Class Today

• More types of events
  – Model manipulation
  – pointOfViewChanged
• Guarding events
• Adding a new Property 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?

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

```
class TextModel extends STextModel

properties
  WholeNumber counterNumber = 0
```

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?

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

```plaintext
declare procedure pointOfViewChanged()

do in order
    if (this.panda.getEntity().getDistanceTo(this.car) < 2.0)
        this.counter.updateCounter
    end if
    if (this.panda.getEntity().getDistanceTo(this.car) < 2.0)
        this.counter.updateCounter
    end if
    do nothing
```

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 whiteRabbit

- Check to see if contents are hello
- Change it to “0” in setupCounter
- This event can only happen once!

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