Lecture 4: processing.py

Programming for VR I

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processing.py

- We're gonna make pretty stuff today!
- From the website: Processing is a flexible software sketchbook and a language for learning how to code within the context of the visual arts.
- By default, Processing is programmed in a variant of Java - but it has an extension that allows us to program in Python instead.

Let's get started with `processing.py`

- Download Processing from `http://processing.org`
- Run Processing
- By default, it will start an empty project - in Java
- First time around: Add mode... Python

Quick tour

- Examples (press play to run)
- Basics > Math > Sine
- Topics > CellularAutomata > Wolfram
- Topics > Simulate > SmokeParticleSystem

The basic flow

- setup runs once
- draw runs once per frame (by default, 60 frames per second)

What's in setup?

```
def setup():
    # Set up the size of the display window.
    size(640, 480)
    # Anything else you need to run once and only once at the start.
```

What's in draw?

```
def draw():
    # Any commands you need to run once a frame, for example drawing a circle.
    ellipse(width - mouseX, height - mouseY, 80, 80)
```

Run and save

- Press play - it works!
- Notice a `processing.py` project is always a whole folder
- Inside that folder is a file with the same name as the folder, with extension `.pyde`

How does processing.py know which functions to call?

- It doesn't - it calls the functions it wants to be there.
- If you name your `draw` function `Draw` or `loop` or `my_very_good_function` - it won't find it.

The 2d coordinate system

- Processing gives you a 2d drawing surface - a canvas.
- The coordinates of this drawing surface are like so:

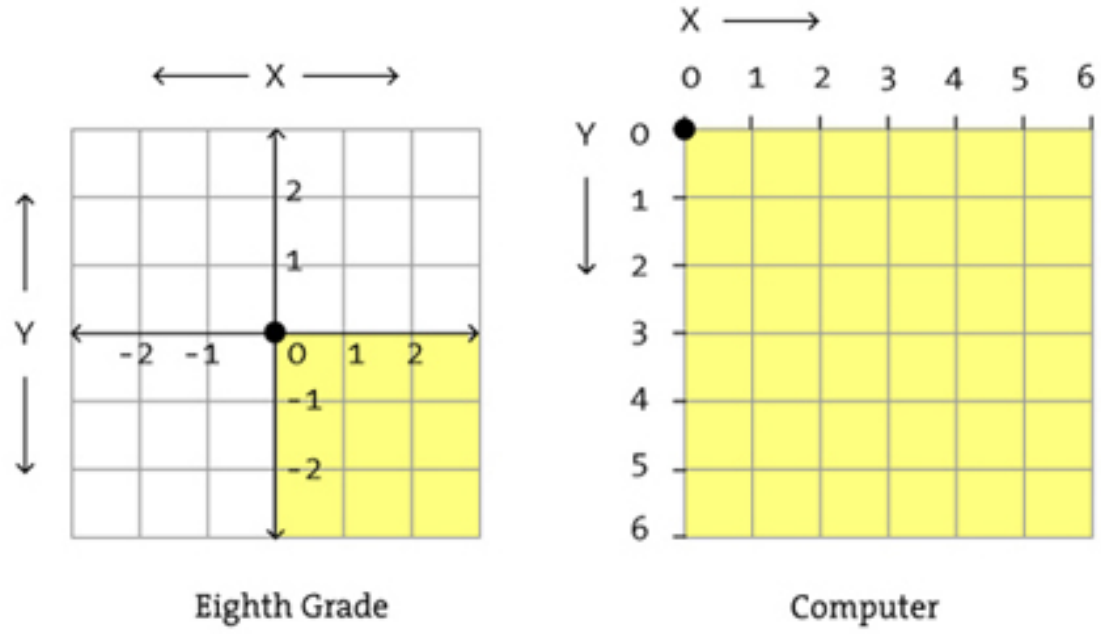


Figure 1: Coordinate system

- Convention: x is before y

Paint 3.0

- `line(x1, y1, x2, y2)`: draws a line
- `rect(x, y, wight, height)`: draws a rectangle
- `ellipse(x, y, width, height)`: draws an ellipse

Paint 3.0

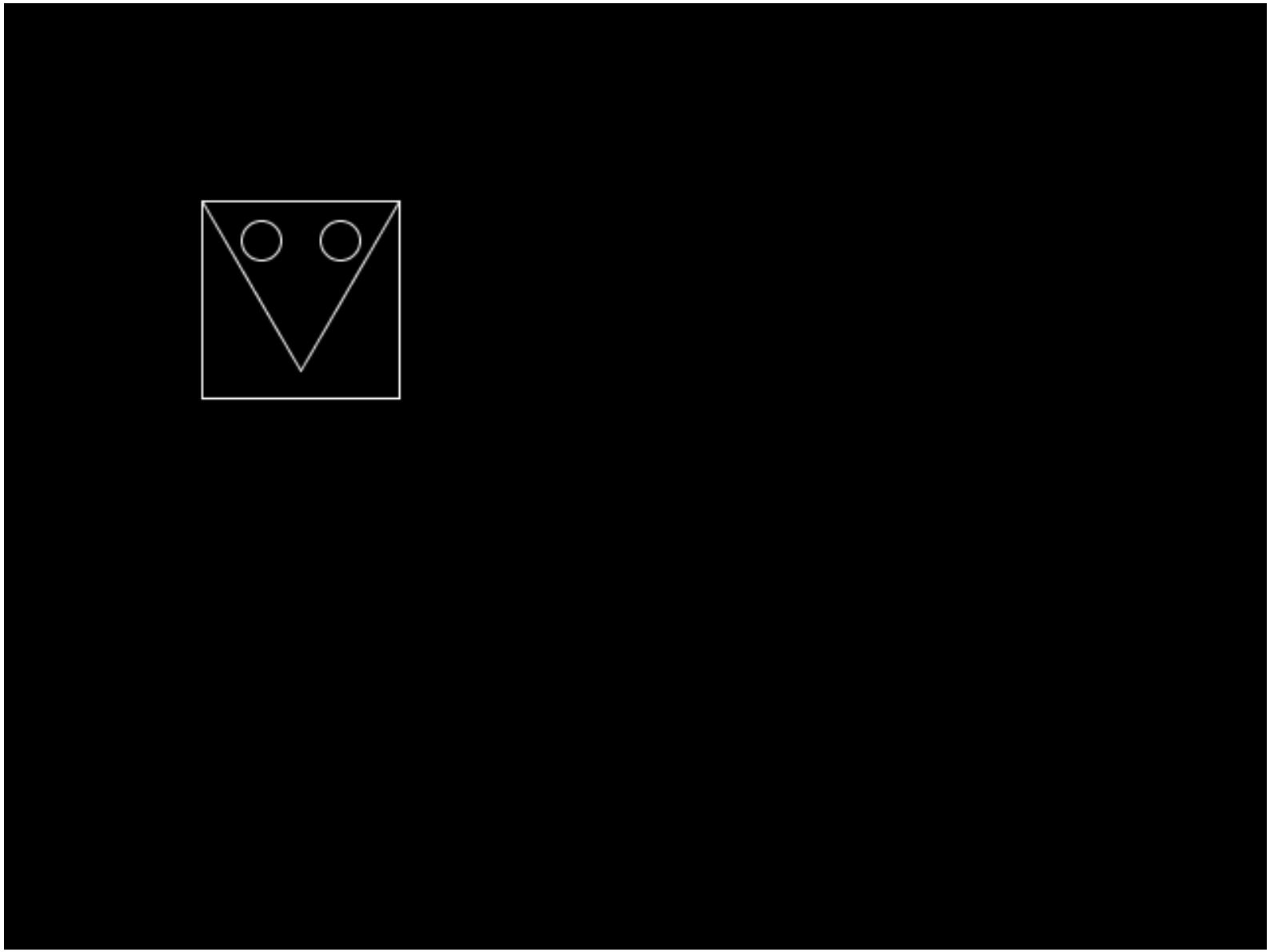
- Set the fill color:

```
fill(r, g, b)
fill(r, g, b, a)
```

- r, g, b: from 0 to 255 - use a color picker
- alpha: from 0 to 255 for blending
- Similarly for `stroke`

Let's try it!

- Draw this figure:



Odds and ends

- To save a screenshot of the frame, use `saveFrame`.
- To prevent looping and redrawing: call `noLoop()`

Randomizing things

- When we draw, adding noise helps make things look good.
- `random` is a module. We import it once at the top of the file. This lets us use `random` functions later on.

```
{.python, .listing} import random ...
print(random.random())
```

- It contains the `random` function, which gives a uniform random float between 0.0 and 1.0

Angles

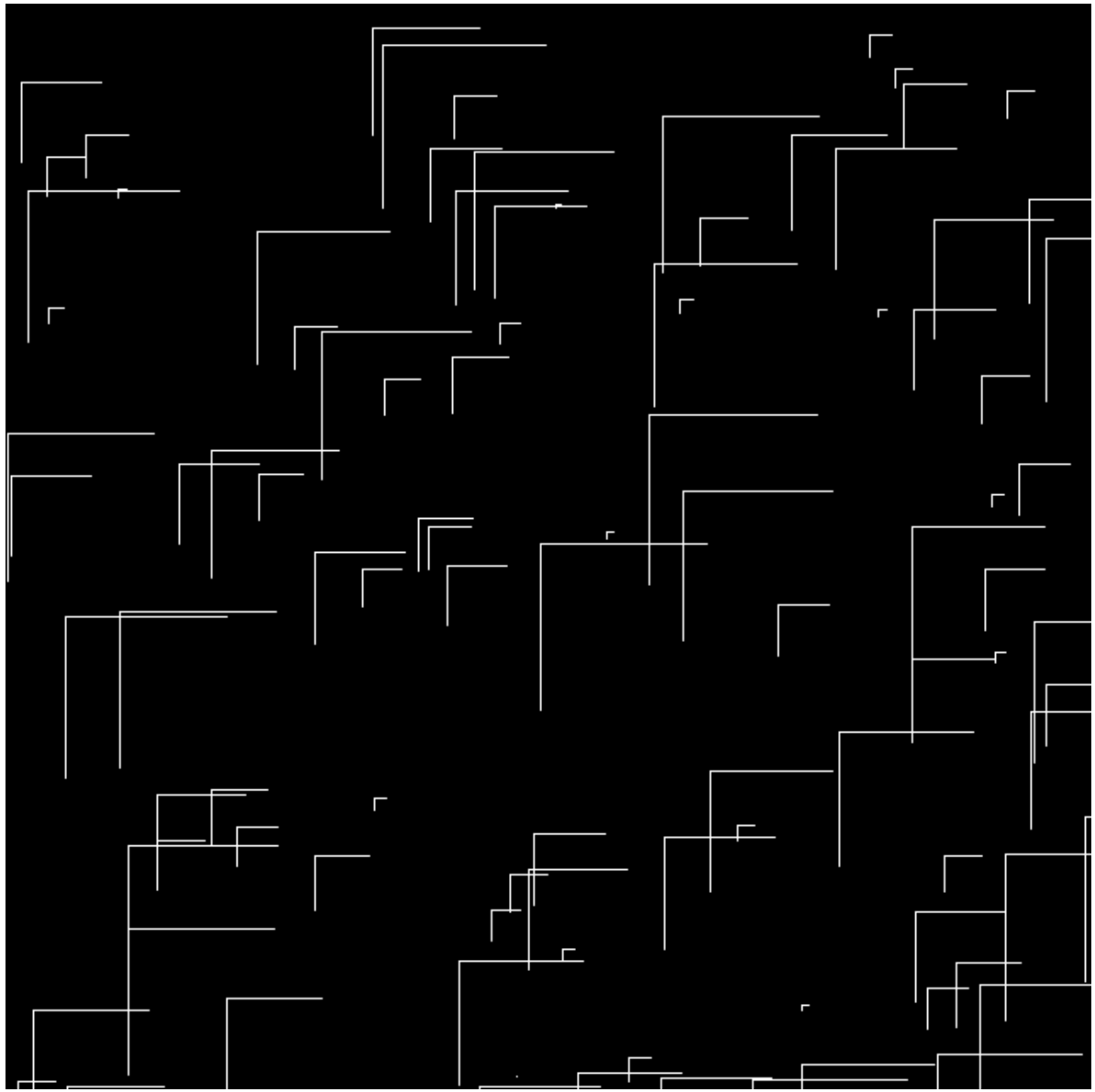
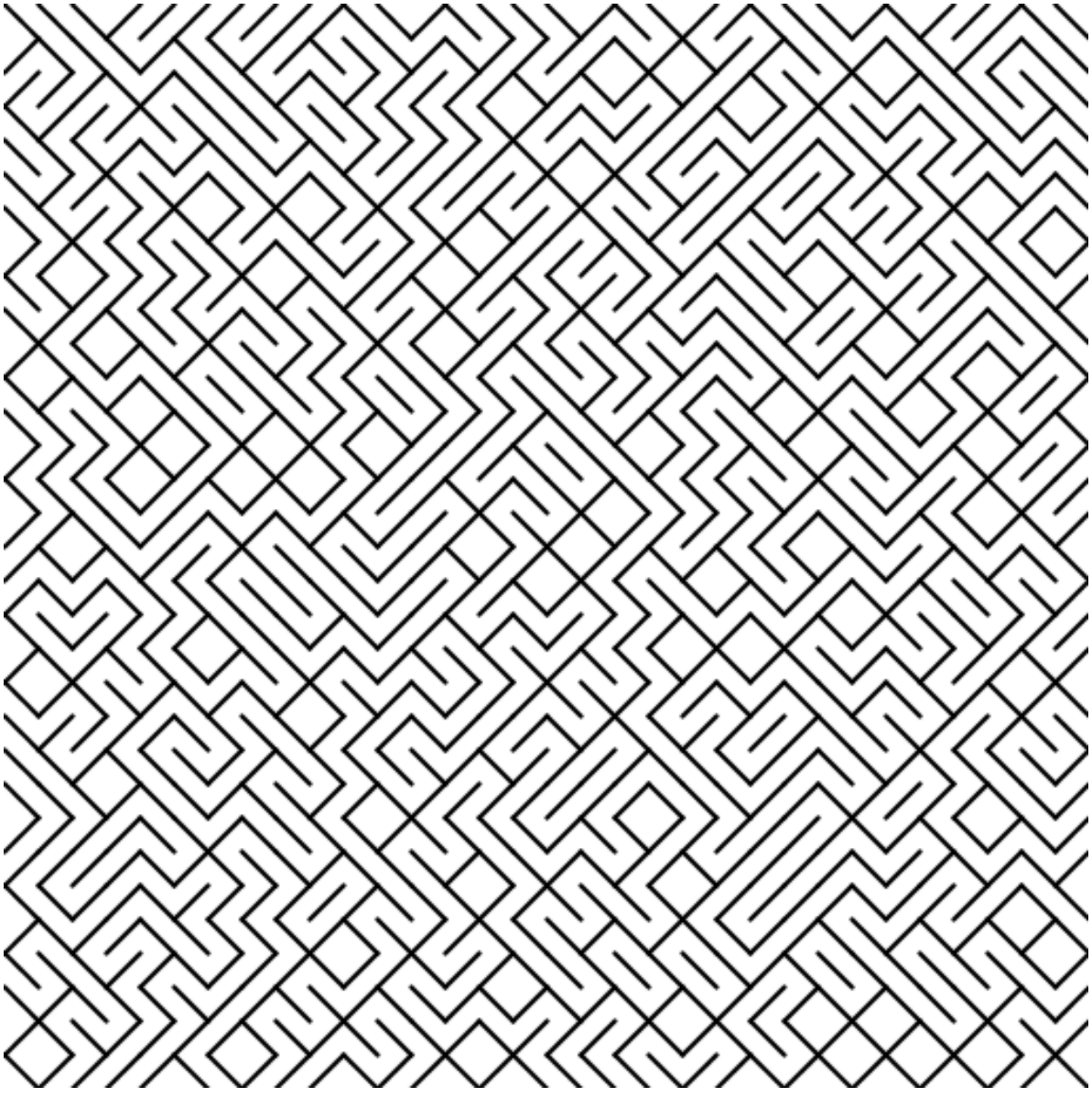


Figure 3: Angles

Stretch example: C64

```
10 PRINT CHR$(205.5+RND(1)); : GOTO 10
```



globals

- never use globals. . .
- . . . except in processing
- functions have scope
- variables die at the end of the function
- sometimes we want them to persist (for instance, across draw calls)
- we use globals for that

git again

- Can you track processing.py projects with git? Yes!
- Let's introduce a few new workflows
- Stop typing your password every time: Git Credential Manager for Windows
- What if you start your repo locally before remotely?

```
git init
```

- Then create the repo remotely.
- Then:

```
git add git commit -m "My message" git push
```