Introduction to Game World Modeling

(SENG 463 - Game Programming)

Dr.Çağatay ÜNDEĞER

Research and Innovation Director

SimBT Inc.

e-mail :

cagatay.undeger@simbt.com.tr

cagatay@undeger.com

Outline

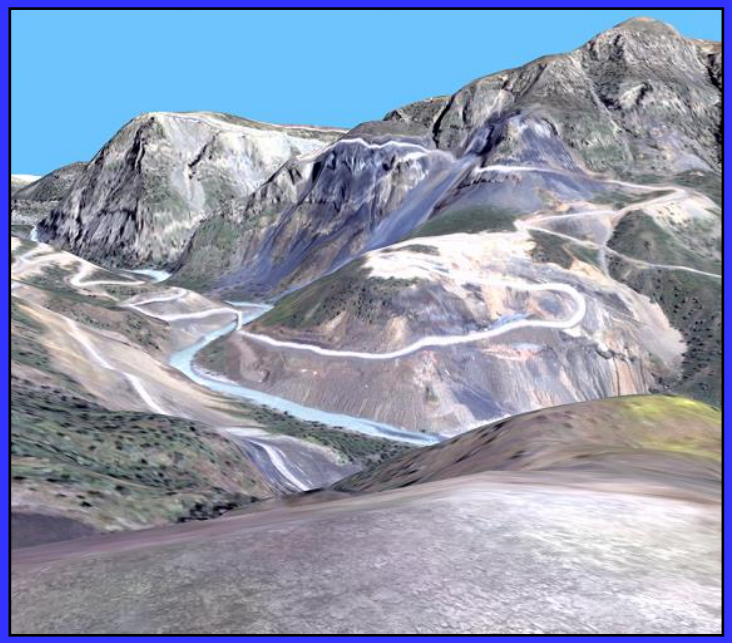
- Game World Modeling
- Environment (game world)
- Scenario
- Perception
- Behaviour
- Physics (Actions/Interactions)
- Body Movement and Animation
- Visual Effects
- Sound Effects

Game World Modeling

- To develop a game, you need a game world model with environment & entities

Game World Modeling

- Land topography modeling
- Land surface modeling (rock, sand, swamp)
- Land cover modeling (trees, bushes)
- Land detail modeling (barriers, bridges)



Game World Modeling

- Sample snapshots from a train simulator

Game World Modeling

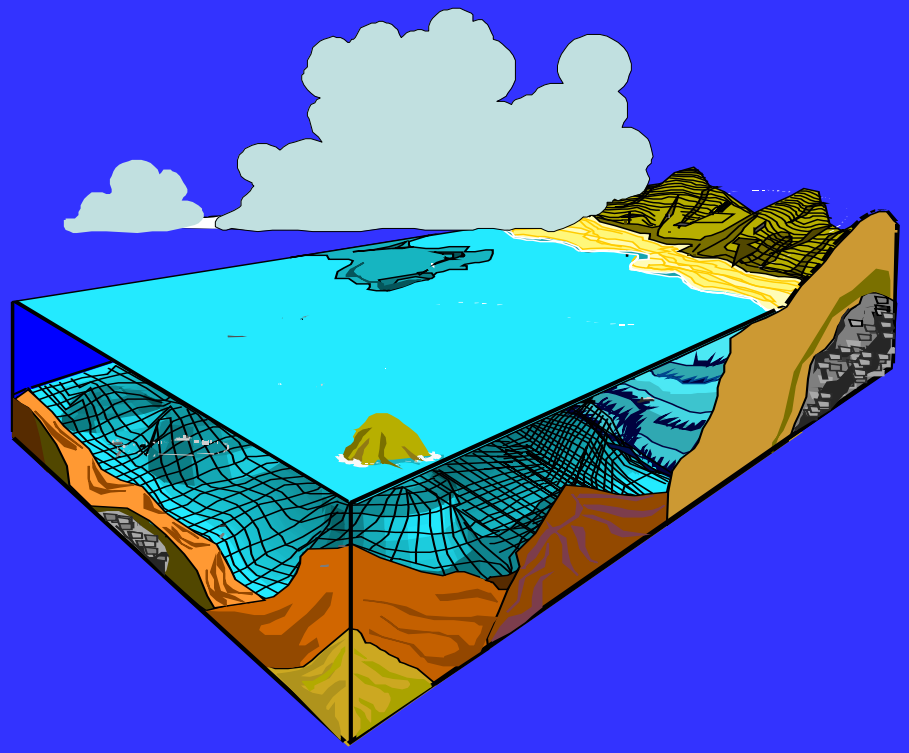
- Water surface modeling (waterfall, waves, foams)

Game World Modeling

- Sample snapshots from a ship simulator

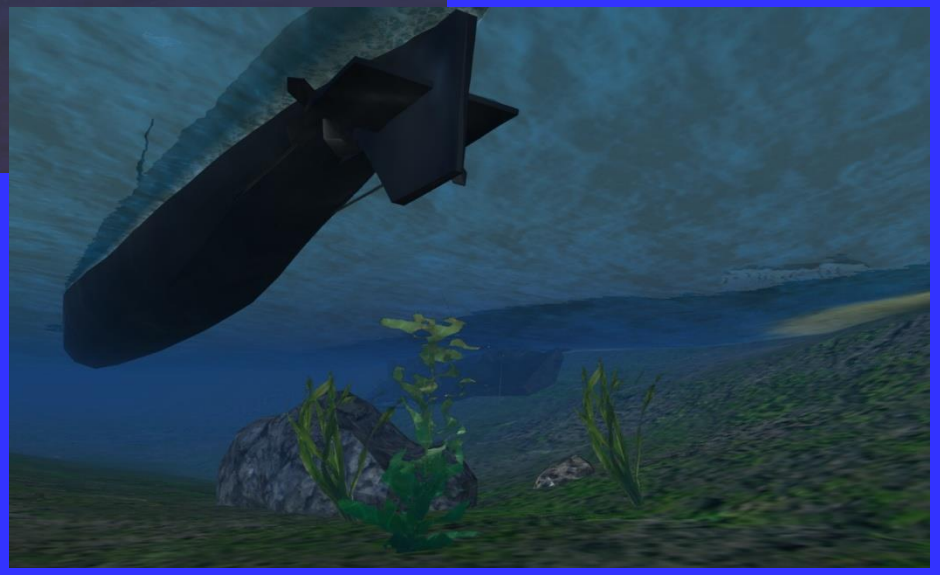
Game World Modeling

- Underwater modeling (current, salt)
- Underwater base surface modeling (rocks, soil)
- Underwater base cover modeling (moss)



Game World Modeling

- Sample snapshots from an underwater vehicle simulator



Game World Modeling

- Sky modeling (fog, rain, snow, clouds, lights)

Game World Modeling

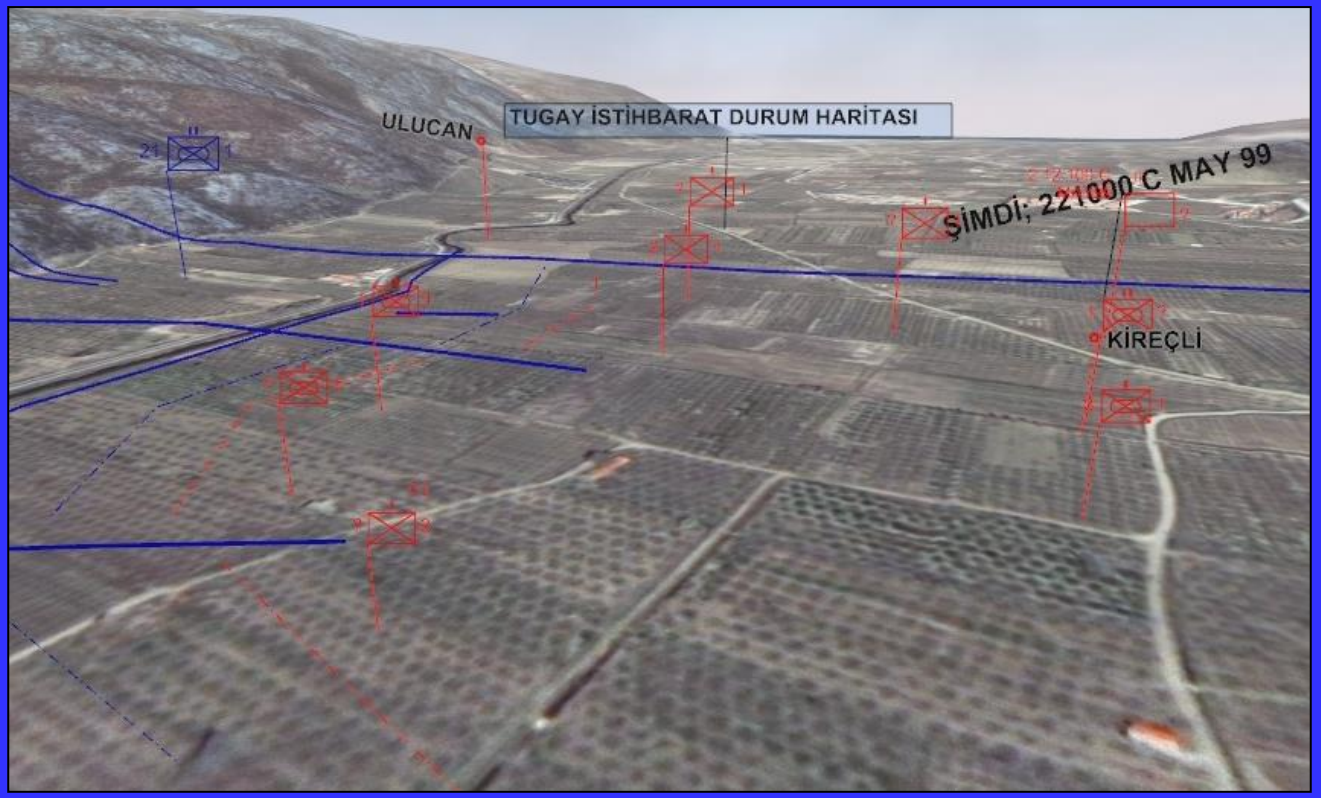
- Space modeling (sun, moon, stars)

Game World Modeling

- Entity modeling (soldiers, tanks, birds,)

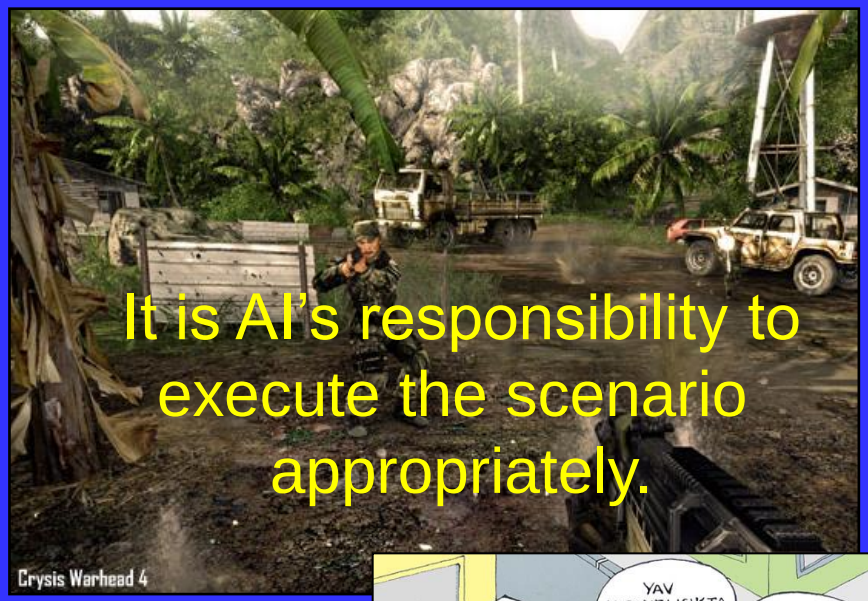
Scenario Modeling

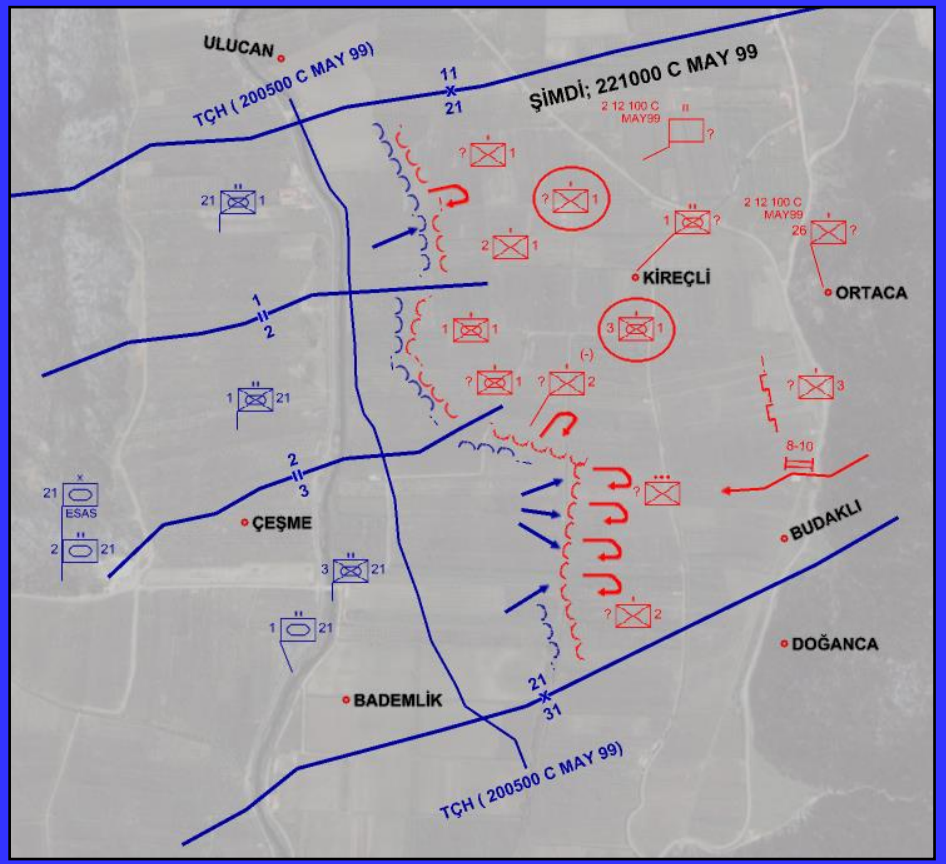
- Without a scenario, the flow of a game would be chaotic and uncontrolled.
- This would be undesirable for most of the games.



Scenario Modeling

- But what could a scenario be consist of ?
- Who is responsible for scenario control?





Perception Modeling

- The process of getting awareness or understanding of external and internal sensory information.

Smell:
Wet grass

Hear:
Rain drops

See:
Rain drops

Taste:
Rain drops

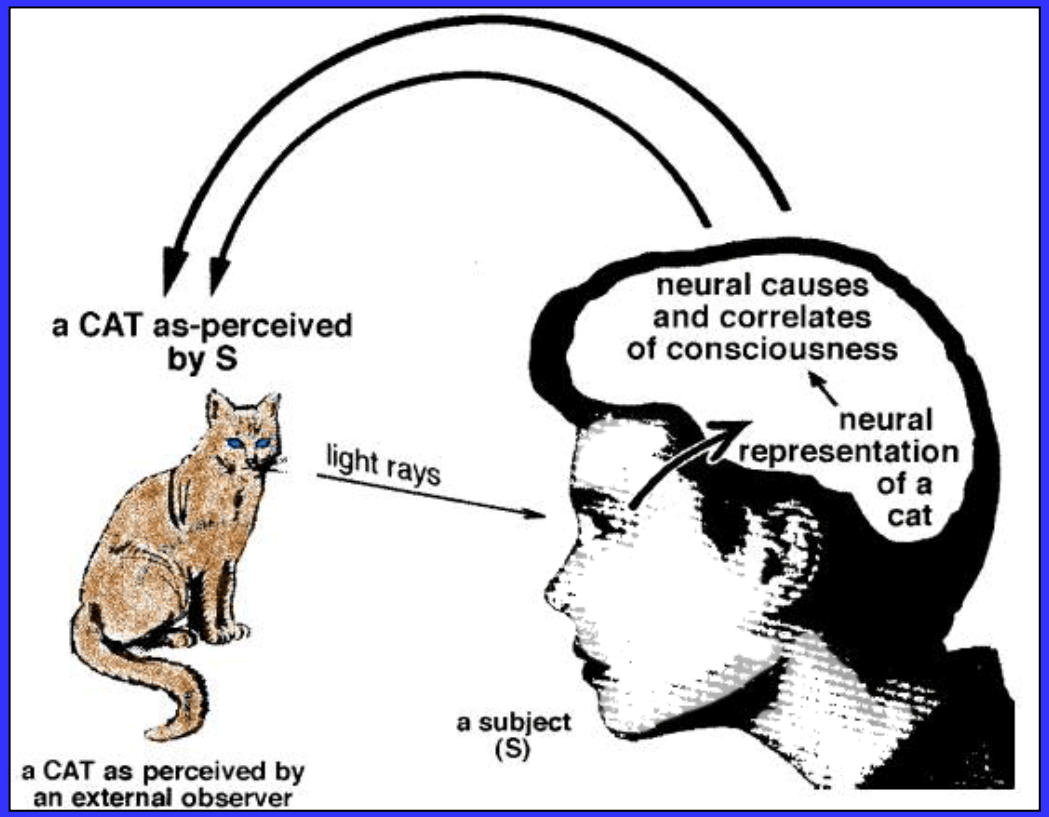
Feel:
Rain drops
Wet skin

Perception Modeling

- Where does perception stand in a game?

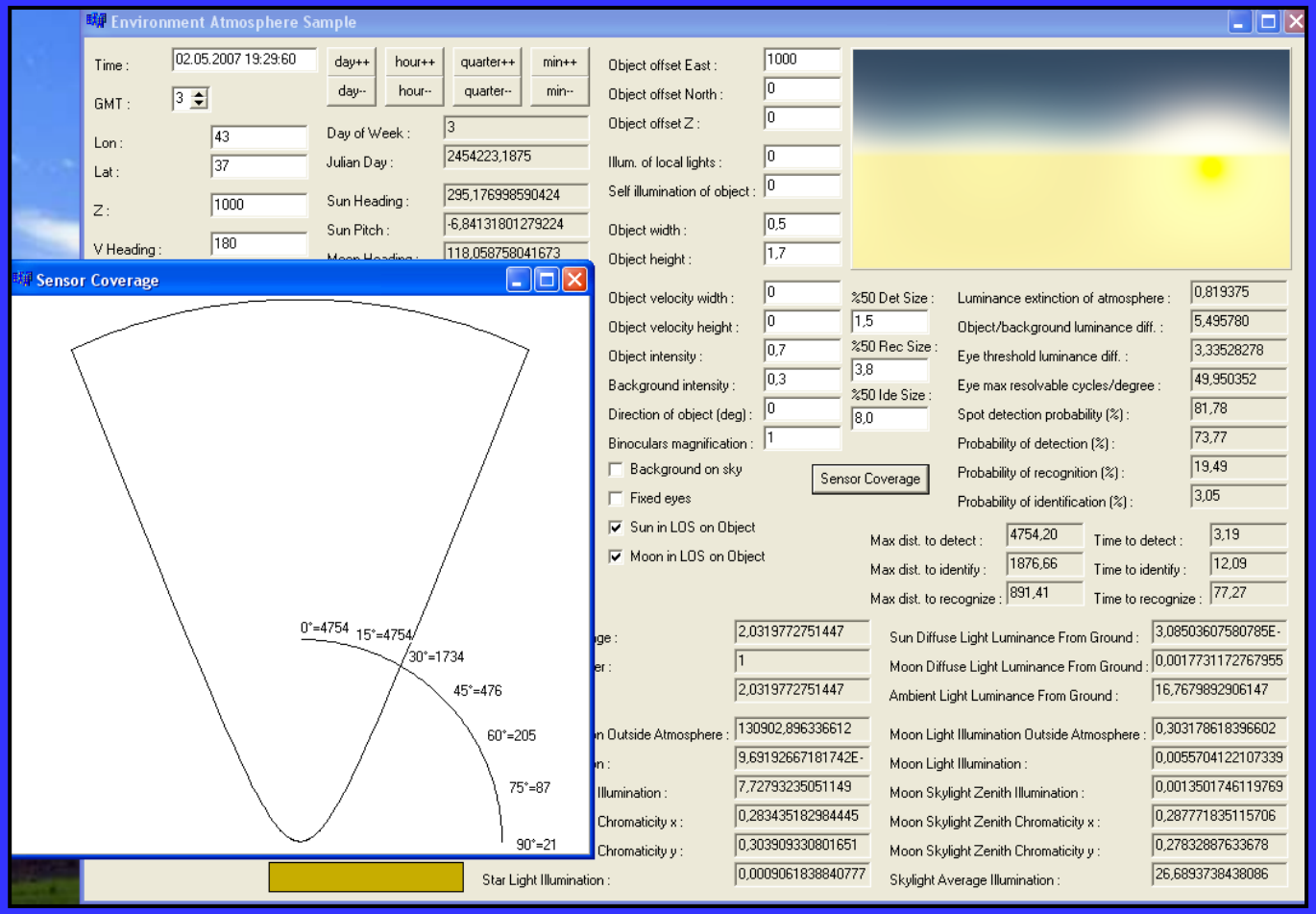
Perception is the only way for an entity to understand what is going on around the game world.

It is AI's responsibility to evaluate the perception and act accordingly.



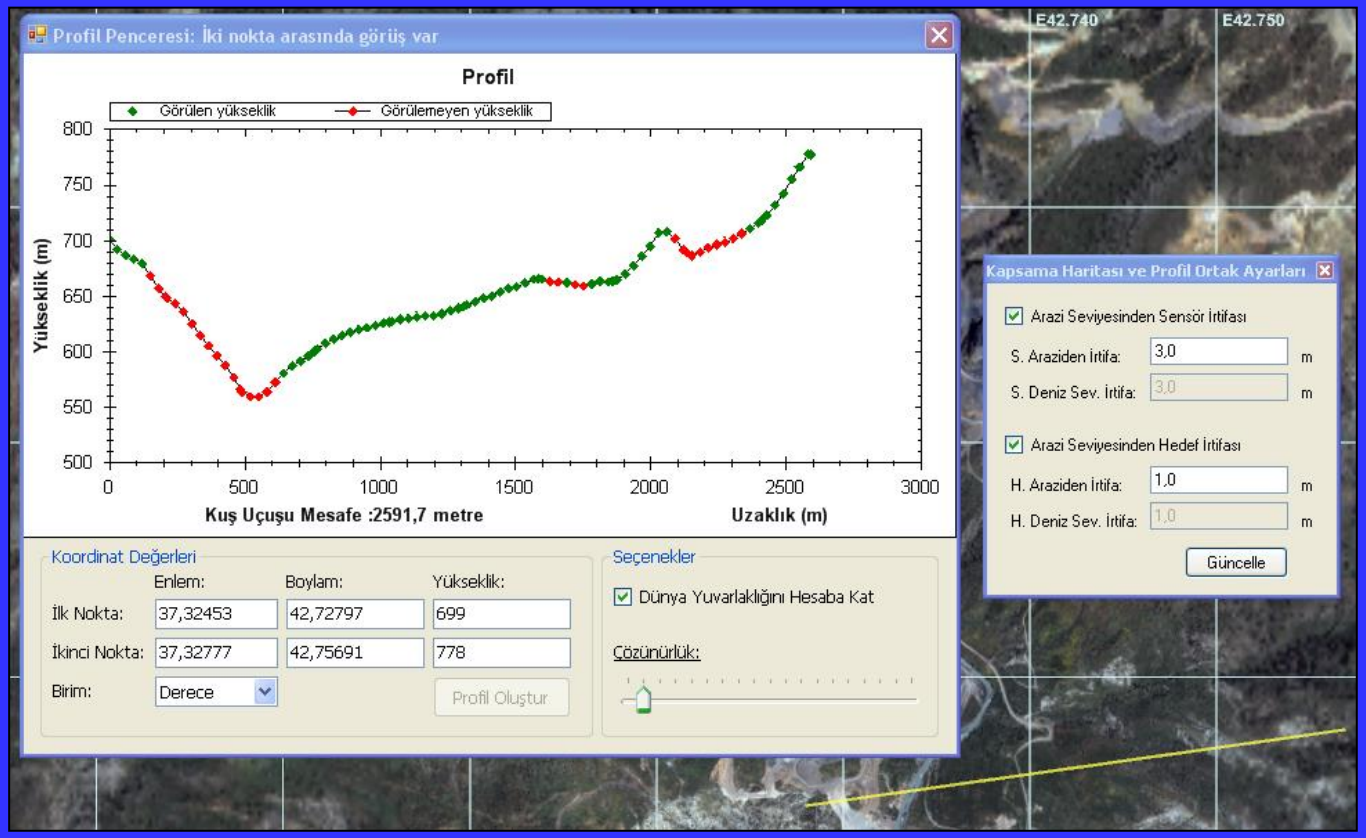
Perception Modeling

- Perception computation could be so complex depending on the realism required.



Perception Modeling

- Perception computation could be so time consuming depending on the resolution & detail of the environment.



Behavior Modeling

- Deals with performing intelligent behaviors using perception - reasoning - action cycle

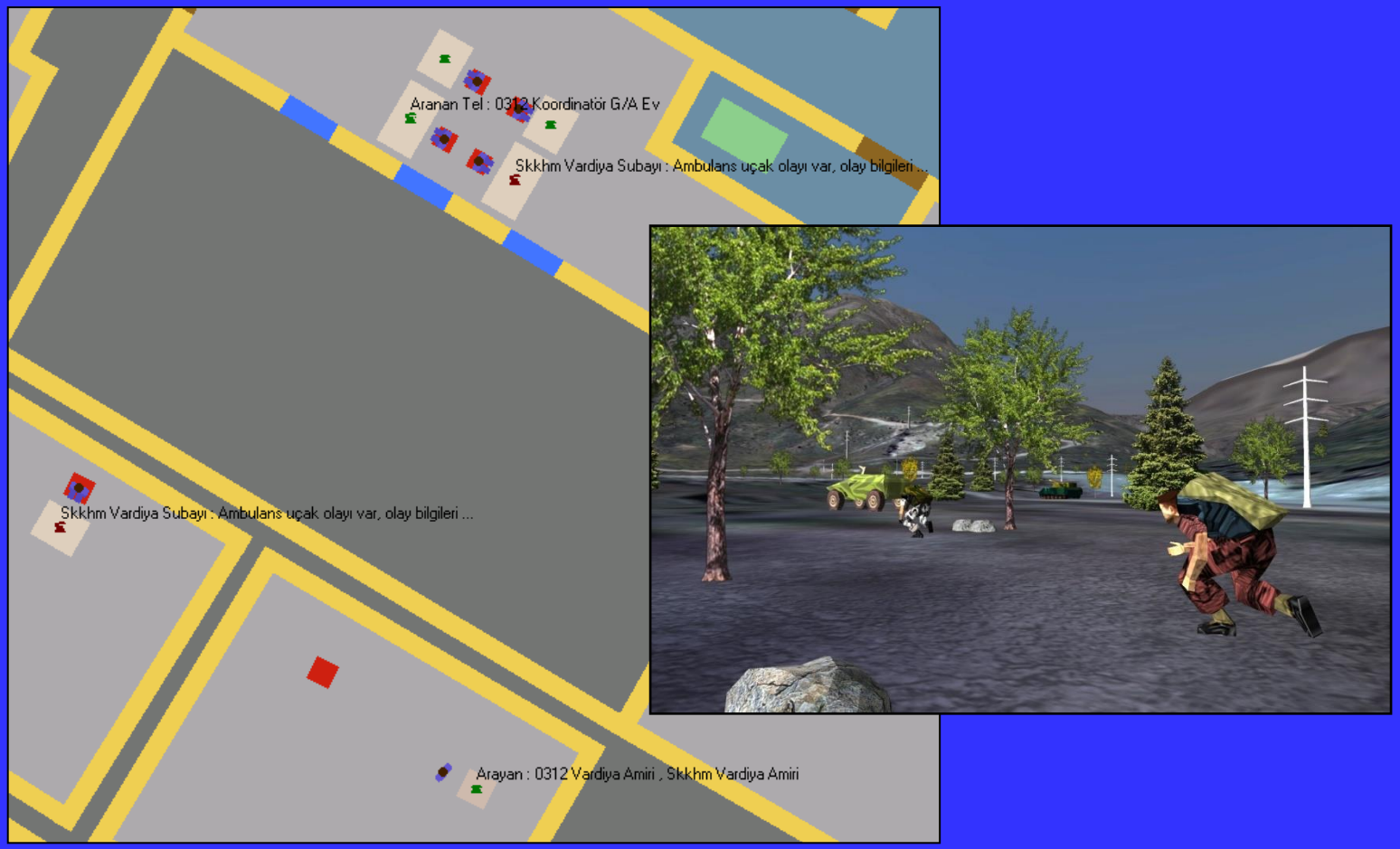
perception

reasoning
using AI techniques

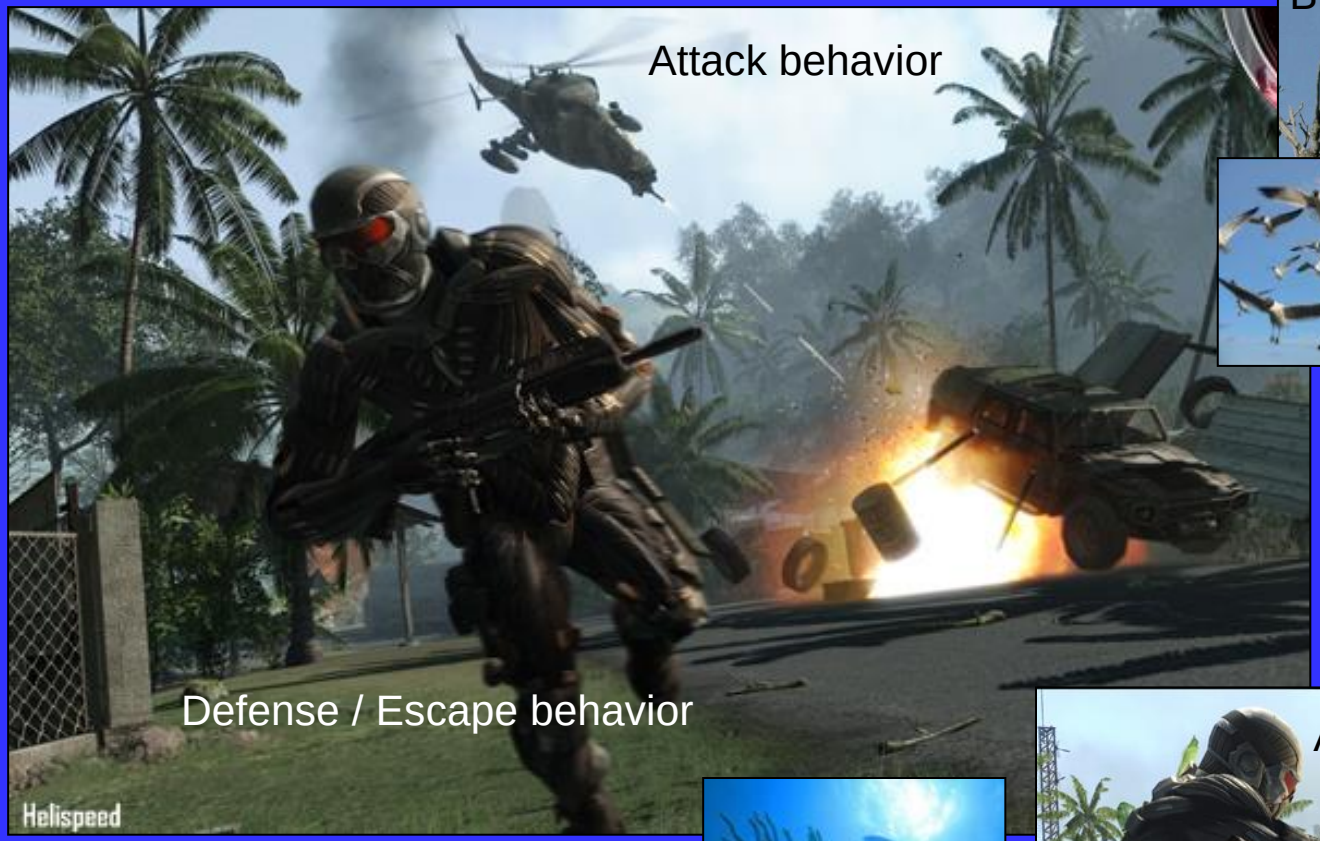
action

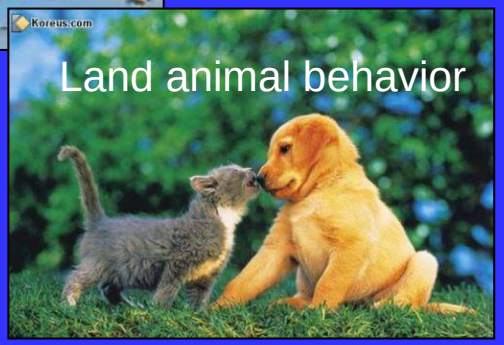
Behavior Modeling

- Actions might be physical interactions or just words to communicate.



Behavior Modeling





Physics Modeling

- Deals with interaction of objects with each other physically.

Physics Modeling

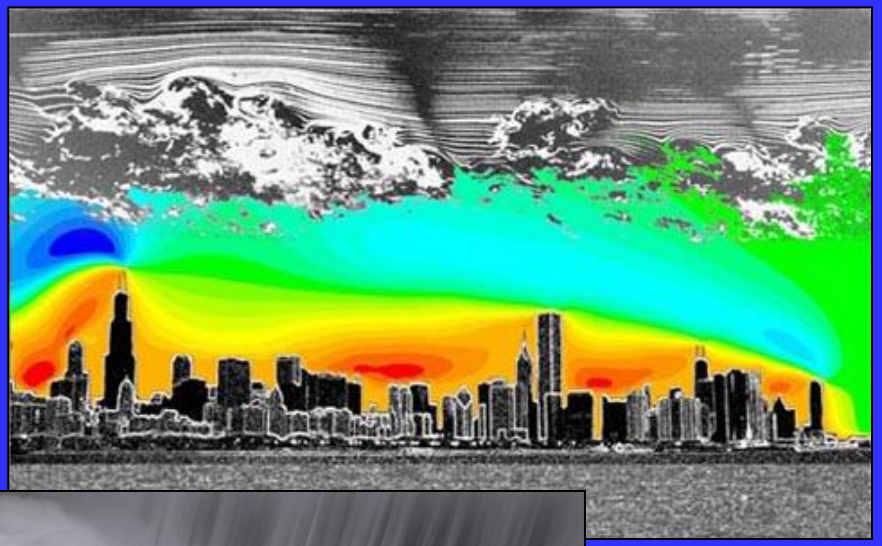
- Common aspects:
  - Rigid body dynamics (boxes, buildings)

Physics Modeling

- Common aspects:
  - Deformable body dynamics (clothes, parachute)

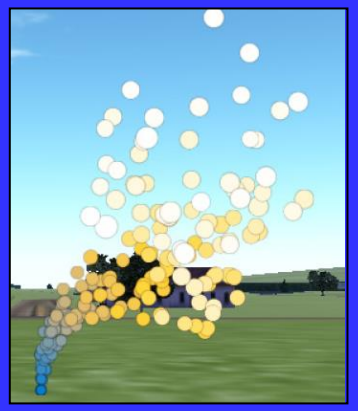
Physics Modeling

- Common aspects:
  - Fluid dynamics (water, air)



Physics Modeling

- Common aspects:
  - Partical dynamics (smoke, flame)



Physics Modeling

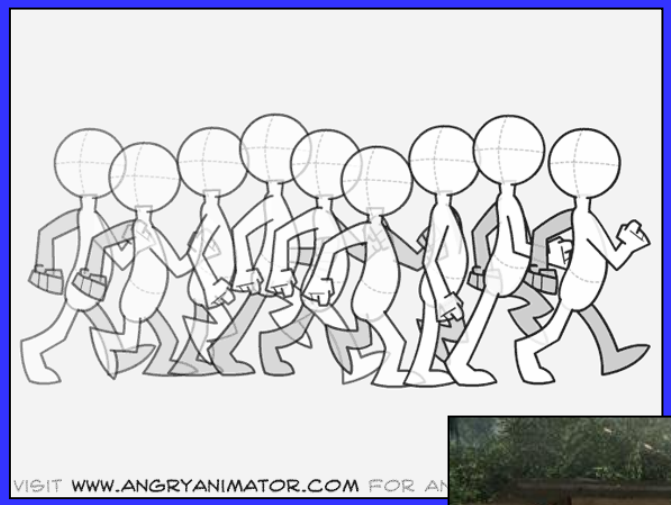
- Common aspects:
  - Partical dynamics (rain, snow, fireworks)

Physics Modeling

- Common aspects:
  - Explosion/Damage dynamics (bomb, grenade)

Body Movement and Animation Modeling

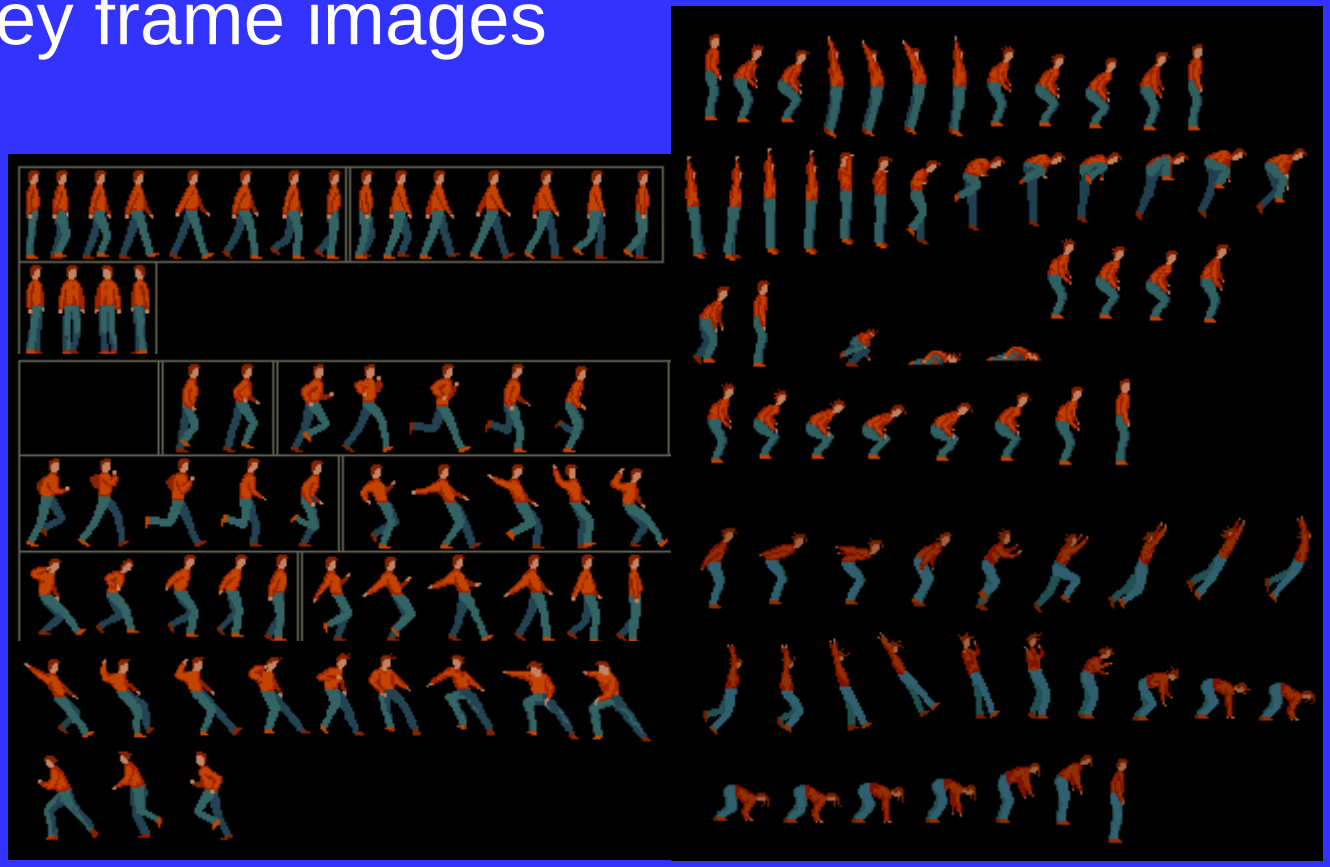
- Deals with body movement and animation of human and other entities.



It is AI's responsibility to decide which actions and movements to perform

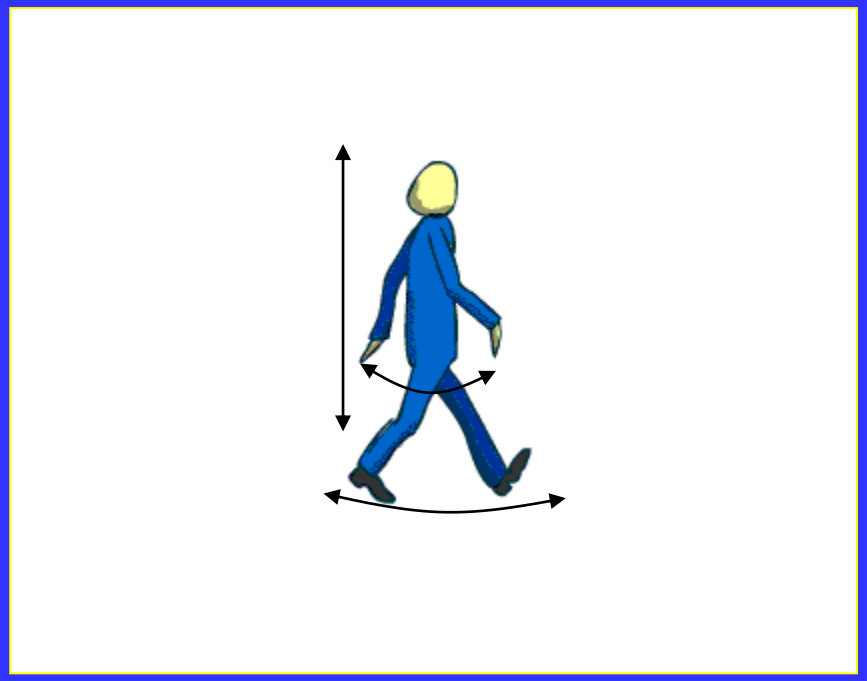
Body Movement and Animation Modeling

- Simple techniques used:
  - Statically produced body animations using key frame images



Body Movement and Animation Modeling

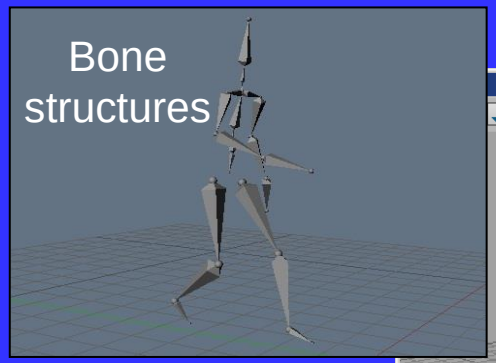
- Simple techniques used:
  - Matematically defined body movements

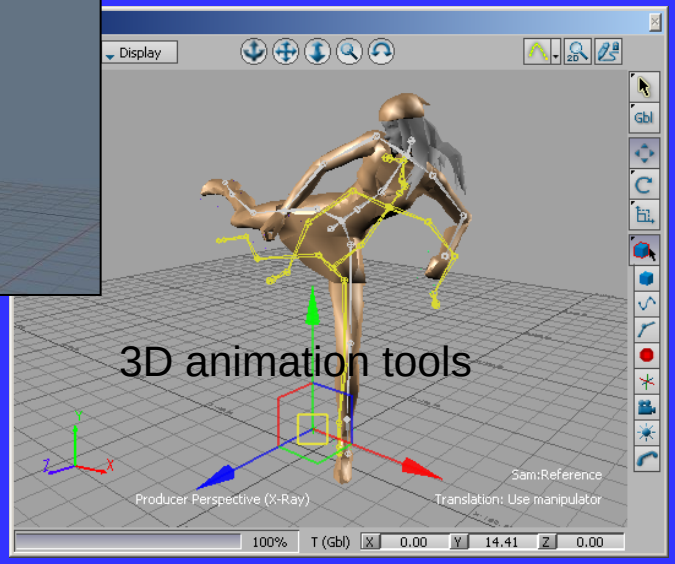


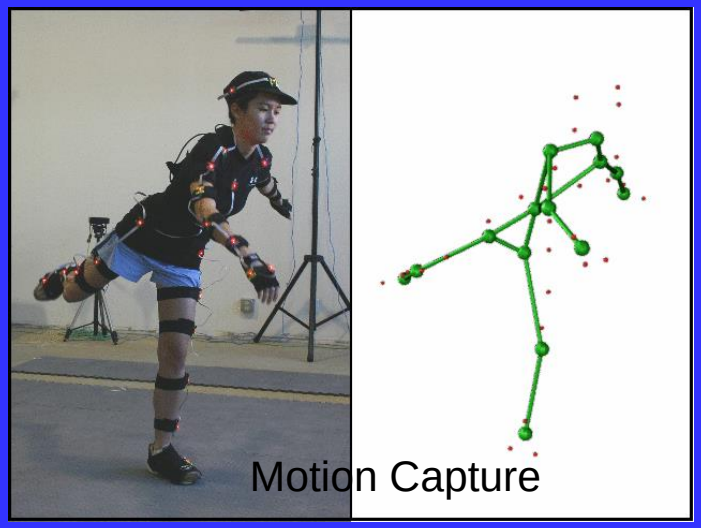
Movements of the body points (vertices) are defined matematically

Body Movement and Animation Modeling

- Advance techniques used:
  - Movement with bone structures
    - Moving bones statically or matematically
    - Moving bones with motion capture data







Visual Effects Modeling

- The special illusions and visions within a game world other than existing entities.

Visual Effects Modeling

- Lighting effects and Lense flares

Lense Flares

Visual Effects Modeling

- Fire, smoke, flames, explosions
- Partical effects can also be considered as visual effects.

Visual Effects Modeling

- Helicopter rotors, aircraft trails, etc.

Sound Effects Modeling

- Sound effects are an important part of our perception so an important part of a game.
- In games, 3D sound effects are commonly used to make auditory materials atractive.