Mei Si
Assistant Professor,
Cognitive Science Department &
Games and Simulation Arts and Sciences Program
Basic Research Topics

- Embodied Conversational Agent
  - Model of character’s “Mind”
    - Model of the user
  - Embody the character
- Interactive Narrative/Interactive Storytelling
- User experience/User Interaction Design
Authoring Challenge

Different paths through the story lead to different user experiences

Automation is needed
Decision Making: Role of Motivations, Context and Theory of Mind

Wolf’s Alternative Actions:

- Eat Red
  → Not Hungry
  → Woodcutter will kill me
- Greet Red back:
  → Follow Norm
  → Fun to talk
- Walk away
  → Fun to walk
- Do nothing
  … …
Emotion: Role of Motivations, Context and Theory of Mind

- Relevance
- Motivational Congruence
- Accountability
- Control
- Novelty
Plot Design

- Arrange a sequence of events for creating pedagogical or entertainment effects
  - Order of events
  - Pacing
Forms of Embodiment

- 3D digital character
- 2D digital character
- Combine digital character with robotic body
• Procedural Generation of Facial Expression, Gestures and TTS
• Coordinated Verbal and Non-verbal Behaviors

```
sbm bml char brad <speech
  type="application/ssml+xml" id="myspeech">
  <mark name="T0"/>hello
  <mark name="T1"/>
  <mark name="T2"/>my
  <mark name="T3"/>
  <mark name="T4"/>name
  <mark name="T5"/>
  <mark name="T6"/>is
  <mark name="T7"/>
  <mark name="T8"/>Mike
  <mark name="T9"/></speech>

<head type="NOD" start="myspeech:T4"/>
<face type="FACS" au="4" amount="5"
  start="myspeech:T7"/>
```
A Virtual Space for Children to Meet and Practice Chinese

Learning by acting
- 2D animated characters
- Kinect enabled interaction
- Support multi-user, multi-location interaction and real time voice chat
Embodied User Interaction

- Difference between face-to-face interaction and media mediated interaction
- Cognitive robotics
- Kinect enabled contact free interface
- Hepatic feedback
Embodied Cognition

“In building our physical and social worlds, we build our minds and our capacities of thought & reason.”

-- Andy Clark
Key Theories in Embodied Cognition

- **Perception**: motivated by active exploration of environment & its affordances.
- **Decision-Making**: leverage resources from body movement and environment.
- **Emotion**: rooted in the body & mirror neurons encourage empathy.
- **Memory**: offloaded to the environment via cognitive scaffolding.
In contrast, non-embodied theories treat

- Our body as sensing and communication devices
- Cognition as a set of functions that operate on information and can be simulated by non-body based machine
Bach y Rita Study

- Tactile-visual substitution study conducted over many years:
- Blind subject rigged to head-mounted camera with sensors attached to thighs.
- Activates “quasi seeing” w/o parts of the body or brain dedicated to seeing.
URP/Independent Study

- Virtual environment/virtual character programming
- Cognitive robotics for interactive storytelling
- Experimenter
- Literature review

sim@rpi.edu