Skeletal Animation in Blender

COSC450

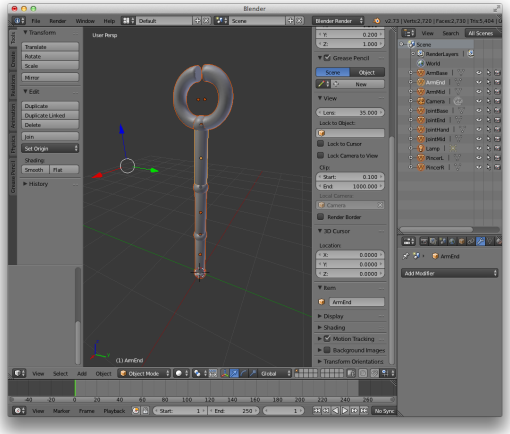
Skeletal Animation

We start with a simple character

- A robot arm
- An arm made up of cylinders
- Spheres for joints
- A simple pincer hand

We'll add a basic skeleton

- A series of bones along the arm
- Bones to control the pincer
- Control elements for animation



Adding a Skeleton

Bones are added like other objects

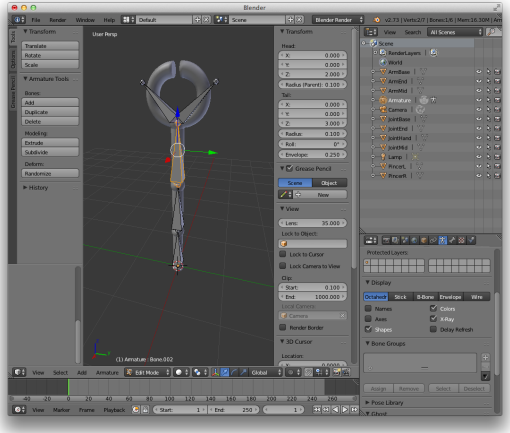
- **A** to add an element
- Select Armature → Single Bone

Bones are typically inside characters

- Select X-ray in the Armature panel

Can add new bones with extrude

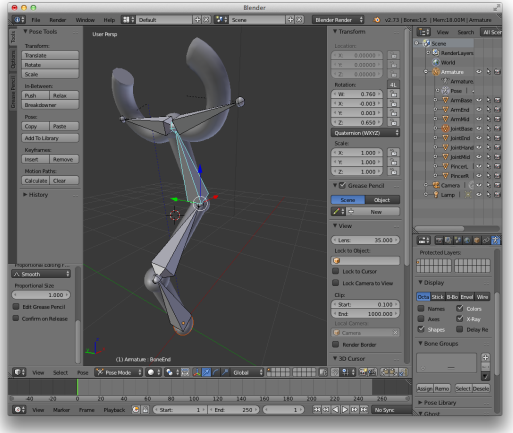
- Go into Edit mode (**Tab**)
- Select the end of the bone
- Press **e** to extrude a new bone
- Can branch the skeleton



Posing the Skeleton

Select the armature, go to Pose Mode

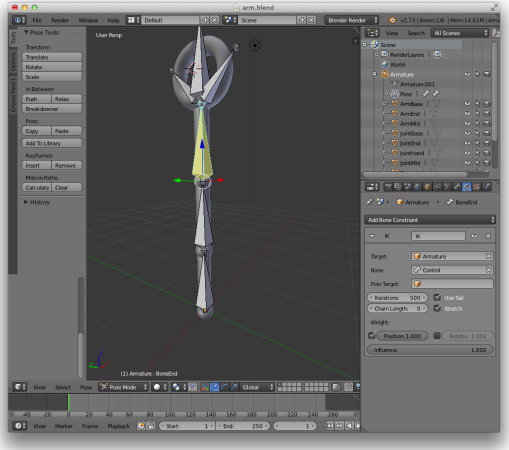
- Can move the bones around
- Want objects to follow bones
- Set up parent relationships
  - Select object
  - Shift-select bone
  - `Ctrl-P` and choose Bone
- Now objects follow bones



Inverse Kinematics

We don't want to pose every joint

- Can have skeleton follow a bone
- In edit mode extrude a new bone
- Remove it's parent (bone properties)
- Change to pose mode
- Select the last bone of the arm
- In bone constraints panel...
- Add an IK constraint
- Set the target to the armature
- And the target bone to the control



Adding Kinematic Constraints

Not all movements are valid

- Gripper should only open/close
- In the bone properties
  - Can lock rotation axes
  - Can lock translation on base
- In bone inverse kinematics
  - Can set limits on motion
  - E.g.: Limit angles to $\pm 90°$