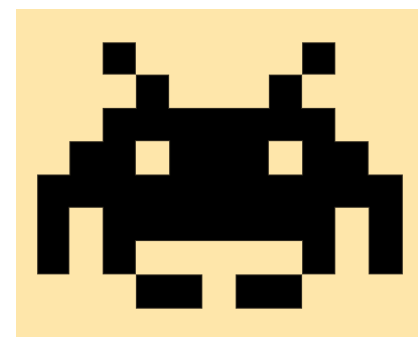# CSCI 1106
Lecture 05

Player Movement &

High Level Game Design

Announcements

- Game project starts next week
- Today's Topics
  - Player Movement
    - Motivation for player movement
    - Mouse Movement
    - Keyboard Movement
  - High-level game design
    - The Unifying Theme
    - The Game Story
    - Game Mechanics

Player Motion

- All interactive games have player movement
  - Players can move their character or avatar on the screen
  - Players can react to the game and move their avatar
- How the avatar moves is dictated by the game
  - Laws and physics of the game
  - Goals and objectives
  - Environment and level of play
- Common ways to move the avatar are through
  - Mouse
  - Keyboard
  - Dedicated game controllers and joysticks

Direct Mouse Movement

- Idea: Make the player the "mouse"
  - The avatar appears where the mouse is pointing to
  - No need to control the velocity of the avatar
  - Position and velocity is managed by the mouse movement

- How:
  - Set the player sprite's coordinates to the mouse coordinates at each FRAME event
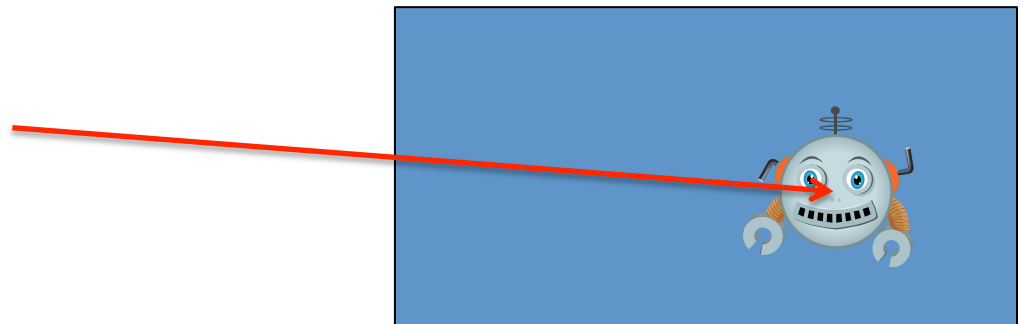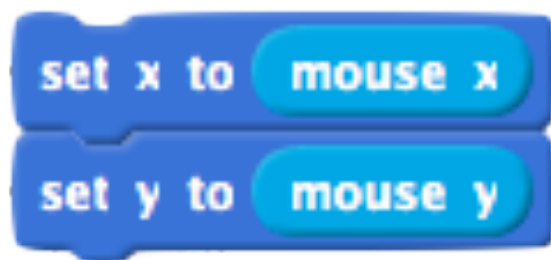
Direct Mouse Movement

- Pros:
  - Easy
  - Not much code required
- Cons:
  - Restrictions on movement may be needed, e.g.,
    - Disallowing movement in some dimensions (paddle)
    - Checking if mouse is over the game panel area
  - Violates most accepted laws of physics
    - Avatar can accelerate and move instantly
- How can we solve these problems?

Mouse Movement using Easing

- Idea: gradually move avatar toward the location clicked on with the mouse pointer
  - A mouse click sets the target to move toward
  - Calculate distance between the avatar and target
  - Incrementally move the avatar toward the target
  - Note: the avatar isn't guaranteed to reach the target because the target will change if another location is clicked first
- Pros:
  - Makes the physics of the game more realistic
  - Restricts avatar movement by ignoring clicks on illegal areas of the stage
- Cons:
  - Allows only coarse-grained movement

Implementing Easing

- Declare an EASING constant
  - *0 < EASING < 1*
  - Smaller constant implies slower movement

- Create a transparent "Target" sprite

- Set *"Target" at* avatar's location

- On each FRAME event If the mouse is down
  - Move "Target" to mouse location

- On each FRAME event
  - If avatar's distance to "Target" is greater than 1
    - point avatar at target
   - move avatar an EASING fraction of the distance to the target
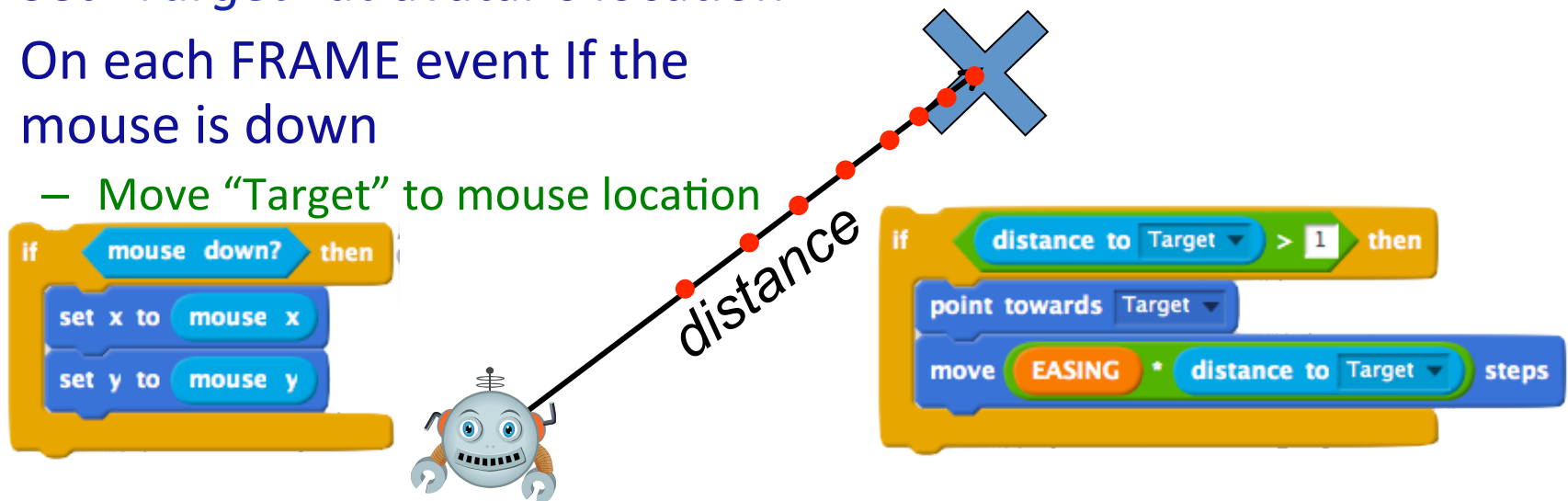
Keyboard based Movement

- Idea: Move the player with the keyboard
  - The arrow keys control the direction that the avatar moves
  - These directions allow the player to move diagonally as well
  - Need to respond to the KEY PRESS events or check if keys are being pressed.
  - More than one key can be down at the same time
- Pros:
  - Very precise movement
- Con:
  - Requires the player to learn the control keys

Implementing Keyboard Controls

- ## On a FRAME event
  - Check which of the arrow keys are pressed and move in that direction
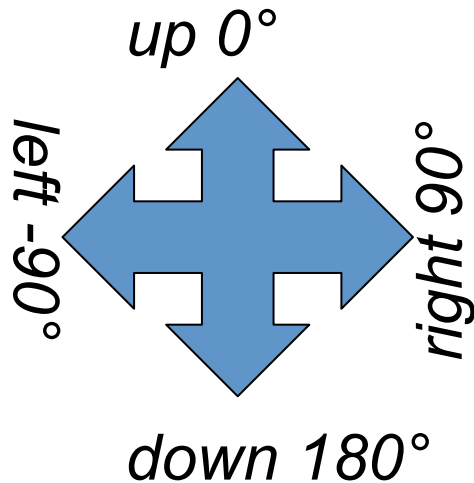
up 0°

left -90°

right 90°

down 180°

High-Level Game Design

- Game Elements
  - Technology
  - Story
  - Mechanics
  - Aesthetics
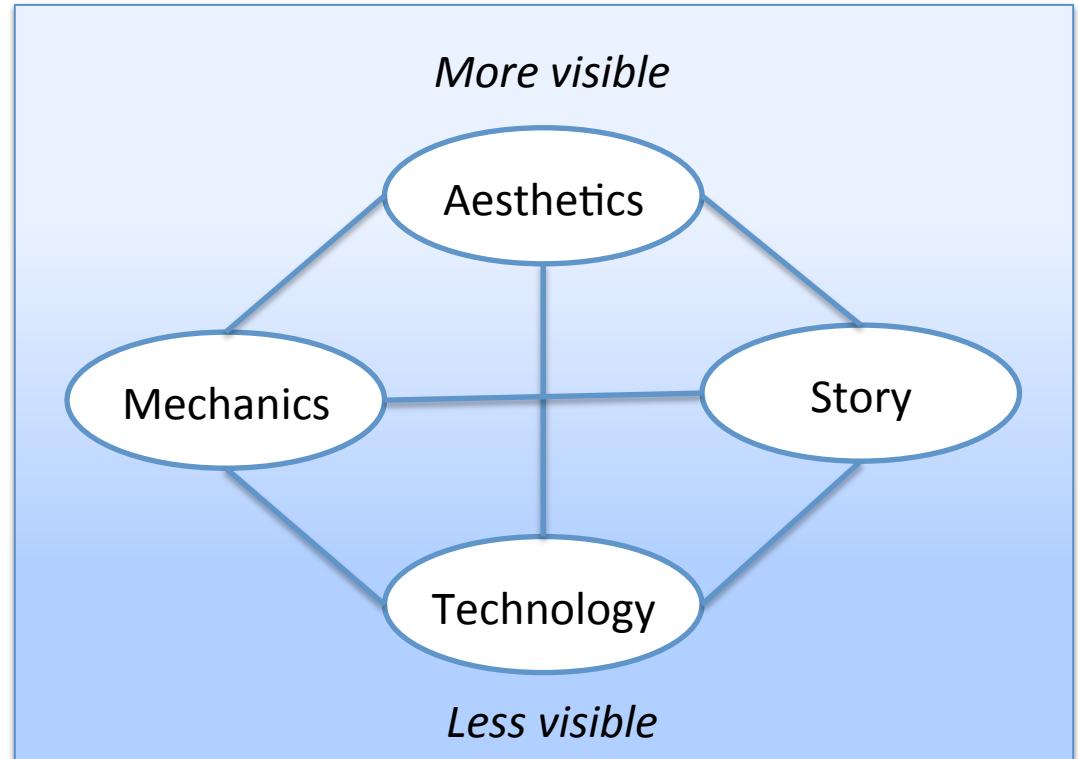
- Idea: The elements work together to create a *unifying theme* in the game

Unifying Theme

- What experience do you want to convey?
  - e.g., pirate life, civilization simulation, a wild west adventure
- Structure your story and mechanics to reinforce your theme
- Examples:
  - Wild west
    - Lots of primitive actions
    - Lots of chance
    - A simple backstory
  - Civilization
    - Mostly strategic actions
    - Some chance, with medium small affects
    - An epic story

The Game Story

- There's nothing like a good story to pull you in...
- A story is composed of:
  - A "world"
    - A place with consistent properties
    - e.g. physics, magic, culture, etc.
  - Characters
    - Individuals with likes/dislikes, personalities, and goals
    - Stock Characters: e.g. soldiers, clerics, plumbers
  - A quest
    - Why are we/they here?
- The story immerses the player
  - Transports them into the "world"
  - Whets the interest of the player (first 100 pages)
- Separates great games from ok games

Story Considerations

- Depth
  - How detailed or grand is the story to be?
  - Epic? (Star Wars)
  - Simple backstory? (Angry Birds)
- Delivery
  - How is the story communicated to the player?
  - Prologue? Snippets? Chapters?
  - Does the player choose the direction of the story?
- Pacing
  - Rate of story telling corresponds to speed of the game
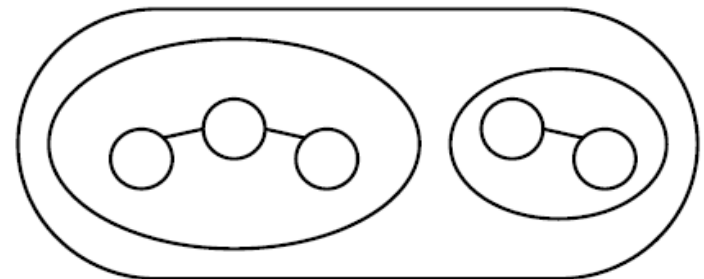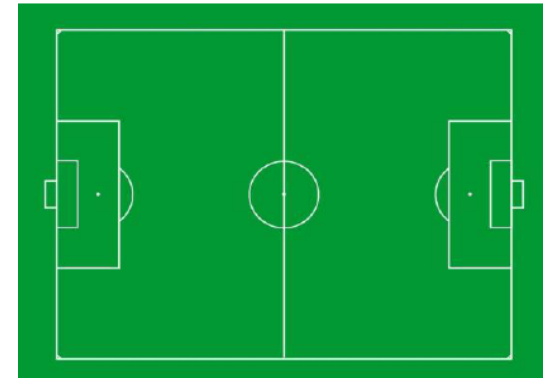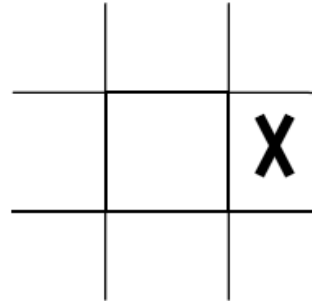
Game Mechanics

- Idea: Use game mechanics to
  - Implement the game story
  - Support the unifying theme of the game
- Game mechanics comprise
  - Rules
  - Environment
  - Actions
  - Chance (Randomness)
  - Skills

Game Mechanics: Rules

- Written rules of play (what happens when I...)
  - User manual
  - Game code

- Unwritten rules
  - Etiquette
  - Sportsmanship

- Object of the game (how do I win the game)
  - Clear
  - Achievable
  - Rewarding/Fun

Game Mechanics: Environment

- **Spaces**
  - Discrete or continuous?
  - Boundaries?
  - Nested Spaces?
- **Number of players**
  - Computer
  - Human
- **Physics**
  - Interaction of objects

Game Mechanics: Actions

- Primitive Actions (private's view)
  - Moving the player
  - Shooting
- Strategic Actions (general's view)
  - Protecting a zone
  - Ambushing

- Most games require combination of both types of actions

Game Mechanics: Chance

- Adds a surprising or unexpected elements
  - The so called "secret of fun"
- Consider how probabilities will factor into the play over the duration of the game
  - Power-ups
  - Density of projectiles
- Some predictability is useful! ?
- The "chance trade-off"
  - A lot of randomness: game is about tactics, short term
  - A little randomness: game is about strategy, long term
  - Good games have the right mix

Game Mechanics: Skills

- Idea: The right amount of challenge will keep the player interested
- Three types of skills:
  - Physical Skills
    - Strength, dexterity, coordination, and endurance
    - E.g. How fast can I hit that button?
  - Mental Skills
    - Memory, observation, and problem solving
    - E.g., The answer is ...
  - Social Skills
    - Reading and fooling opponents
    - Coordinating with teammates
- Many successful games combine skills from multiple categories

Game Genres

- Idea: A set of stock (standard) mechanics that are used by similar games is called *genre*
- Examples:
  - Card games
    - Take turns playing cards
    - Rules govern what the cards mean and who wins
  - Racing games
    - Drive a vehicle on a race course
    - Get across
  - First-person shoot-em up
- Right choice of genre supports the unifying theme