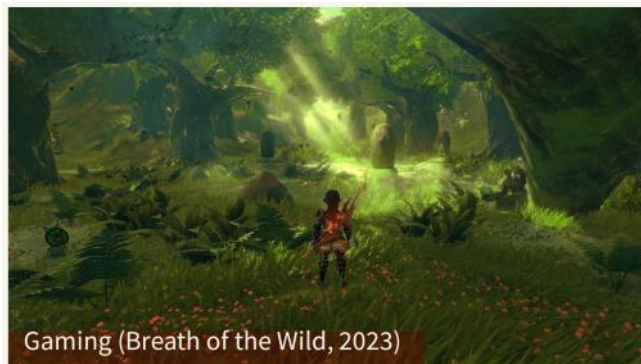


2. Animation





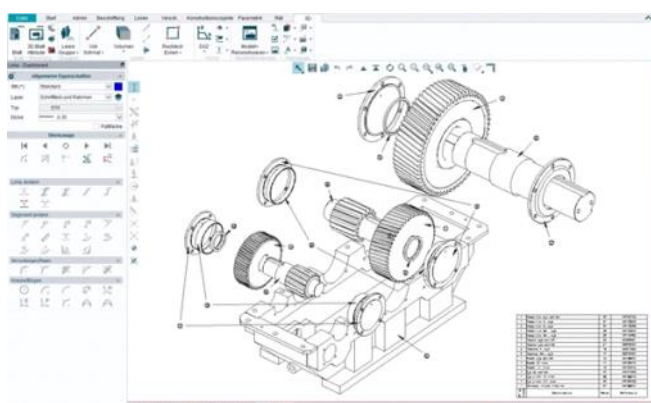
3. Gaming



Gaming (Breath of the Wild, 2023)



4. Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM)



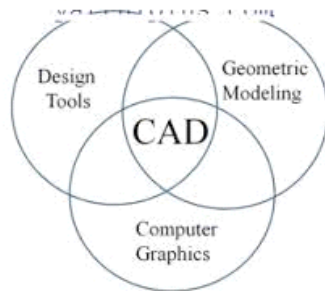
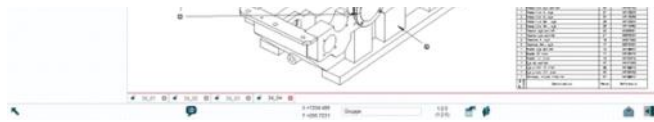
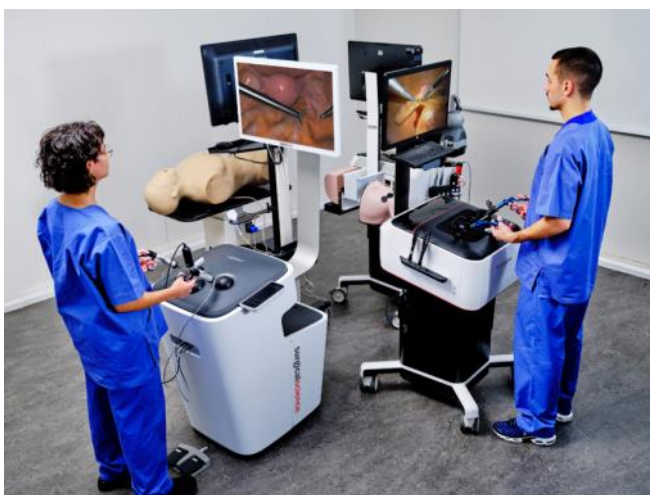


Fig. 1.4. CAD

5. Simulations



6. Medical Procedures



7. Virtual Reality

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8. More recently:

--> CycleNet: <https://hbertiche.github.io/CycleNet/>

--> Controllable Animations: <https://controllable-cinemagraphs.github.io/>

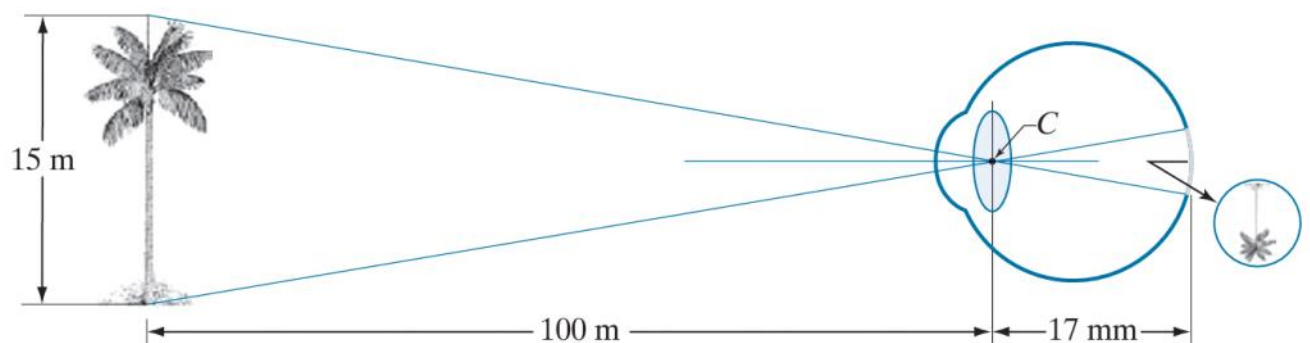
Discussion:

1. Miscellaneous Math --> Recap within the course.

2. C v/s Python

II. Digital Image Fundamentals

Image formation in the eye



The human eye works like a sophisticated biological camera, skilfully capturing and understanding the visual world. Light, with its different colours and brightness levels, enters through the clear cornea and passes through the lens inside the eye. This complex interaction of optics allows the eye to focus and project a clear image onto the retina at the back. The retina has millions of light-sensitive cells, called rods for low-light vision and cones for colour perception in bright light. When light hits these cells, it starts chemical reactions that create electrical signals. These signals travel through the optic nerve to the brain, where intricate processing constructs the visual experience. The brain combines information from both eyes to create a 3D and dynamic representation of the scene.

Digital Image Acquisition

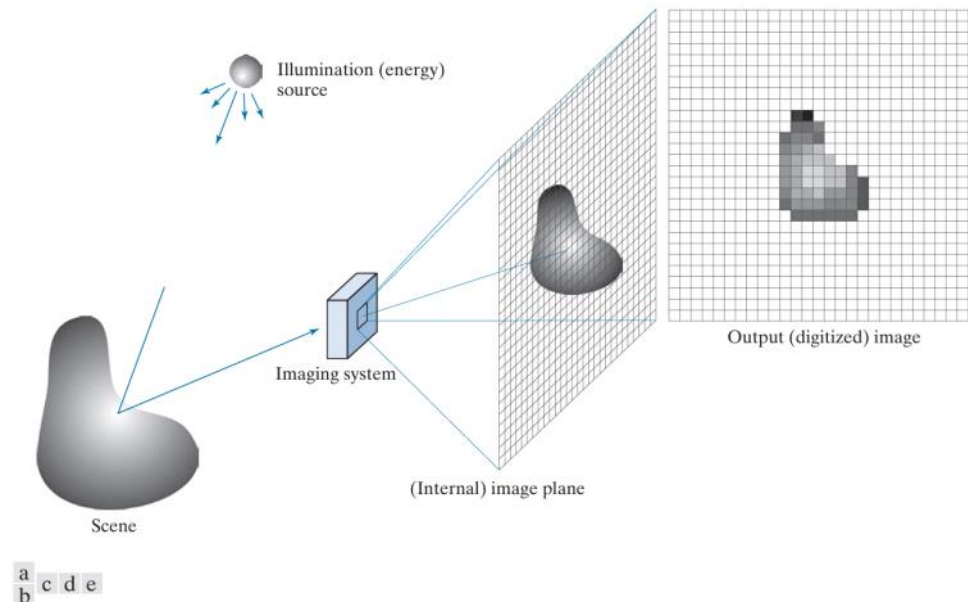


FIGURE 2.15 An example of digital image acquisition. (a) Illumination (energy) source. (b) A scene. (c) Imaging system. (d) Projection of the scene onto the image plane. (e) Digitized image.

