

# Computer Animation



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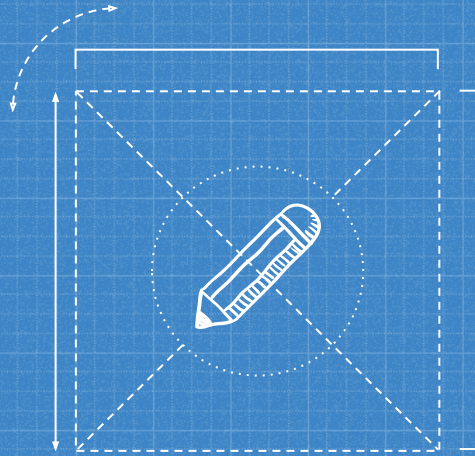




# Topics:

- INTRODUCTION
- APPLICATIONS
- DESIGN OF ANIMATION SEQUENCES
- GENERAL COMPUTER ANIMATION FUNCTIONS
- RASTER ANIMATIONS
- COMPUTER ANIMATION LANGUAGES
- KEY FRAME SYSTEMS
- MOTION SPECIFICATIONS





# INTRODUCTION



# Computer Animation

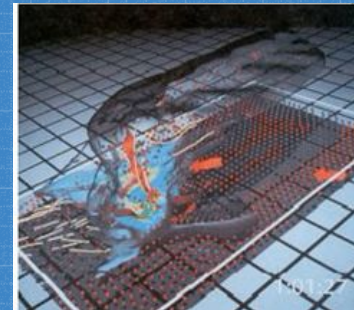
## What is Animation?

Make objects change over time according to scripted actions



## What is Simulation?

Predict how objects change over time according to physical laws

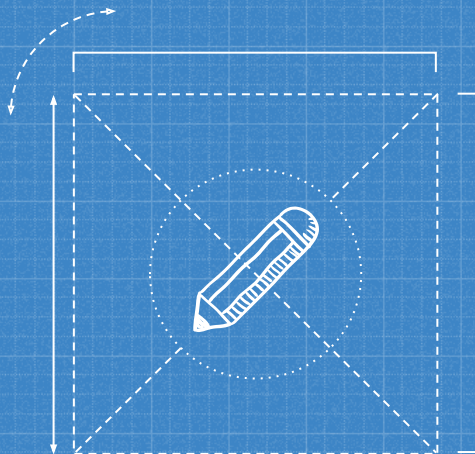




# Introduction

- Computer animation is the process used for generating animated images (moving images) using computer graphics.
- Animators are artists who specialize in the creation of animation.
- From Latin animātiō, "the act of bringing to life"; from animō ("to animate" or "give life to") and -ātiō ("the act of").





# APPLICATIONS



# Computer Animation



Video Games

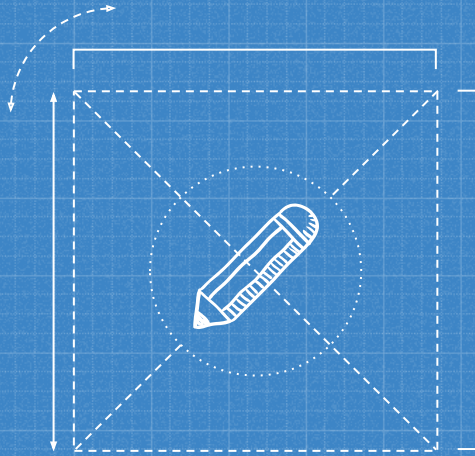


Cartoons



Mobile Phones





# DESIGN OF ANIMATION SEQUENCES



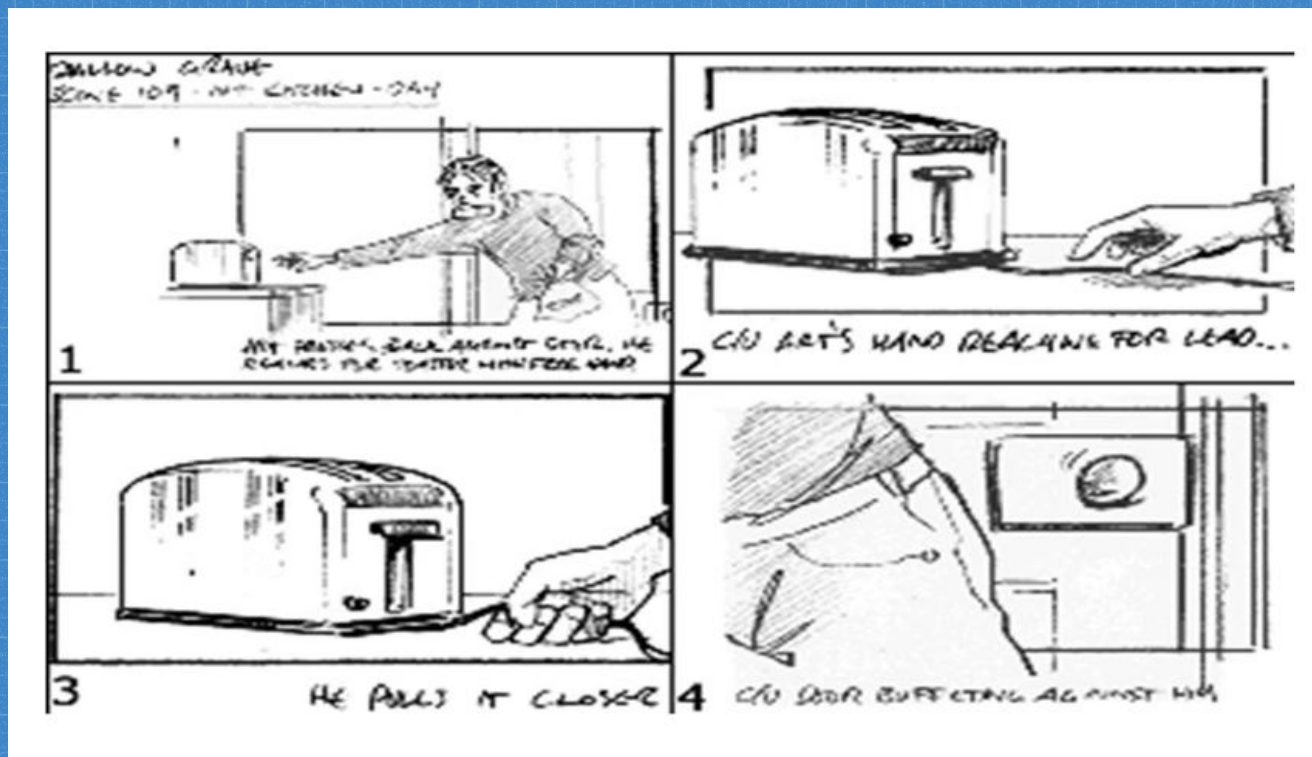
## Design Of Animation Sequences

Steps for designing animation sequences.

- Storyboard Layout
- Object definitions
- Key frame specifications
- Generation of in-between frames



# Storyboard Layout



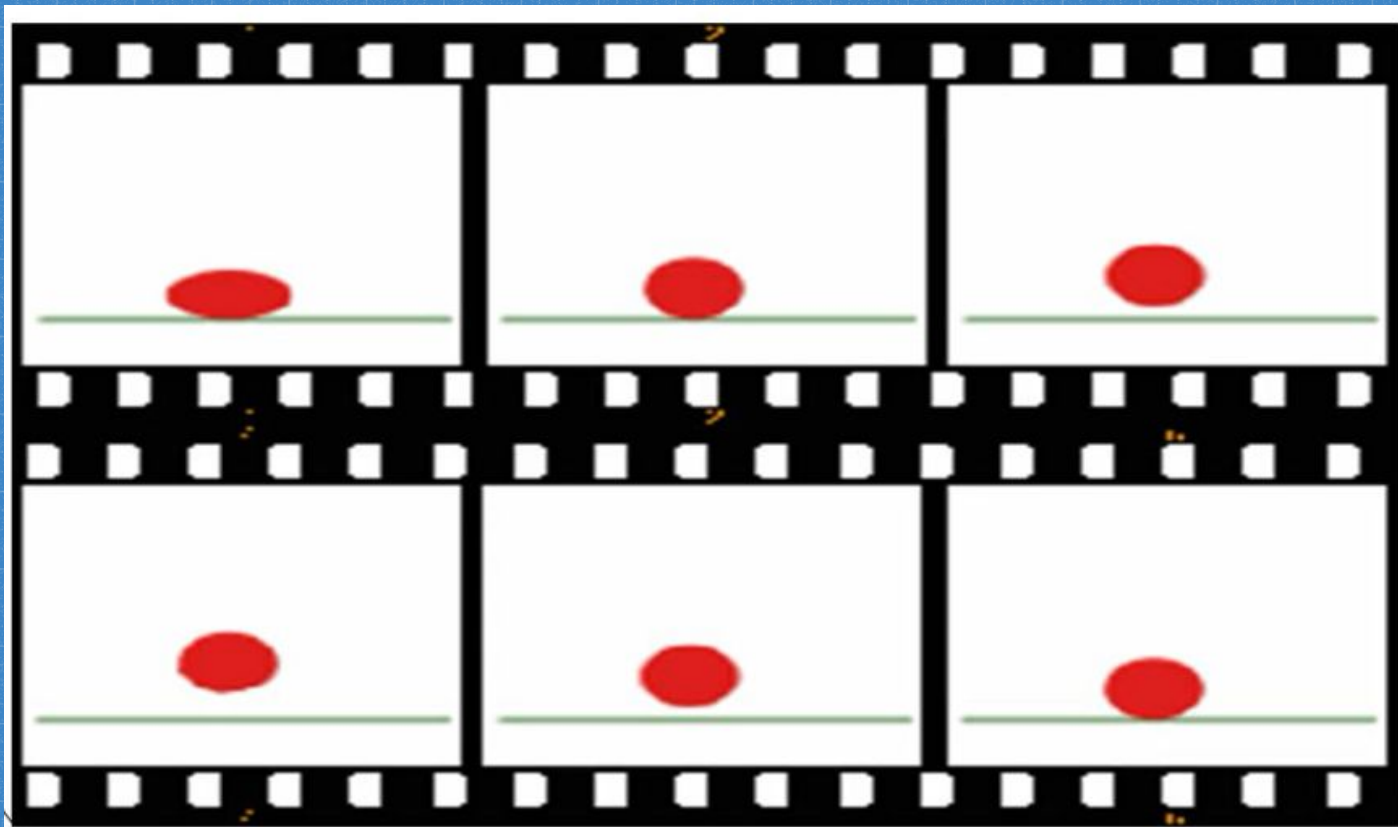


## Object Definitions





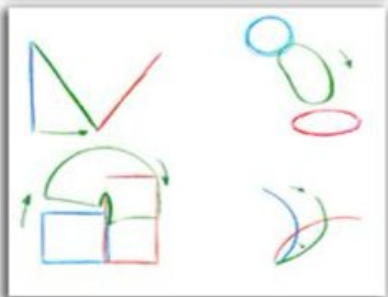
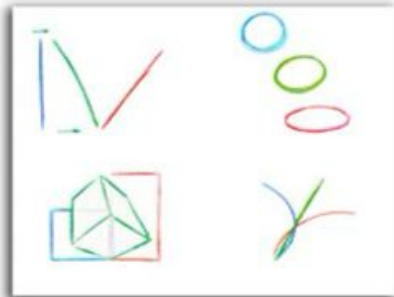
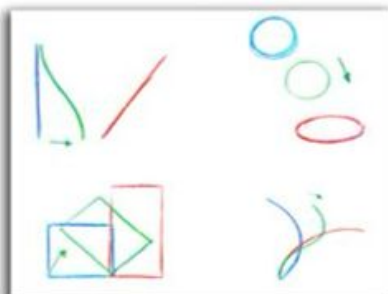
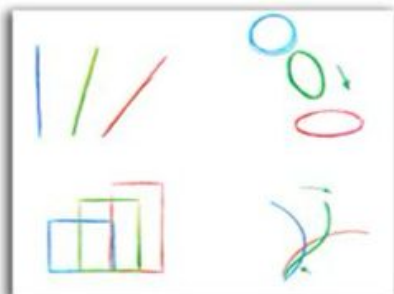
## Key frame Specifications





# In-between frames

## Inbetweening



Even Halves

Even Thirds

Slo-in

Slo-out

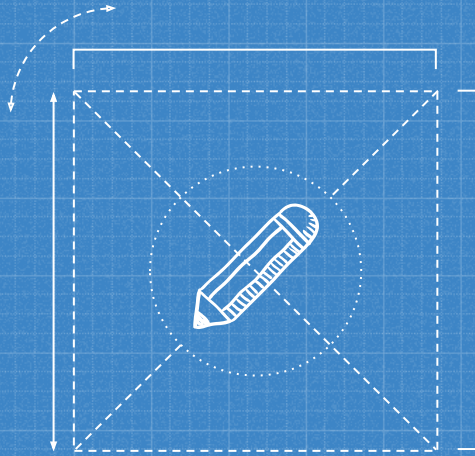
Slo-in/Slo-out

DO NOT BUNCH UP YOUR  
INBETWEENS ANYWHERE ALONG  
THE PATH OF ACTION



Inbetweening is the fine art of knowing how and where to draw the line so that the action intended is clearly understood by the viewer. A good inbetween is not just half way between two lines.





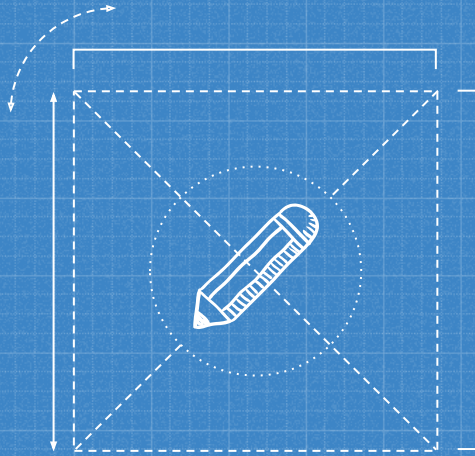
# GENERAL COMPUTER ANIMATION FUNCTIONS



## General Computer Animation Functions

Animation software provide basic functions to create animation and process the individual object.



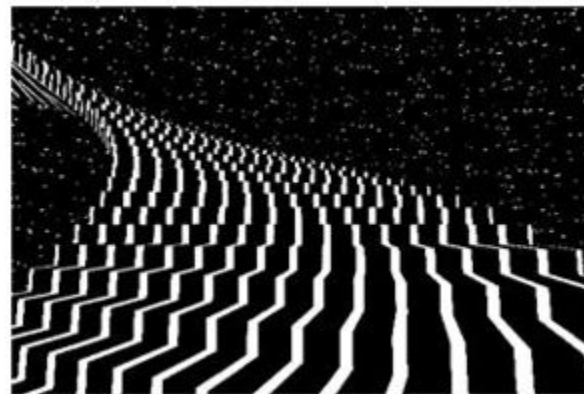


# RASTER ANIMATIONS

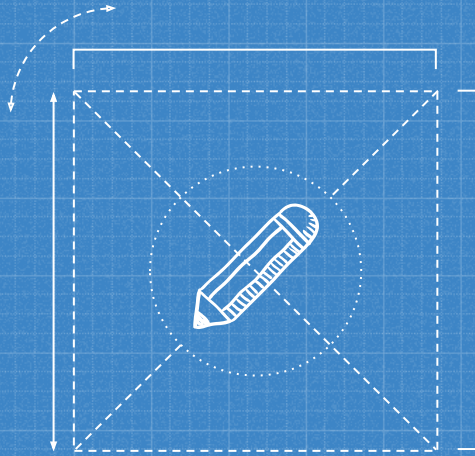


## Raster Animations

Real-time animations can be generated using raster operations.







# COMPUTER ANIMATION LANGUAGES



# Computer Animation Languages

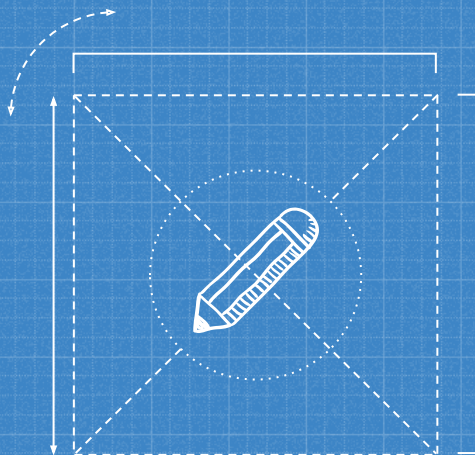
## GENERAL PURPOSE LANGUAGES:

C, C++, Pascal, or Lisp (control animation sequences).

## SPECIALIZED ANIMATION LANGUAGES

- Key frame systems
- Parameterized systems
- Scripting systems

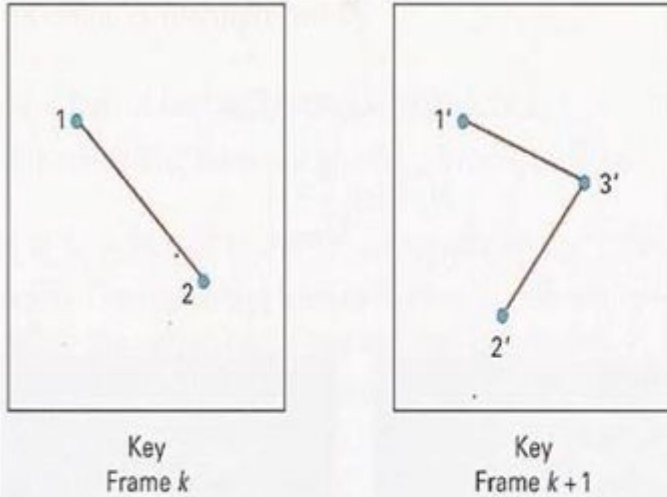




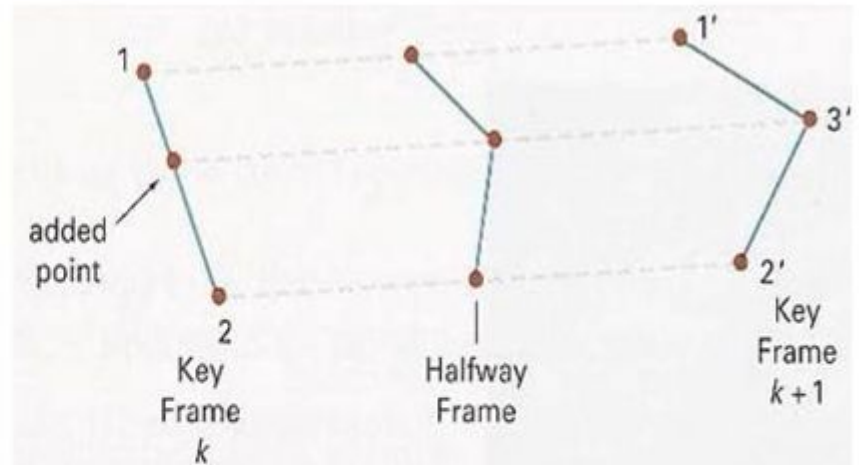
# KEY FRAME SYSTEMS



# Key Frame Systems



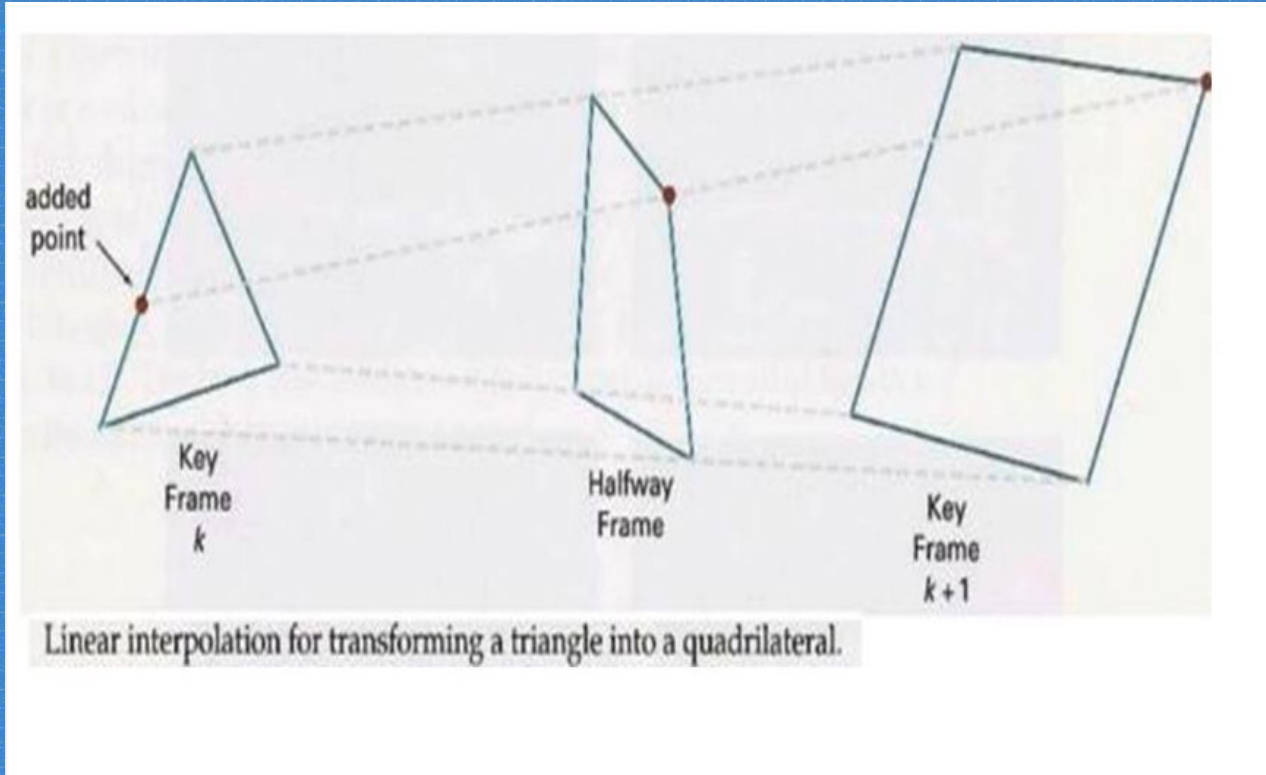
An edge with vertex positions 1 and 2 in key frame  $k$  evolves into two connected edges in key frame  $k + 1$ .



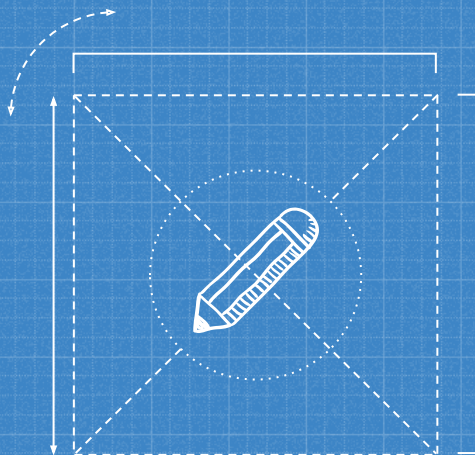
Linear interpolation for transforming a line segment in key frame  $k$  into two connected line segments in key frame  $k + 1$ .



# Key Frame Systems







# MOTION SPECIFICATIONS



# Motion Specifications

Various ways in which motions of objects can be specified as:

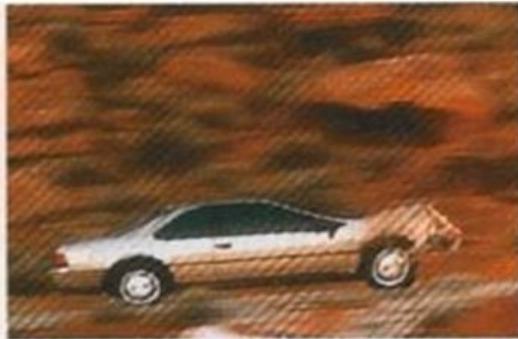
- Direct Motion Specification
- Goal-Directed Systems
- Kinematics and Dynamics



# Direct Motion Specification



(a)



(b)



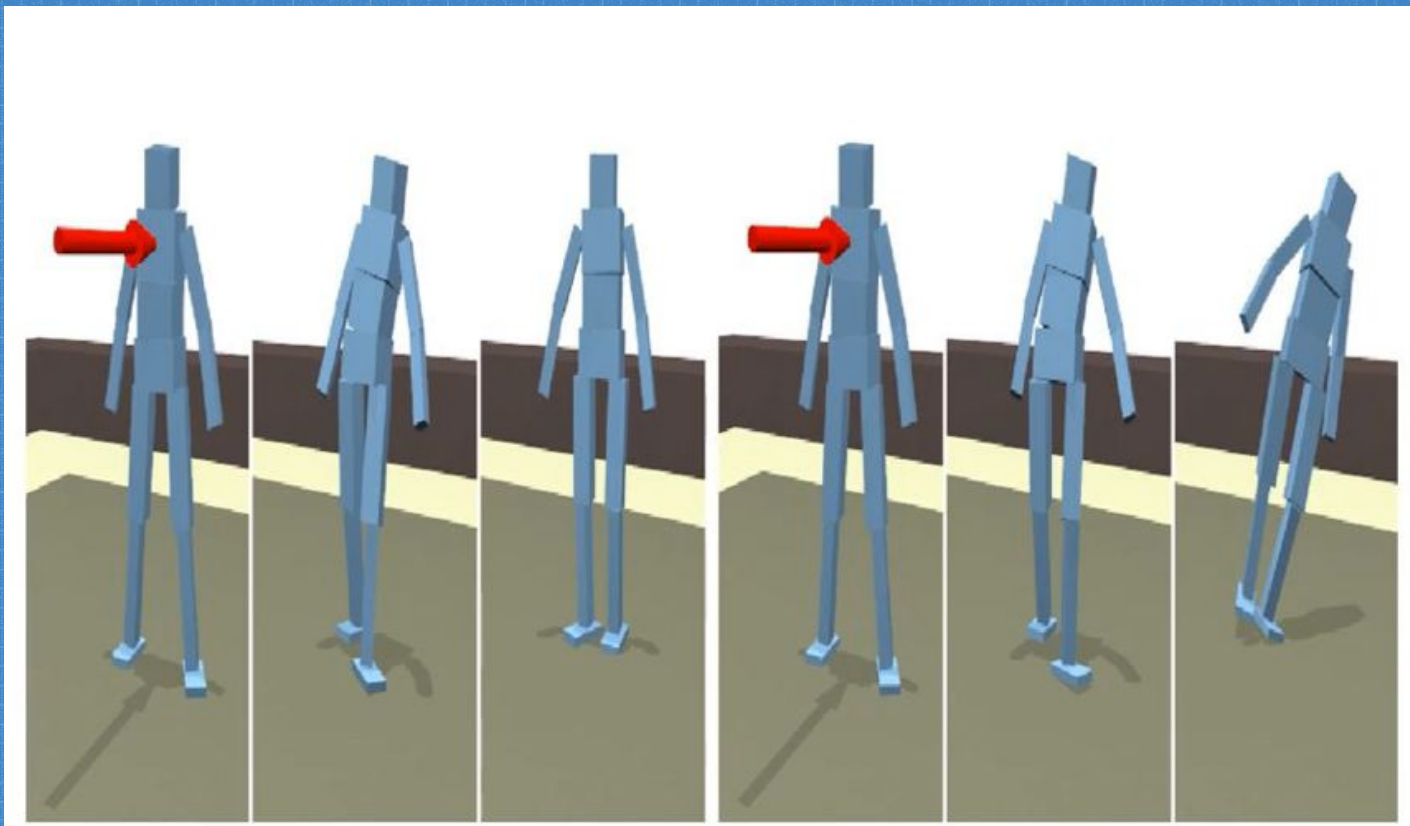
(c)



(d)



# Goal-Directed Systems





# Kinematics and Dynamics

## Kinematics

Motion parameters such as position , velocity and acceleration are specified without reference to the forces.

## Inverse Kinematics

Initial and final positions of objects at specified times and from that motion parameters.



# Kinematics and Dynamics

## Dynamics

- The forces that produce the velocities and accelerations are specified(physically based modeling).
- It uses laws such as Newton's laws of motion , Euler or Navier -stokes equations.



# Thanks !