

Fencing Woman: Articulated Animation in VPython

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Math 198

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Project Overview

- ◉ Goal: To create a fencer performing the Advance Lunge and hitting an opponent. Then, the fencer will retreat backwards. The opponent will remain stationary.
- ◉ Use VPython

Fencing Review

- En Garde
- Advance
- Lunge
- Retreat

En Garde



Lunge

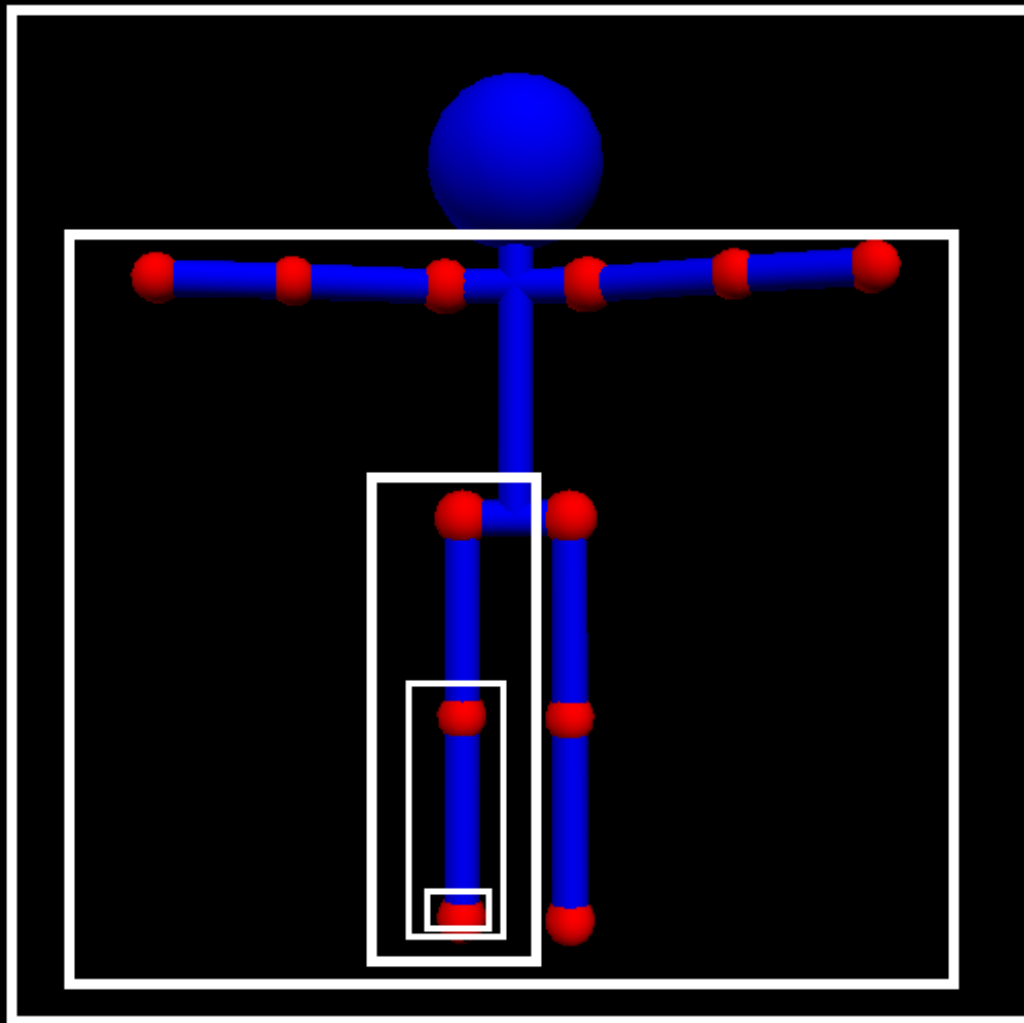


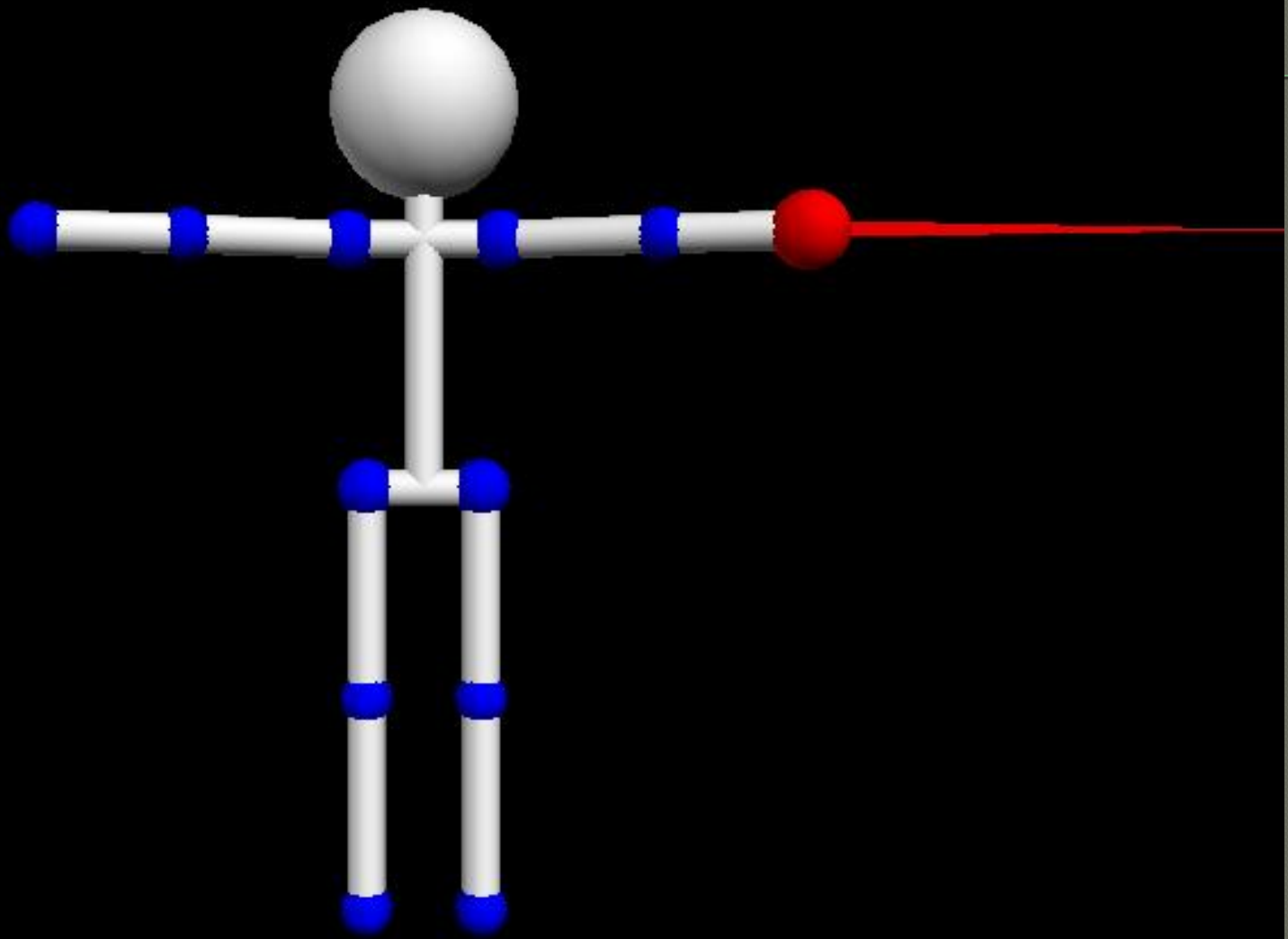
Advance Lunge

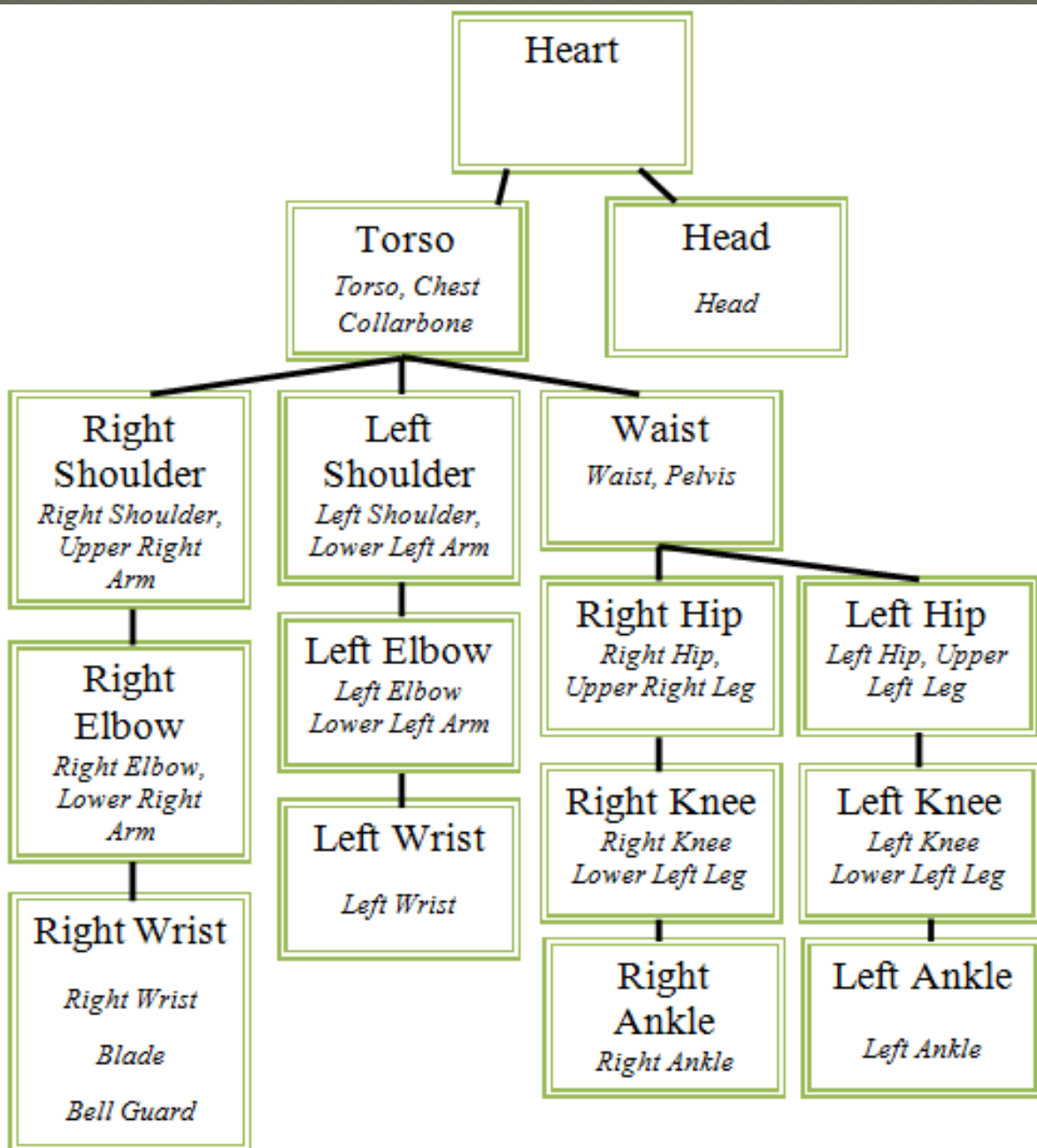


Creating the Body: Frames

- ◉ First, created the frames
- ◉ Then, put objects within the frames
- ◉ Frames review-hierarchy, top down process





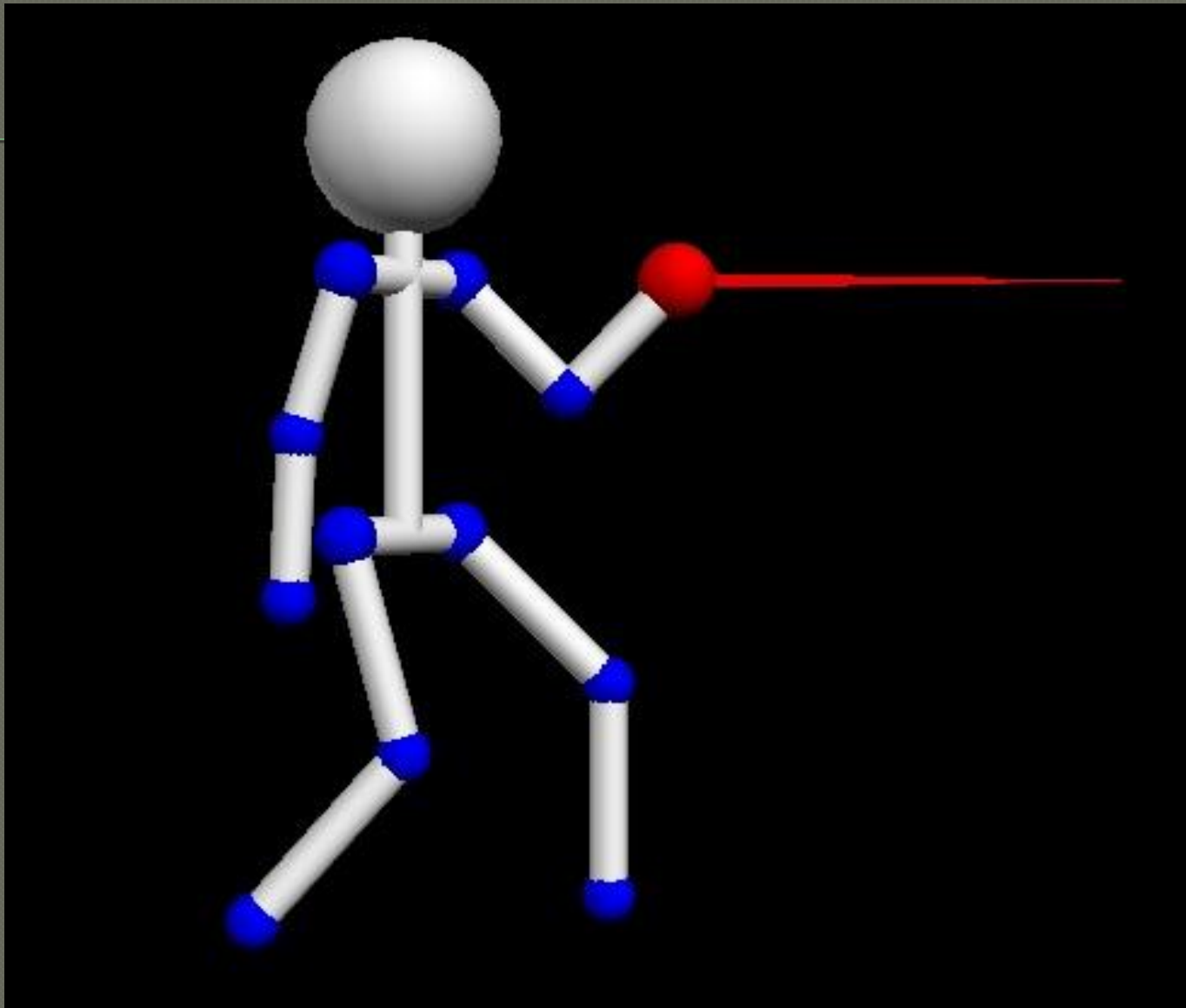


VPython Frame Notation

- `fheart=frame()`
- `fhead=frame(frame=fheart, pos=(0, 1.75, 0))`
- `ftorso=frame(frame=fheart, pos=(0, .75, 0))`
- `fwaist=frame(frame=ftorso, pos=(0, -2.5, 0))`
- `fshoulderL=frame(frame=ftorso,
pos=(-sqrt(2)/2, -.75, sqrt(2)/2))`
- `felbowL=frame(frame=fshoulderL,
pos=(-.6, -2, 0))`
- `fwristL=frame(frame=felbowL, pos=(-.1, -2, 0))`

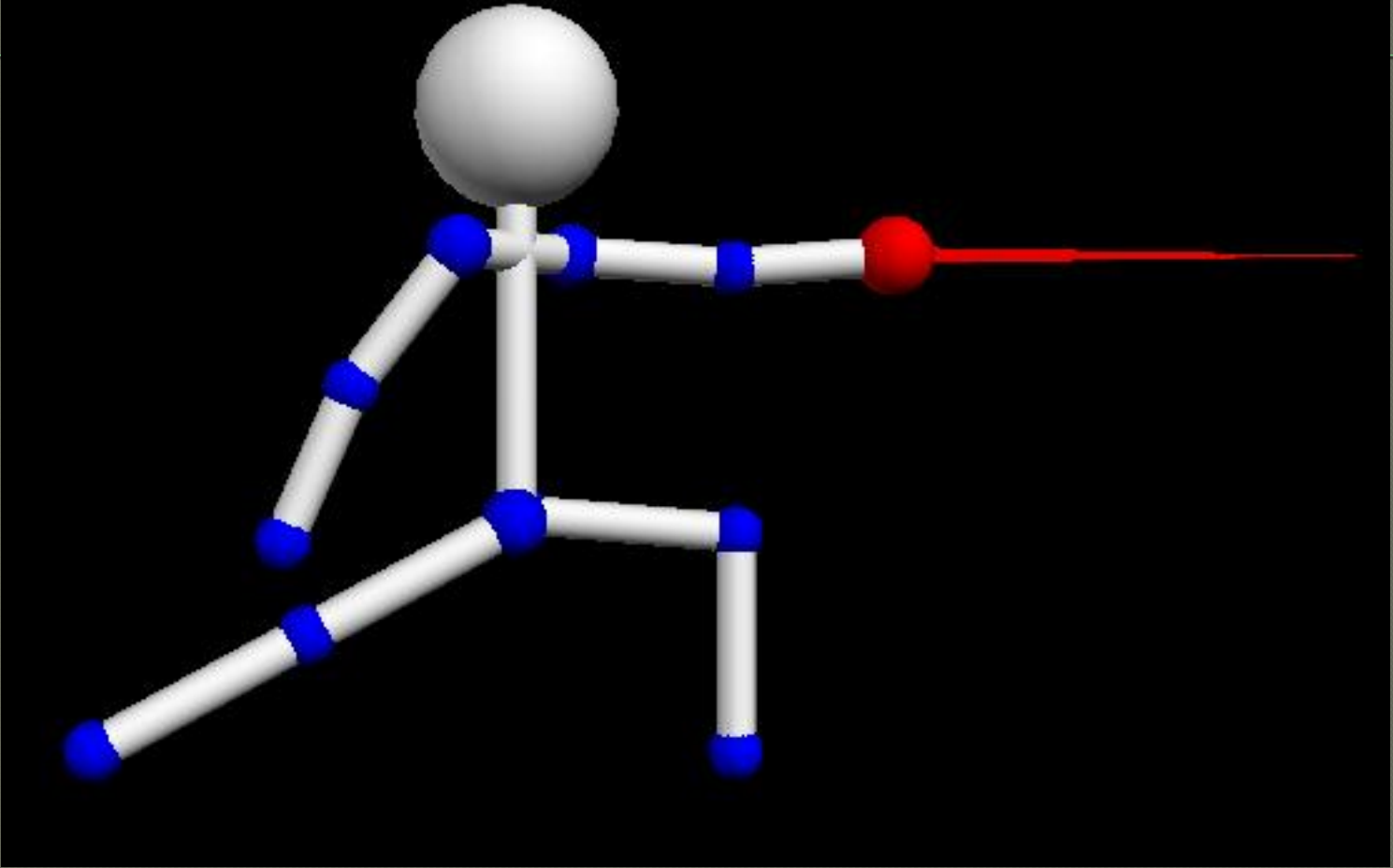
Creating En Garde

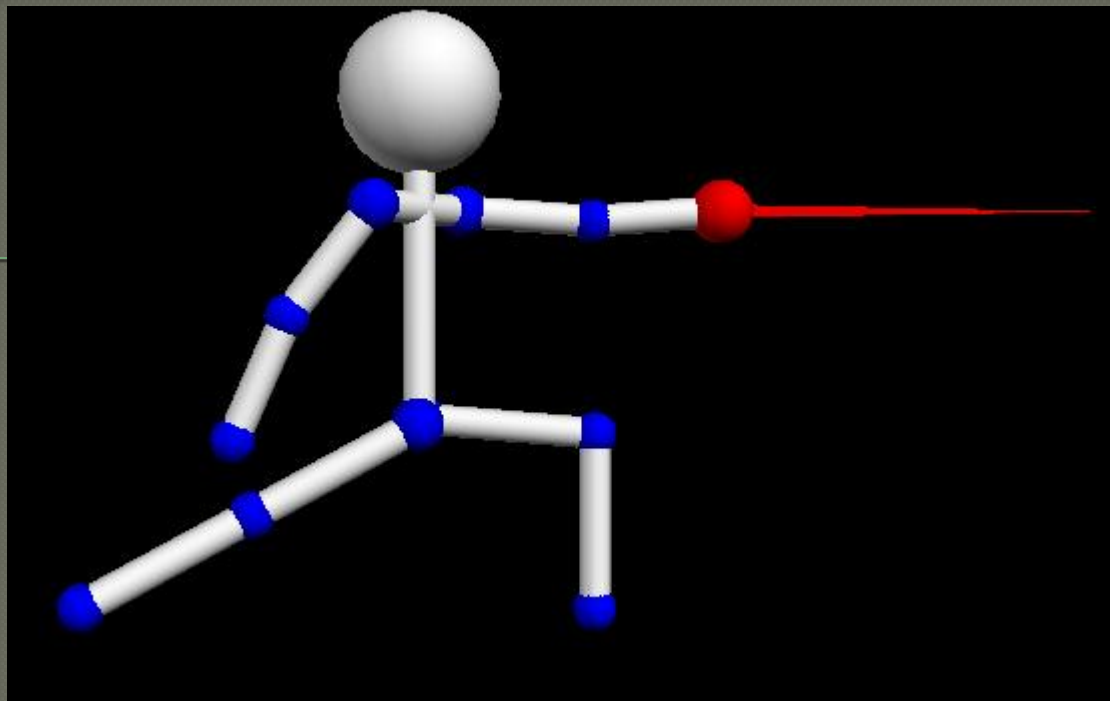
- ◉ Instead of rotating the body, I changed the positions of the frames to have the fencer start out in En Garde.



Creating Animation: Rotating Frames

```
fwaist.rotate(angle = ((pi/4)/5.4), axis = (0,1,0))
fshoulderL.rotate(angle = (-5*pi/4)/54, axis =
(0,0,1))
fshoulderR.rotate(angle = (pi/4)/5.4, axis = (0,0,1))
felbowR.rotate(angle= (-pi/2)/5.4, axis = (0,0,1))
fweaponR.rotate(angle= (pi/4)/5.4, axis = (0,0,1))
fhipL.rotate(angle= (-pi/2)/5.4, axis=(-1,-1,1))
fkneeL.rotate(angle = (pi/3)/5.4, axis=(0,0,1))
fhipR.rotate(angle=(-pi/2)/5.4, axis=(1.5,0,0))
fkneeR.rotate(angle=(pi/2)/5.4, axis=(1.5,0,0))
```



Lunge

```
def lunge(j):  
    for i in range (1, 400, 1):  
        angle = math.radians(i)  
        print i  
        if 0 < i < 5.4:  
            rate(10)
```

Advance

- ◉ Horizontal Translation
- ◉ `def advance(j):`
 `fheart.pos.x+=j`
- ◉ Call the function within the Lunge rotation.

Advance

```
fweaponR.rotate(angle= (pi/4)/5.4,  
                axis = (0,0,1))
```

```
advance(1)
```

```
fhipL.rotate(angle= (-pi/2)/5.4,  
             axis=(-1,-1,1))
```

Retreat

- ◉ Horizontal Translation

- ◉ `def backwards(j):`
 `dir=1`
 `fheart.pos.x-=dir`

Retreat

- ◉ Reverse the Lunge
- ◉ Same code, but with opposite angles
- ◉ Instead of going from top down, move from down up.
- ◉ Also call the backwards function within the retreat lunge.

Creating the Opponent

- Created a second wire frame
- Shifted the head and torso by 15 in the x direction

```
fheart2=frame()
```

```
fhead2=frame(frame=fheart2, pos=(15, 1.75, 0))
```

```
ftorso2=frame(frame=fheart2, pos=(15, .75, 0))
```

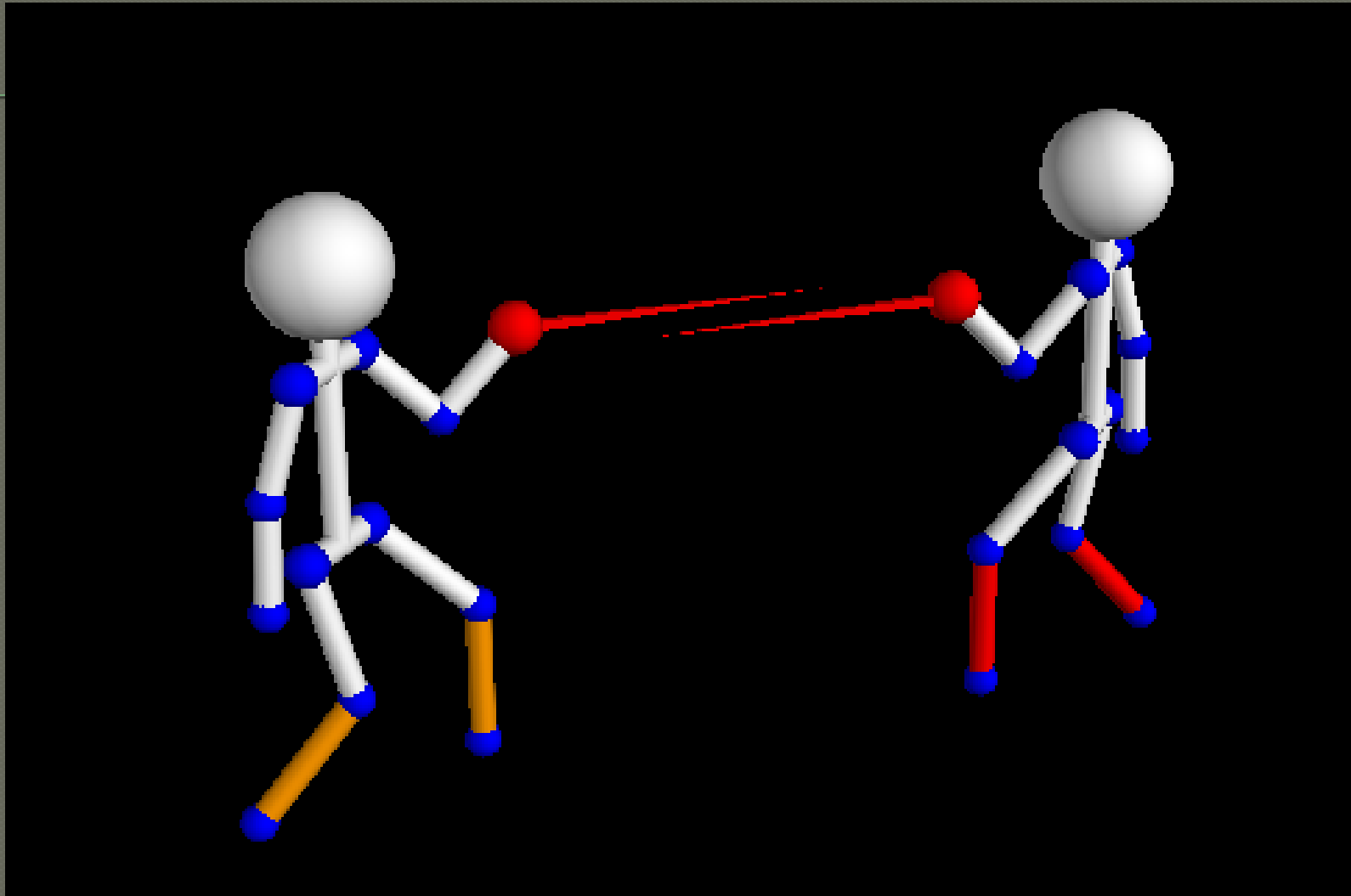
```
fwai2=frame(frame=ftorso2, pos=(0, 2.5, 0))
```

Creating the Opponent

- Rotated torso by π to turn the opponent to face the moving fencer.

```
ftorso2.rotate(angle = (pi),  
               axis = (0, 1, 0))
```

- Changed "sock" colors

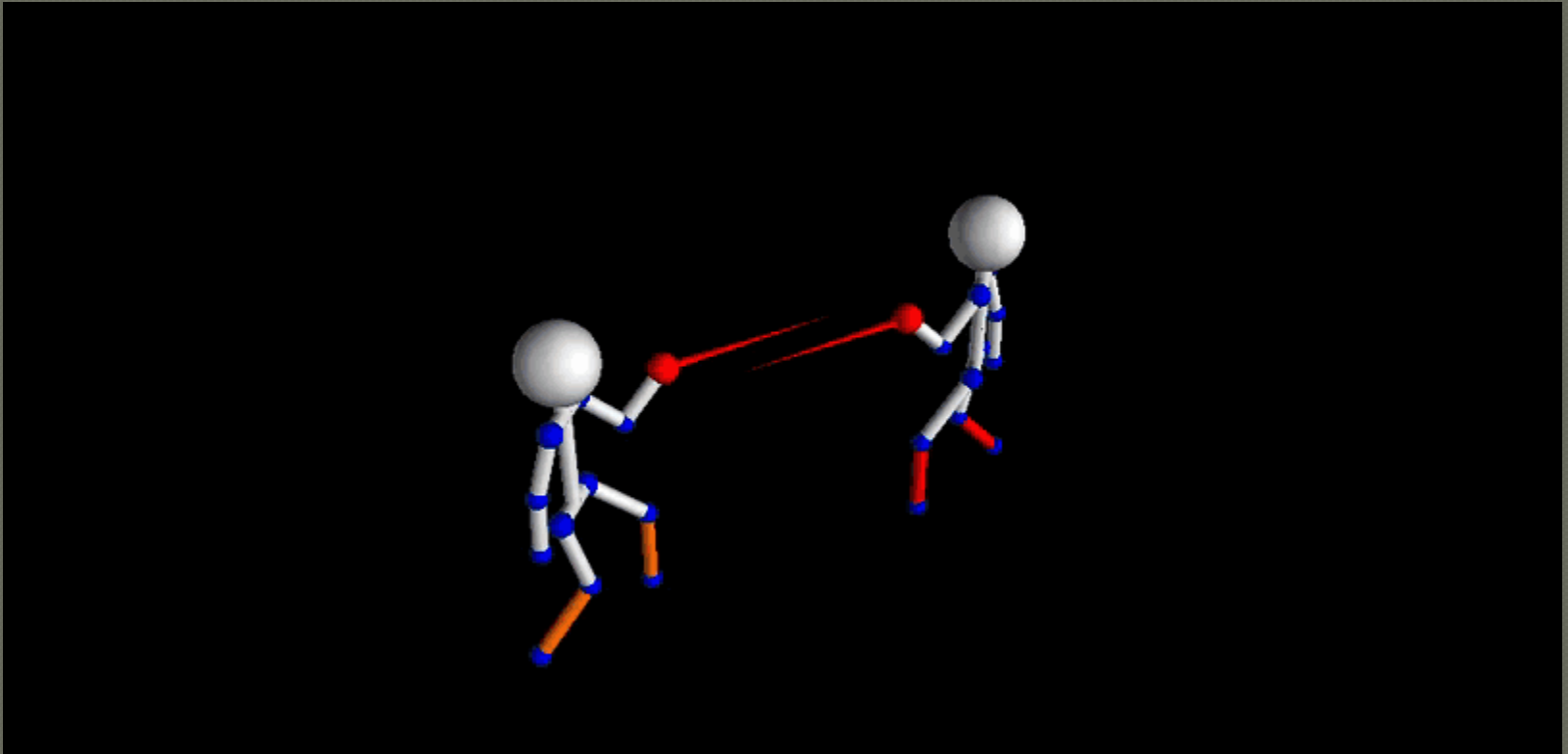


Key Presses

- ◉ Fencing animation does not start until any key on the key board is pressed
- ◉ After the frames and objects for body 1 and 2, add the following:

```
scene.waitfor('keydown') # wait for  
keyboard key press
```

Final Animation:



Project Future

- ◉ Have the opponent retreat and then parry riposte
- ◉ Can demonstrate other fencing moves:
 - Feint
 - Fleche
 - Beat
- ◉ Create a virtual fencing bout
- ◉ Add in the strip