

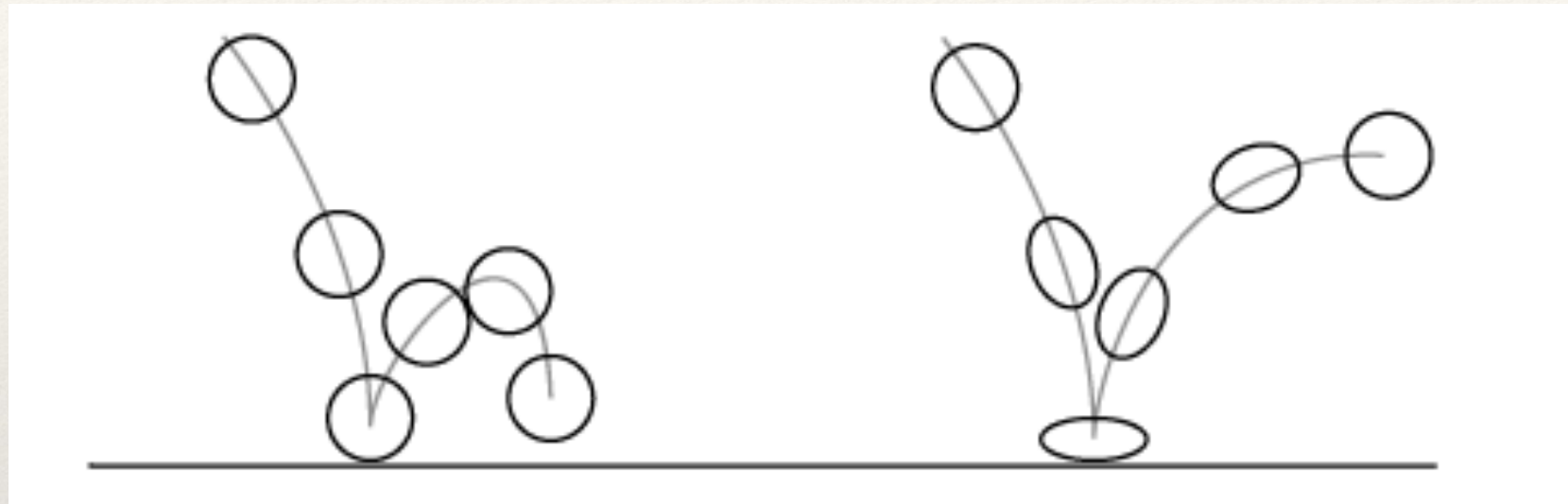
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Timers

Elements of Graphics
CS324e

Creating Animations



- ❖ Series of images presented in succession
- ❖ Gives the impression of continuous motion
- ❖ Using `frameCount` allows animations to play indefinitely

Problem with FrameRate?

- ❖ Sprite animations assume a particular frame rate
 - ❖ Not necessarily 60 frames of animation per second
 - ❖ Sprite frame rate should be slower
 - ❖ Interactive frame rate should be faster
- ❖ How can we animate at a rate different from the frame rate?

Timers

- ❖ Timers allow for changes to happen independent of the frame rate
- ❖ `millis ()` counts milliseconds elapsed since program start
- ❖ Timer variables can initiate an action based on this elapsed value

Consider...

```
int animationTimer = 0;
int animationTimerValue = 50;
int currentFrame = 0;
void setup() {}
void draw() {
    image(x_sprite[currentFrame], 20, 250);
    if ((millis() - animationTimer) >= animationTimerValue) {
        currentFrame = (currentFrame + 1) % numFrames;
        animationTimer = millis();
    }
}
```

Saving Sequential Images

- ❖ `save ()` saves the display window image to current sketch folder
- ❖ Takes a String parameter to name output file
 - ❖ `###` marks in `filename` will be replaced with `frameCount`
 - ❖ Valid output file formats are `.tif`, `.jpg`, `.png` and `.targa`
- ❖ `save ()` can be called within `draw ()`
- ❖ `saveFrame ()` can be called within `draw ()` or mouse/keyboard events

Consider...

```
if (frameCount < 1000) {  
    saveFrame("output###.tif");  
}
```

Hands-on: A Timer Class

❖ Today's activities:

1. Experiment with the code example for a timer-based sprite
2. Encapsulate this idea into a separate Timer class. The timer class should keep track of the current time and have an “interval” for its activation time
3. Add to this Timer class so that the timer can repeatedly activate, and also allow the user to deactivate (and reactivate) the time — similar to a pause button