We will learn more types of events such as:

- Model manipulation
- pointOfViewChanged

We will also learn about guarding events and how to add new properties and counters.

Announcements:
- Your Exam 1 is on Gradescope
  - Request regrade by Friday, Oct 19
  - Solutions on the resources tab on course website under old tests

Setup for Lecture today:
- Put in the objects:
  - Biped: Panda, whiteRabbit
  - Automobile: Hatchback, Sportscar
  - Shapes/Text: TextModel – name it counter

Event: DefaultModelManipulation
- Allows you to click on any object and move it
  - Click on it and drag it
  - Click with Shift key – move up and down
  - Click with Control (or CTRL) – turn an object
Try it! – objects moved and turned

Event: pointOfViewChanged
• Pick a character and events can happen based on this character's location changed

Event: PointOfViewChanged (cont)
• I picked Panda

Whenever panda close to whiteRabbit
• Whenever the panda is close to the white rabbit, the white rabbit should tell him
• The event is with respect to the panda

• Move whiteRabbit? Move Panda?
Event Corresponds to Panda

- When you move the whiteRabbit close to Panda, nothing happens.
- When you move the Panda close to the whiteRabbit, something does happen!

Properties

- A 3D object has its own:
  - Procedures – things it can do, like move, turn
  - Functions – values it can calculate like distance to, getHeight
  - Properties – data on its current state
    - Paint – what color it is
    - Opacity – all on are faded?
    - Width, height and depth
    - Vehicle

Change Properties

- What happens when this code executes?

Adding a new property to whiteRabbit

- Suppose we want to add a new property to the whiteRabbit, so it knows the maximum height it has jumped.
- Name it `howHighJumped`
- It’s type would be a decimal number.
Add jump proc, call it, what happens?

Jump Proc Fixed!

• Now whiteRabbit says 10!

Counter

• Want the Panda to count the cars by getting close to each car
• We need a 3D text to display the count. This is a 3D text showing a “String” as a 3D model. Note you cannot add a number to a string.
• We will also need a number property to add to and then redisplay the new number

Create a 3D Text object
Create the 3D text counter

• 3D text counter
  – it’s an object
  – Has a text field
  – set it to “0”

• Note cannot add a number to a string
  “0” + 1 doesn’t compute!

• Make it darker, I painted it Blue

Need to add a Number property to the 3D counter object

• Under textModel add a property

Under textmodel add 2 procedures

• setupCounter
  – What things do we need to do?

• updateCounter
  – What things do we need to do to update the counter?

Code for setupCounter and updateCounter
Interactive Story: Counting Cars

• Want the Panda to first come close to the whiteRabbit who will tell him to count the cars by touching them. At this point we show the counter.
• The panda visits the cars and counts the two cars.
• Then the panda visits the whiteRabbit and this time he says “well done”

First update eventListener

• Have rabbit tell panda to count and initialize the counter

Create new pointOfViewChangeListener for panda

• Count a car when the panda is close to it

Run your program

• Have the panda get close to whiteRabbit, more than once, what happens?
• Have the panda get close to the cars, what happens? How many cars are there?
We need to **guard the events** so they only happen once, or when we want them to

- We only want the rabbit to tell the panda once to count the cars!
- We only want to count a car once!
- We need to make something happen the first time both of these occur, and then check for that later….

Guard getting close to whiteRabbit

- First set the 3D text to “hello”, then change it the first time the panda is close to the whiteRabbit.
- Change it to “0” in setupCounter

Guard getting close to cars

- Change something the first time panda is close to them so you can check it.
- Change the opacity of the car by 10% or more – I decided to set to 0% so invisible
Guard for the whiteRabbit to just say “great job” once

• Add two conditions, now it can only happen once

This lecture covered

• Two new types of events:
  – ModelManipulation
  – pointOfViewChanged

• How to guard an event so it only happens once, or when you want it to
• Adding a new property to an object
• Counter that displays its count