Drawing pictures … It's not art, it's fun

Basic Processing …

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Processing …

- It's our main programming language
- "Processing" is kind of a dumb name,* but it is a good (and fun) language
- It's a language for programming graphical and image-based computations
  - More fun than programming an operating system
  - Easier to do because we "see" what's happening
  - It's real – fun now, great prep for future

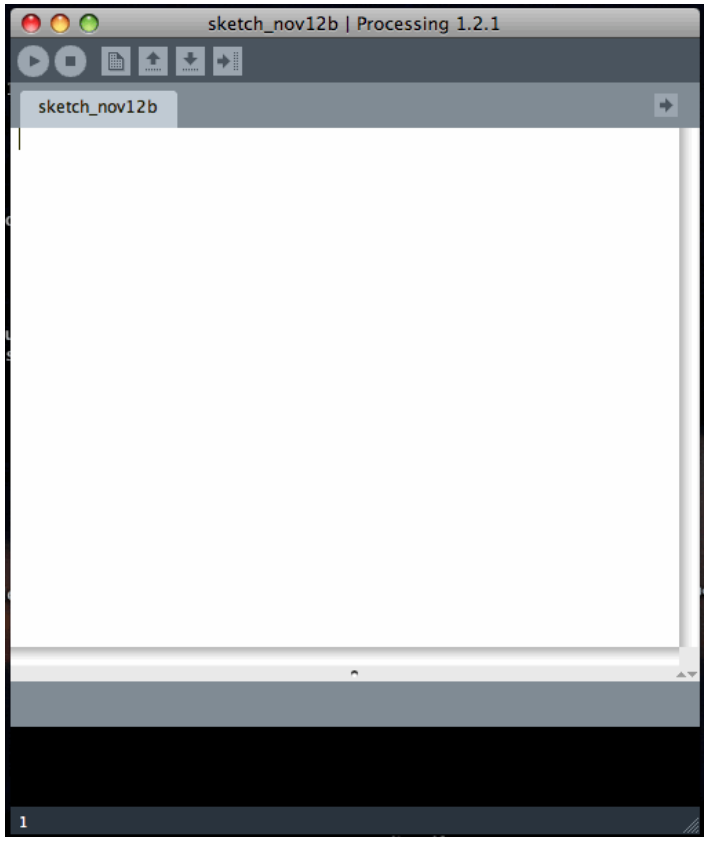
* Really really dumb, actually

Short Interrupt: Grab Processing

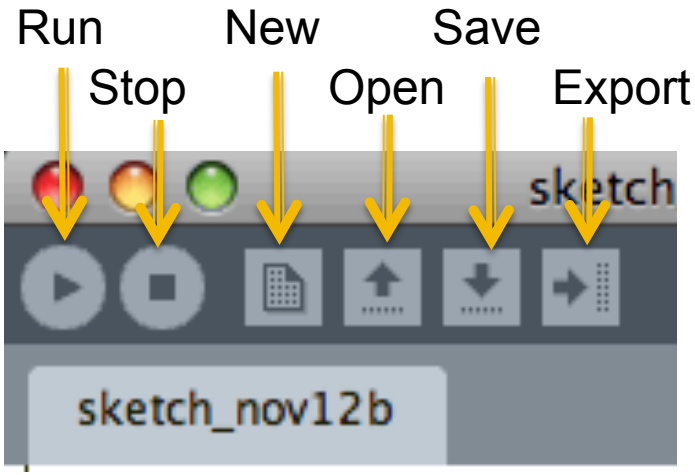
- If you have a personal computer that is convenient to do homework on, then grab a copy of the Processing system and put it on your machine … improve your convenience!
- Grab it at: http://processing.org/download/
- You will want "Windows" or "Mac" versions
- Following installation instructions … it takes less than 5 minutes and then you can work on your own computer!

What You See

- When you start up the Processing system…



programming window



file name

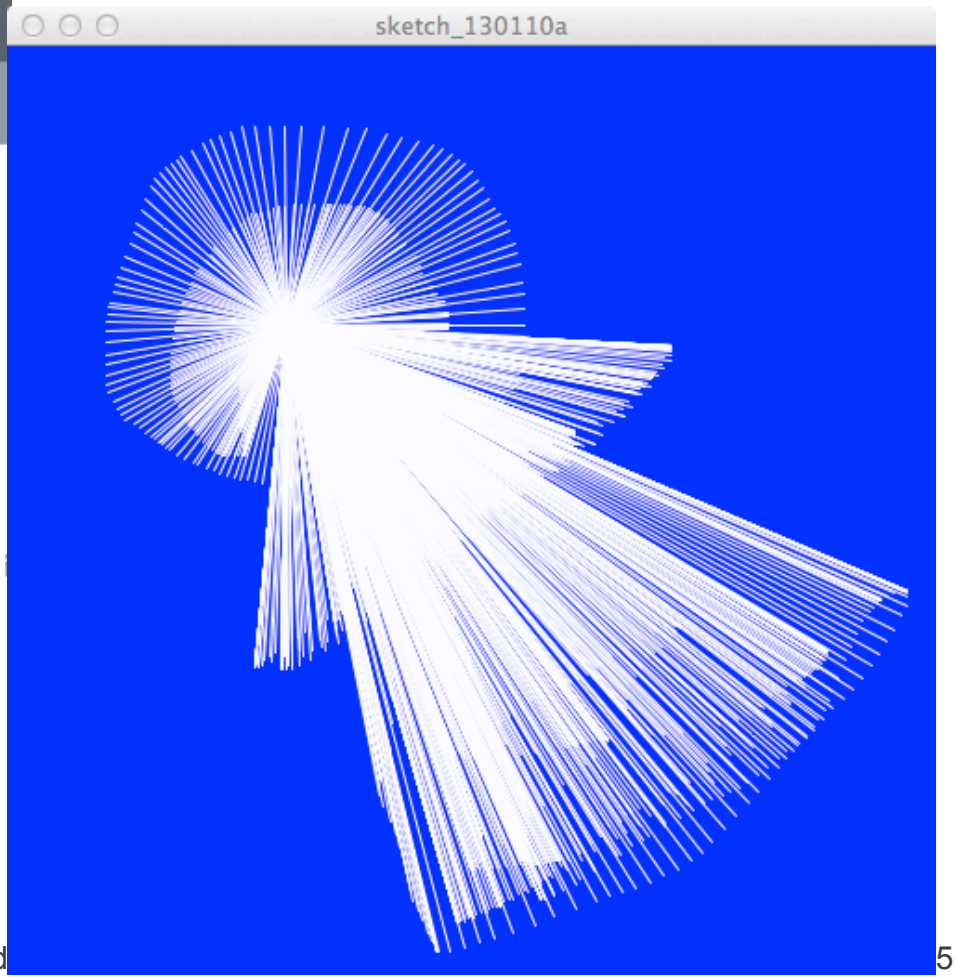
Add Some Code

- Type in instructions that you will learn shortly
  Then run your program

sketch_130110a | Processing 2.0b

sketch_130110a §

```
// Draw a snow angel on blue snow

void setup() {
  size(500,500);         //define canvas size
  background(0,0,255);   //define canvas color
  stroke(0,0,255);       //define line color
}

void draw() {
  line(150,150, mouseX, mouseY); //draw line from
  if (mousePressed){     //if the mouse is ever cli
    stroke(255);
  }
}
```



Looking At Simpler Code

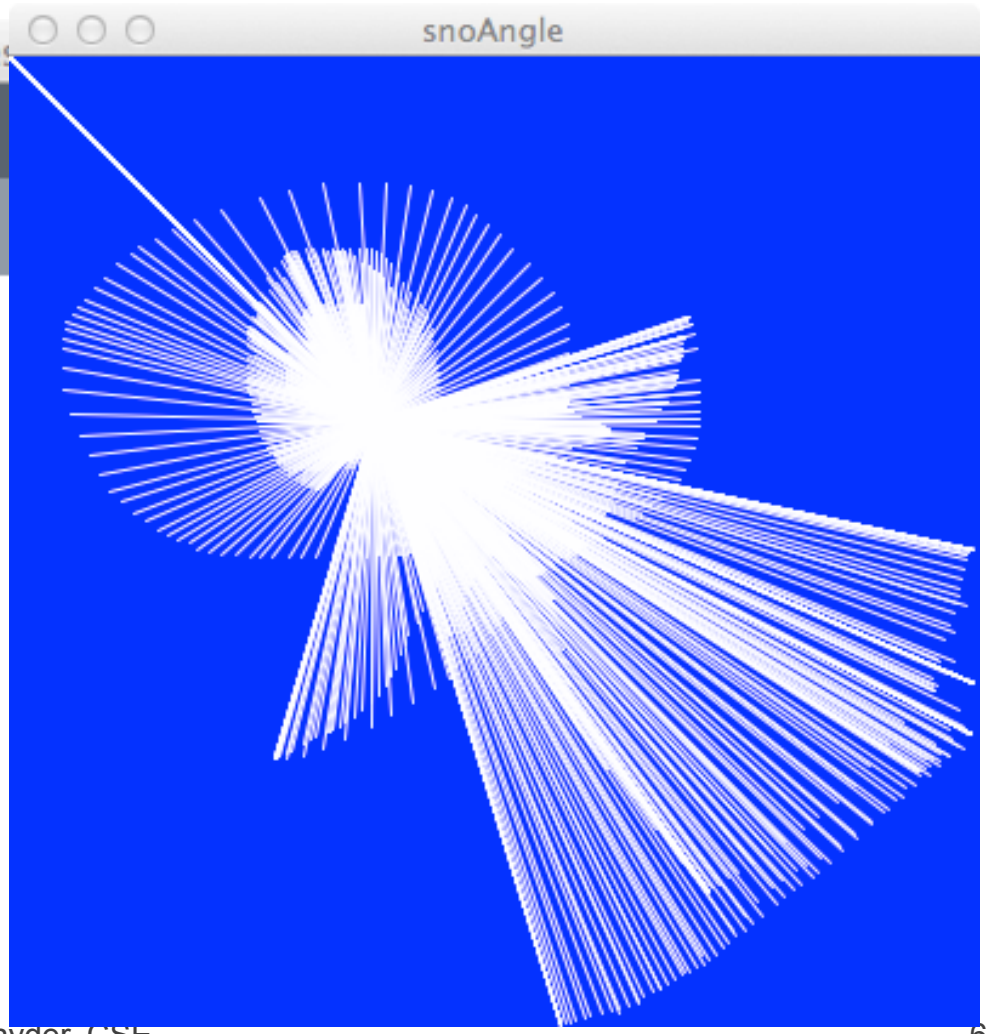
- Drawing a snow angel is straightforward …

snoAngle | Proces

snoAngle §

```
void setup ( ) {
  size(400,400);
  stroke(255,255,255);
  background(0,0,255);
}

void draw ( ) {
  line(150,150,mouseX, mouseY);
}
```

Just Do It!



Coding Is ALL Detail

- Notice everything!


```
void setup( ) {
  size(500,500);
  stroke(0,0,255);
  background(255);
}

void draw() {
  line(100,100, mouseX, mouseY);
}
```

- Two Functions, One Common Form:
  void <*name*> ( ) { *all symbols + placement matter* }
- Every statement ends with a semicolon (;)
- The software colors text it understands – helpful
- Some functions include stuff inside parentheses; these are called *arguments*
- If a function has arguments, each position has a specific meaning: size(<*width*>, <*height*>); stroke(<*red value*>, <*green value*>, <*blue value*>);
- If your cursor is by a closing parenthesis or brace, the matching parenthesis or brace is highlighted

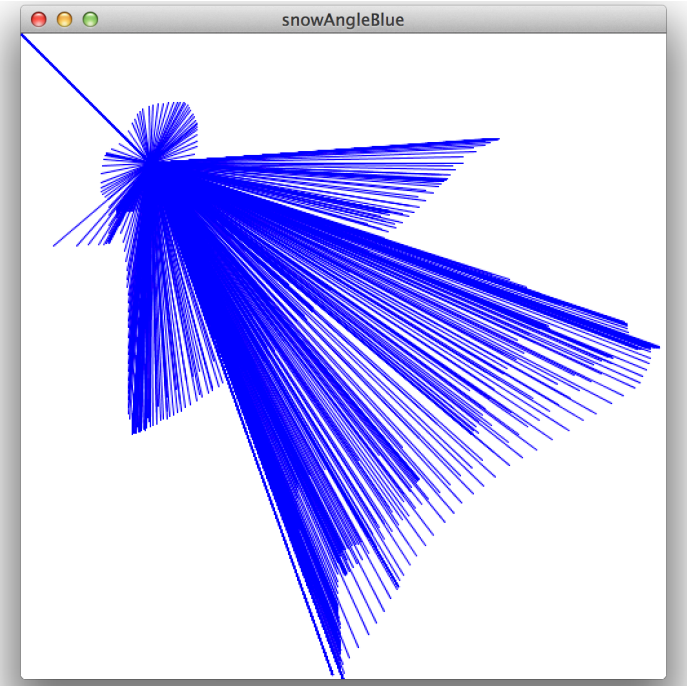
- Keywords are highlighted in blue
- Processing is case sensitive; notice!

The Color Purple

- Colors in most Web programming are given as three values in [0,255]: RGB, for red, green, blue
- The Color Purple, for example, is: **128,0,128**
- These positions are the intensity of the little lights that make up a pixel on the screen
  - The least intensity is 0, that is, off
  - The greatest intensity is 255, maximum brightness
  - Amazingly, the three max RGB colors make **white**
  - So, purple is ½ intensity of Red, no Green, and ½ intensity of Blue … makes sense

Questions about "Angelic Huskies"

- The angel is blue on a white background specified by: `background(255,255,255);` … which means?
- Stroke sets line color: `stroke(0,0,255);`



- Suppose it's a Husky angel on white snow:
- Stroke sets object's color:

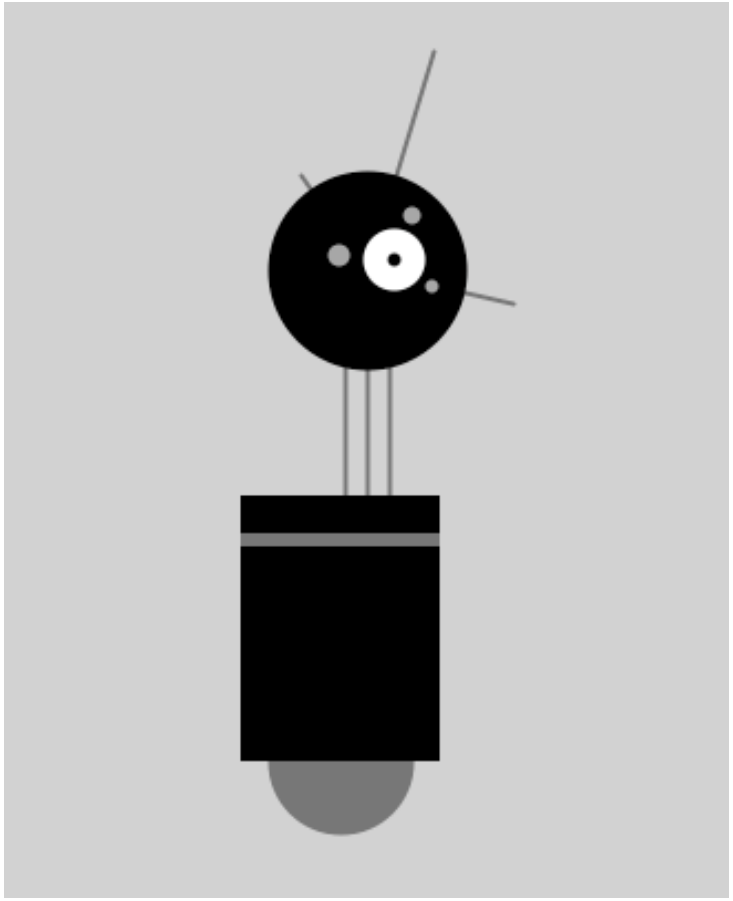
```
stroke(128, 0, 128);
```

It's All The Same

- When the values for RGB are all the same, it's some color of gray, or white, or black
- Since writing `background(255,255,255)` is kind of a drag, Processing allows us to give just one argument; so `background(255)` is equivalent to giving all three `255`s
- What colors are these backgrounds?
  - `background(255,0,0);`
  - `background(64);`
  - `background(0,0,64);`

Simple Shapes Make Robots

- Reas and Fry, in their book, show us a cute robot they programmed using simple shapes
- They give their code and we can see how they built it
- To make the point that all code must "make sense" – its not gibberish – lets look at it even though we don't know Processing yet

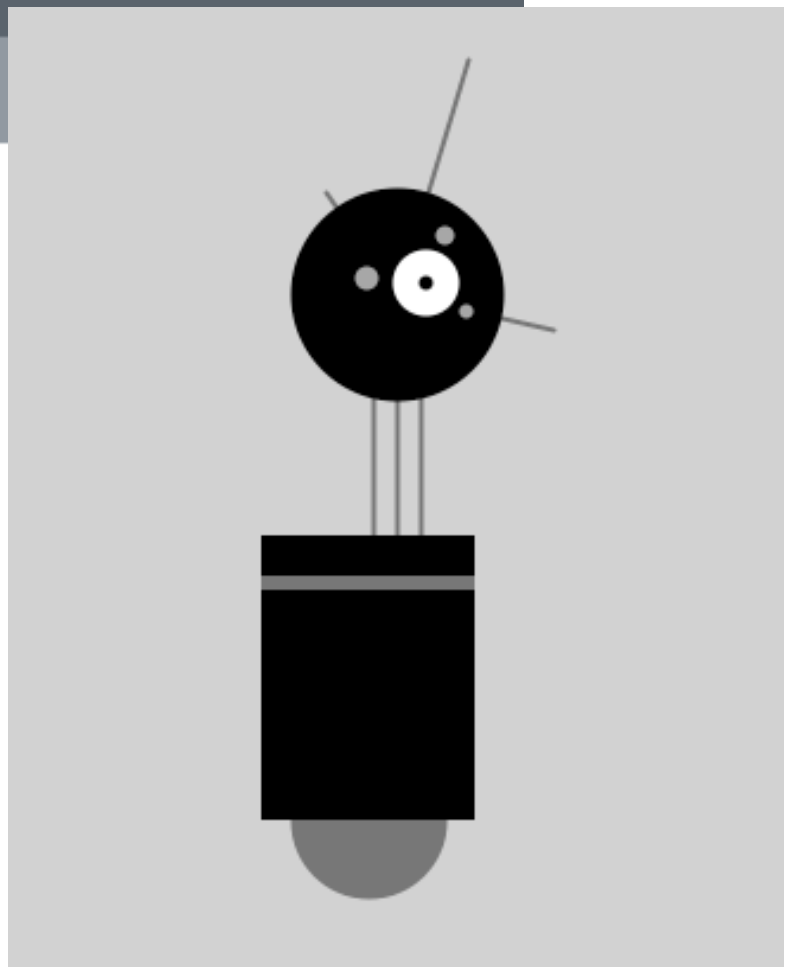


Robot Code, 1

sketch_dec05b | Processing 1.2.1

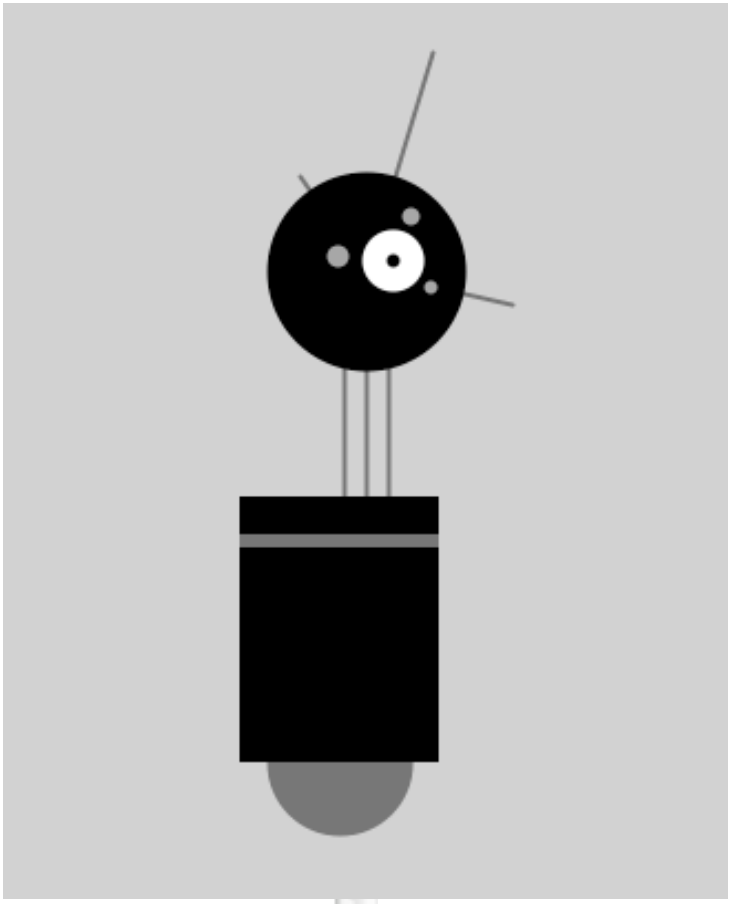
sketch_dec05b

```
size(720, 480);
smooth();
strokeWeight(2);
ellipseMode(RADIUS);

//Neck
stroke(102);                  // Set stroke to gray
line(266, 257, 266, 162); // Left
line(276, 257, 276, 162); // Middle
line(286, 257, 286, 162); // Right

// Antennae
line(276, 155, 246, 112); // Small
line(276, 155, 306, 56);  // Tall
line(276, 155, 342, 170); // Medium
```



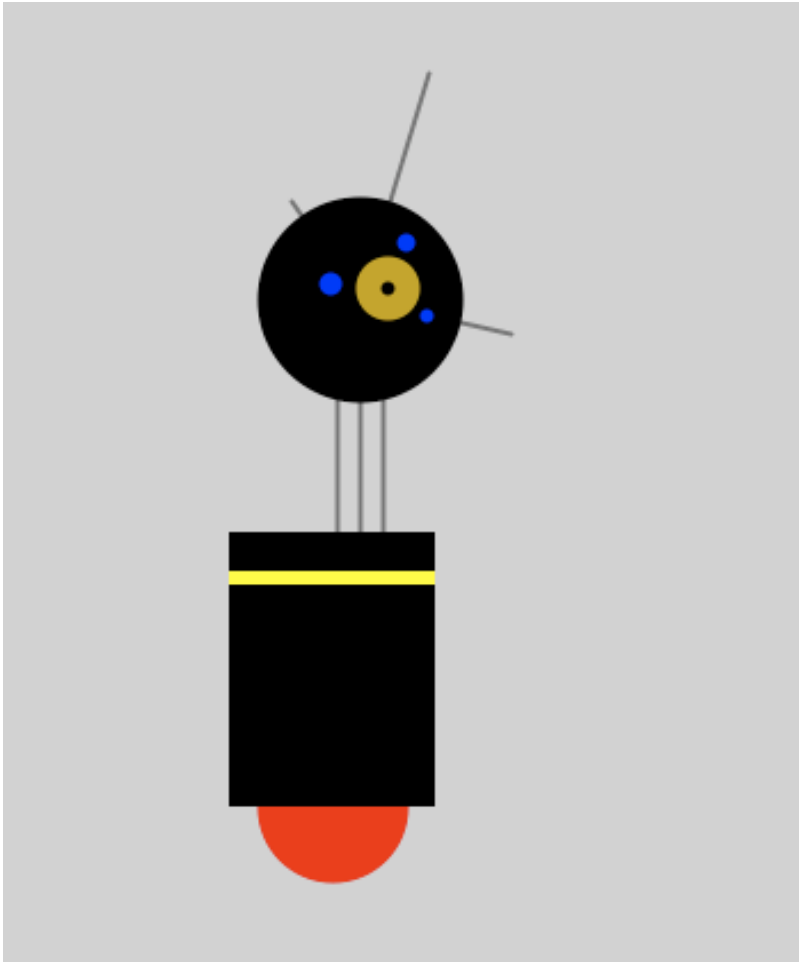
Robot Code, 2

```
// Body
noStroke();                 // Diable stroke
fill(102);                  // Set to gray
ellipse(264, 377, 33, 33);// Antigravity Orb
fill(0);                    // Set to black
rect(219, 257, 90, 120);  // Main body
fill(102);                  // Set back to gray
rect(219, 274, 90, 6);    // Gray stripe

// Head
fill(0);                    // Set to black
ellipse(276, 155, 45, 45);// Head
fill(255);                  // Set to white
ellipse(288, 150, 14, 14);// Large eye
fill(0);                    // Set to black
ellipse(288, 150, 3, 3);  // Pupil
fill(153);                  // Set to gray
ellipse(263, 148, 5, 5);  // Small eye 1
ellipse(296, 130, 4, 4);  // Small eye 2
ellipse(305, 162, 3, 3);  // Small eye 3
```



Knowing Only About Color …

- We "improve" the robot by adding some color



Just Do It!