

# Music Technology

## Processing 1 - Introduction

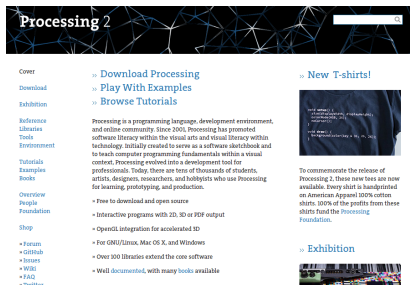
Alex McLean

# Processing



- ▶ Free/open source project
- ▶ Initiated by Casey Reas and Ben Fry in 2005
- ▶ For learning programming in visual context
- ▶ Based on Java, but simplified
- ▶ Sketchbook metaphor

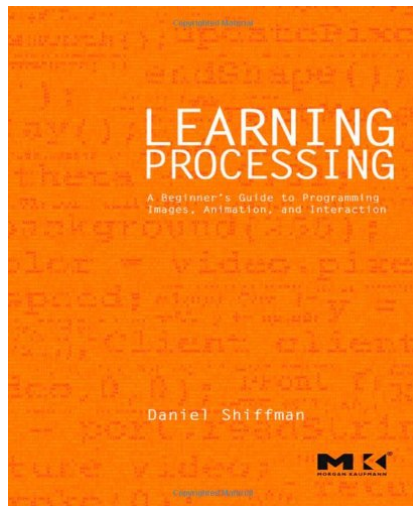
# On-line documentation



<https://processing.org/>

- ▶ Reference, Tutorials, Forum
- ▶ Off-line from UI:
  - ▶ Help -> reference
  - ▶ Right click on code -> find in reference

## Further reading



Video lectures: <http://icm.shiffman.net/>

# Open processing

## Processing 2

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Processing is a programming language, development environment, and online community. Since 2001, Processing has promoted software literacy within the visual arts and visual literacy within technology. Initially created to serve as a software sketchbook and to teach computer programming fundamentals within a visual context, Processing evolved into a development tool for professionals. Today, there are tens of thousands of students, artists, designers, researchers, and hobbyists who use Processing for learning, prototyping, and production.

» Free to download and open source

» Interactive programs with 2D, 3D or PDF output


» OpenGL integration for accelerated 3D

» For GNU/Linux, Mac OS X, and Windows

» Over 300 libraries extend the core software

» Well documented, with many books available


» New T-shirts!



```
void setup() {  
  size(400, 400, P2D);  
  background(0);  
}  
  
void draw() {  
  // something to do  
}
```

To commemorate the release of Processing 2, these new tees are now available. Every shirt is handprinted on American Apparel 100% cotton shirts. 100% of the profits from these shirts fund the [Processing Foundation](#).

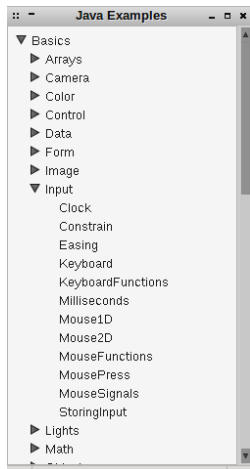
» Exhibition



<https://openprocessing.org/>

# Examples

File -> Examples



# Lets get programming

- ▶ Draw some shapes
- ▶ Play a sound

# Draw a circle

Use the ellipse function call

```
// x, y, width, height  
ellipse(10,10,10,10);
```



# Draw a square

Use the rect function call

```
// x, y, width, height  
rect(30,30,10,10);
```

## Change the brush colour

```
fill(255,0,0);  
ellipse(10,10,10,10);
```

```
fill(0,255,0);  
rect(30,30,10,10);
```

```
fill(0,0,255);  
// x1, y1, x2, y2, x3, y3  
triangle(40,40,50,40,55,45);
```

## Exercise 1

Draw a face (or something) using fill, stroke, ellipse, rect and line.

Reminder:

```
// red, green, blue component from 0 to 255  
fill(255, 255, 255);  
// Same, but for line colour (e.g. around a shape)  
stroke(255, 255, 255);
```

```
// x, y, width, height in pixels  
ellipse(10, 10, 10, 10);
```

```
// same as ellipse  
rect(20, 20, 10, 10);
```

```
// fromX, fromY, toX, toY  
line(40, 40, 50, 50);
```

## Loops - Draw ten squares

```
int count = 0;
while (count < 10) {
    fill((255/10) * count, 255, 0);
    rect(count * 10, 10, 10, 10);
    // add 1 to count
    count++;
}
```

or

```
for (int count = 0; count < 10; count++) {
    fill((255/10) * count, 255, 0);
    rect(count * 10, 10, 10, 10);
}
```

## Exercise 2: Make a sound

Add the minim library to your sketch: (Sketch -> Import library -> minim)

Download sound from <http://yaxu.org/tmp/kick.wav>

Add the sound to your sketch with Sketch -> Add file

```
// Initialise audio
```

```
Minim minim = new Minim(this);
```

```
// Prepare a sound
```

```
AudioSample kick = minim.loadSample("kick.wav");
```

```
// Trigger the sound
```

```
kick.trigger();
```

# Animation the Processing way

Does things in `setup()` once, and then in `draw()` every frame

```
Minim minim;
```

```
AudioSample kick;
```

```
void setup() {  
    // make the canvas a bit bigger  
    setup(300,300);  
    minim = new Minim(this);  
    kick = minim.loadSample("kick.wav");  
    frameRate(2);  
}
```

```
void draw() {  
    ellipse(random(width),random(height),10,10);  
    kick.trigger();  
}
```

## Exercise 3

1. Make a shape move
  - ▶ Add a global float variable called `bally` that stores the y position of the shape
  - ▶ Add another global float variable that stores the speed of the shape
  - ▶ Add speed to `bally` every frame (i.e. within `draw()`)
2. Make the shape bounce off the edges of the sketch and make a sound
  - ▶ have an if statement that tests whether `bally > height`
  - ▶ when that is true, play a sound and invert speed, (i.e. set `speed = 0 - speed`)
  - ▶ do something similar for the top of the sketch (i.e. when `bally < 0`)
3. Challenges: have multiple shapes, or add gravity effect.
4. Challenge question: Could we replace the float variables with int variables? What is the advantage of either?