CSCI 1106
Lecture 10
Buttons, Text, and Lists
Announcements

• Today’s Topics
  – Random Numbers
  – Buttons
  – Text
  – Lists
Don’t Push the **Big Red Button**...

- Buttons are sprites that identify an action and how to perform it
- Buttons identify an area for a user to click on
- Buttons generate an event that the application can respond via an event handler
Button State

• A button has three (3) states
  – **Up** is the normal state of the button
  – **Over** is when the mouse is hovering on the button
  – **Down** is when the button is pressed

• Idea: For each of the three states the button can have a different look (costume)
Creating Buttons

• Create *sprite with three costumes*
  – *Up*
  – *Over*
  – *Down*

• Have sprite receive FRAME event
  – If the mouse is touching the button
    If clicked [*Down*] use Costume 3
    Otherwise [*Over*] use Costume 2
  – Otherwise [*Up*] use Costume 1

• Only change costumes if necessary!

• When should we actually execute action associated with button?
Text

• It is useful for games to display text
  – Instructions
  – Player information (score, health, level, etc)
  – Dialogue

• There are two types of text that we can display
  – Static text, which does not change during the game
    • Instructions
    • Dialogue
  – Dynamic text, which changes as the game progresses
    • Player information
Static Text

- To create static text on the stage
  - Use sprite whose costume(s) contain text
  - Place sprite where you want to text to be displayed
- Switch the static text by switching costumes
- Pros:
  - Easy to do
  - Can use any tool to create and render the text
- Cons:
  - Text cannot be modified once program is running
  - Text design in the Scratch Paint Editor is minimalistic
Dynamic Text

• Three options for displaying dynamic text:
  – Variables
  – Say/Think blocks
  – Third party blocks
Dynamic Text: Variables

• To Use:
  – Create a variable
  – Drag the field displaying the variable to where you want to place it
  – Modify variable to change the text being displayed on stage
  – Hide / Show the variable as desired

• Pros:
  – Easy to use

• Cons:
  – Does not look good
Dynamic Text: Say/Think Blocks

• Use these blocks in your scripts when you wish a sprite to say or think something

• Pros:
  – Easy to use
  – Looks ok

• Cons:
  – Text is associated with a sprite
  – In many cases, the text is neither said nor thought
    • e.g., Player information
Dynamic Text: Third Party Blocks

• There are additional blocks, implemented by other people available on the web
  – You will need to find them on your own

• Pros:
  – Look good

• Cons:
  – Have to find them yourself
  – In many cases they are specialized
    • e.g., a counter rather than a general text field
Lists

• A *list* is contiguos sequence of elements
  – Used to store lists of data, e.g.,
    • numbers
    • strings

• Lists can be manipulated using operations:
  – *add* item to end of the list
  – delete $i^{th}$ item of the list
  – *insert* item at location $i$
  – replace $i^{th}$ location with item $i$
  – *access* $i^{th}$ location
List Operations

| Codon | 1 | 2 | 3 | 4 | 5 | 6 | 7 | ...
|-------|---|---|---|---|---|---|---|---
| Codon | A | O | G | A | C | G | G |   

- **Think item 3 of Codon**
- **Add G to Codon**
- **Replace item 2 of Codon with C**
- **Delete 4 of Codon**
## Looping over a List

<table>
<thead>
<tr>
<th>Index</th>
<th>Codon</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>2</td>
<td>U</td>
</tr>
<tr>
<td>3</td>
<td>G</td>
</tr>
<tr>
<td>4</td>
<td>A</td>
</tr>
<tr>
<td>5</td>
<td>C</td>
</tr>
<tr>
<td>6</td>
<td>G</td>
</tr>
<tr>
<td>7</td>
<td>G</td>
</tr>
</tbody>
</table>

set idx to 1

repeat length of Codon

say item idx of Codon for 2 secs

change idx by 1

A
U
G
G
G