



Creative Coding for the Web

Michael Hadley

Overview

- Art made on/for/with the web
- Coding setup
- p5 and the web
- Lab: translating images/videos/audio into designs



Web Art

wind map

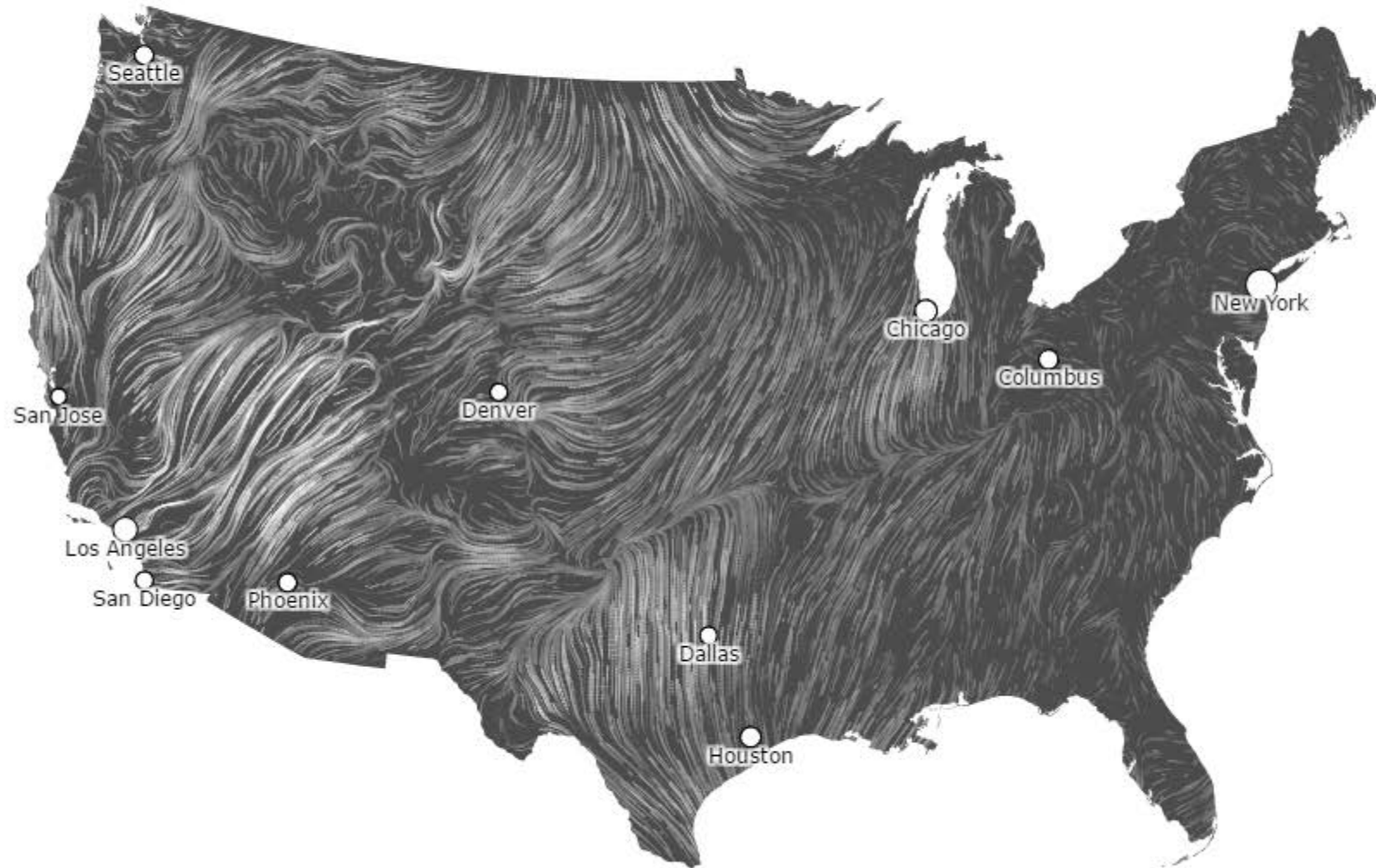
March 20, 2017

9:35 pm EST

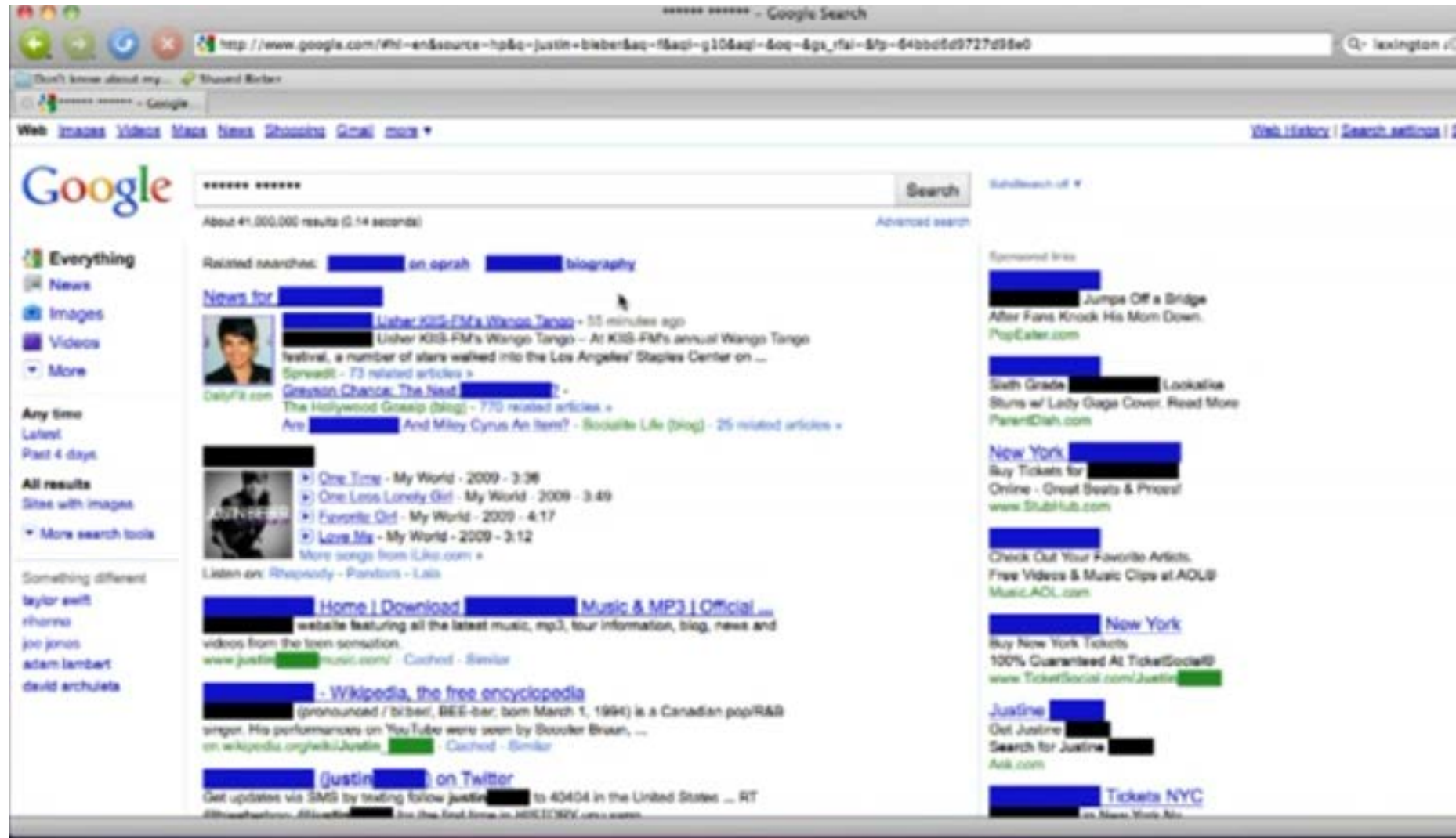
(time of forecast download)

top speed: 31.2 mph

average: 9.0 mph



<http://hint.fm/wind/>



<http://fffff.at/shaved-bieber/>



<http://salavon.com/work/color-wheel/image/410/>



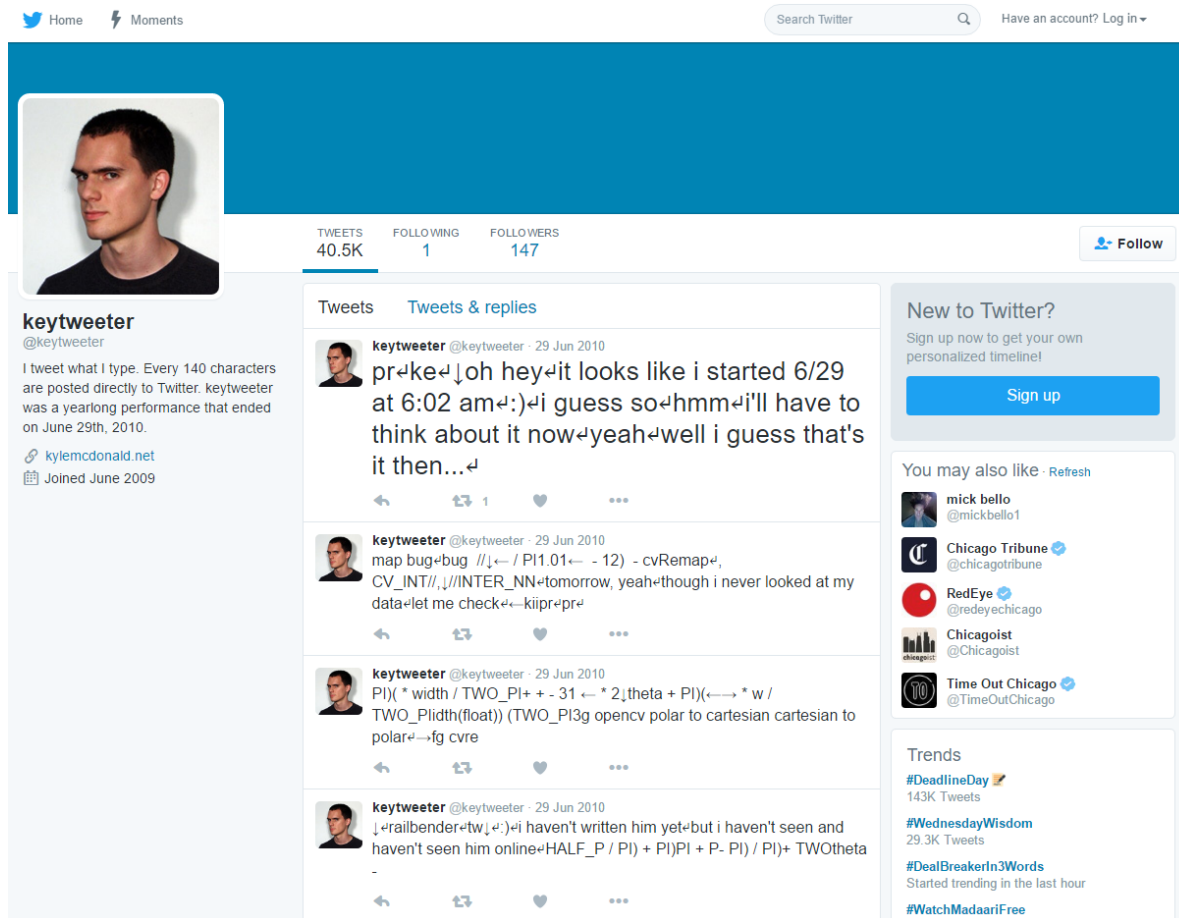
Location: wired.com

Bookmarks:



Mark Napier - Shredder

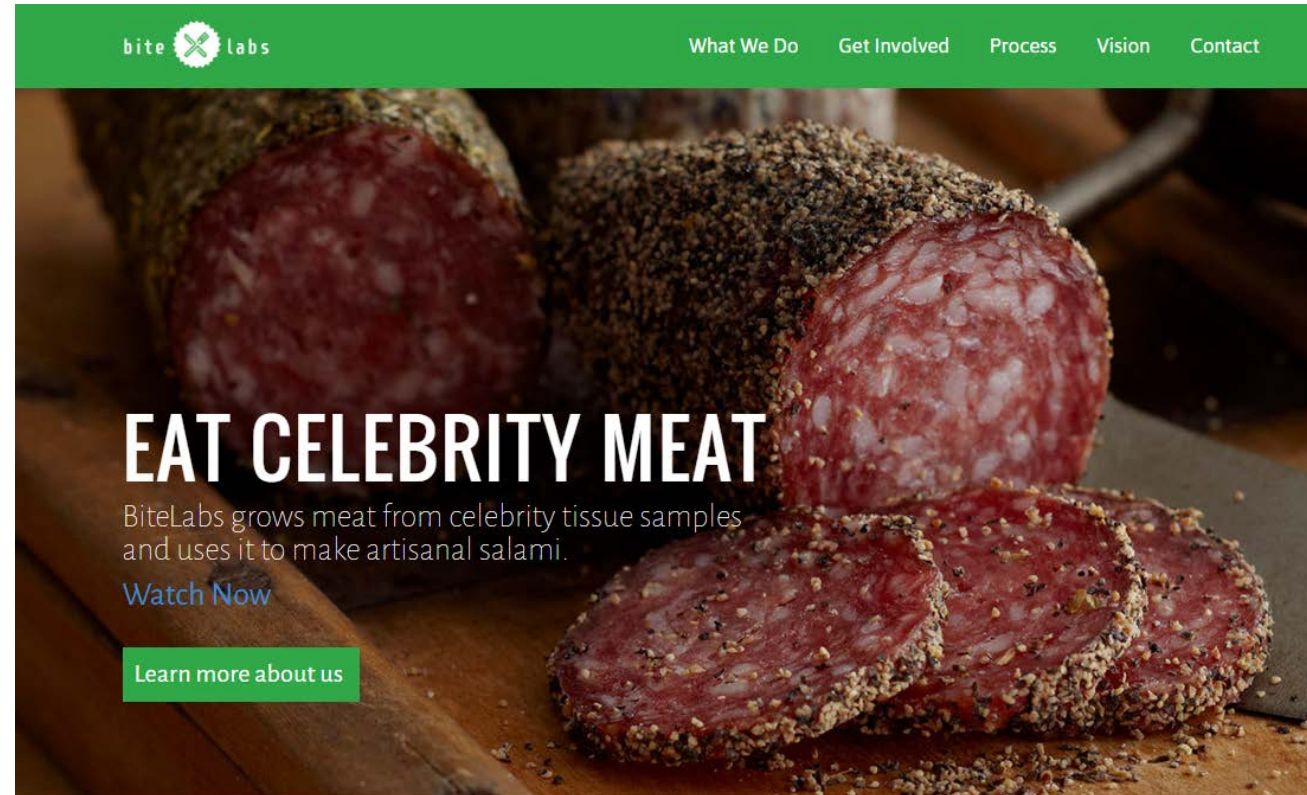
<http://www.potatoland.org/shredder/shredder.html>



KeyTweeter
[Twitter](#)



256 Important Things
[Flickr album](#)



The image shows the top portion of the Bite Labs website. It features a green navigation bar with the 'bite X labs' logo on the left and links for 'What We Do', 'Get Involved', 'Process', 'Vision', and 'Contact' on the right. Below the navigation bar is a large hero image of several slices of salami on a wooden cutting board. Overlaid on the left side of the salami image is the text 'EAT CELEBRITY MEAT' in large, bold, white capital letters. Below this headline is a smaller line of text: 'BiteLabs grows meat from celebrity tissue samples and uses it to make artisanal salami.' Underneath that is a blue link that says 'Watch Now'. At the bottom left of the hero section is a green rectangular button with the text 'Learn more about us' in white.

bite X labs

What We Do Get Involved Process Vision Contact

EAT CELEBRITY MEAT

BiteLabs grows meat from celebrity tissue samples and uses it to make artisanal salami.

[Watch Now](#)

[Learn more about us](#)

You've never experienced celebrities like this



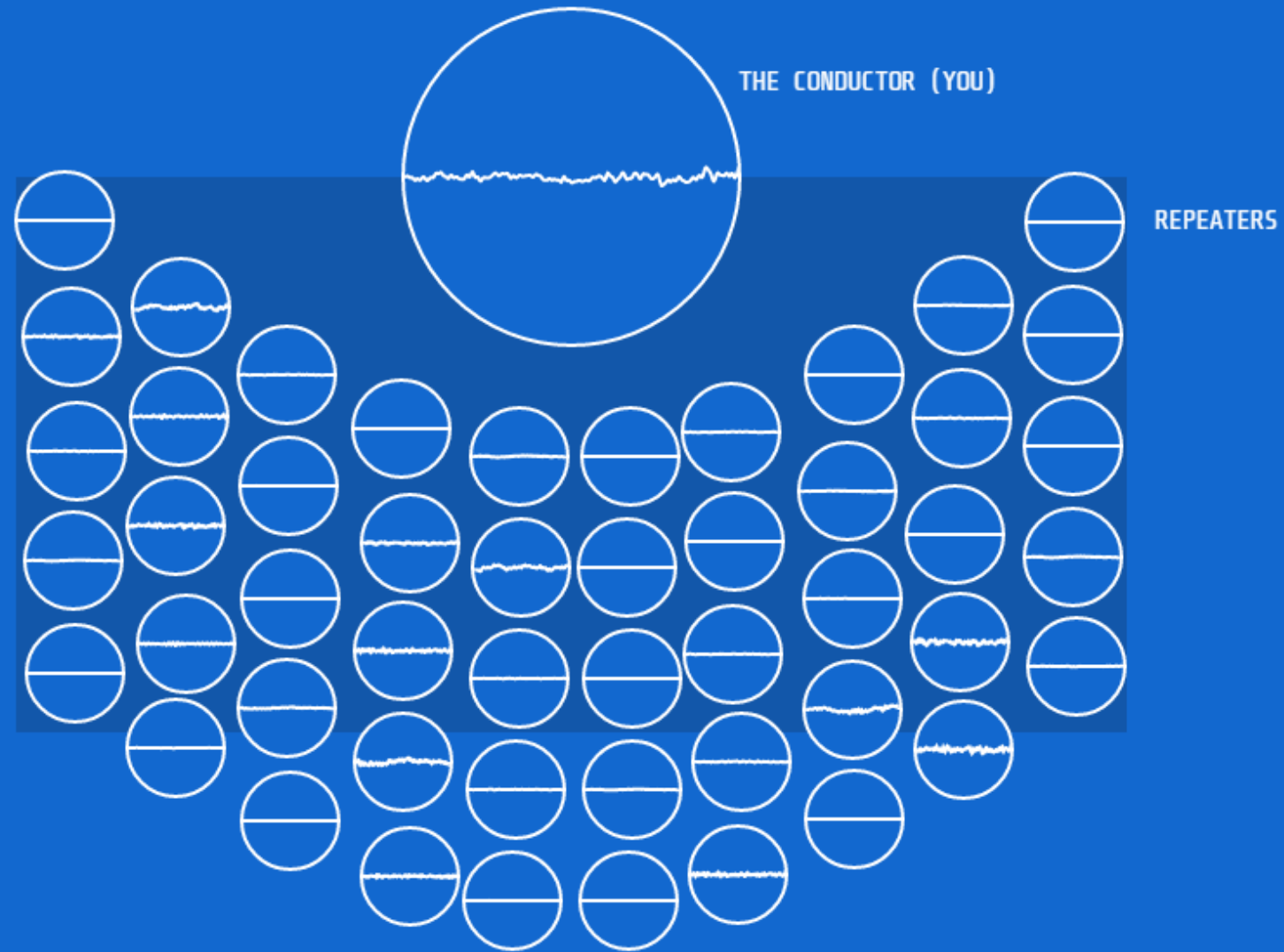
<http://www.bitelabs.org/>



<http://projects.justinblinder.com/Vacated>



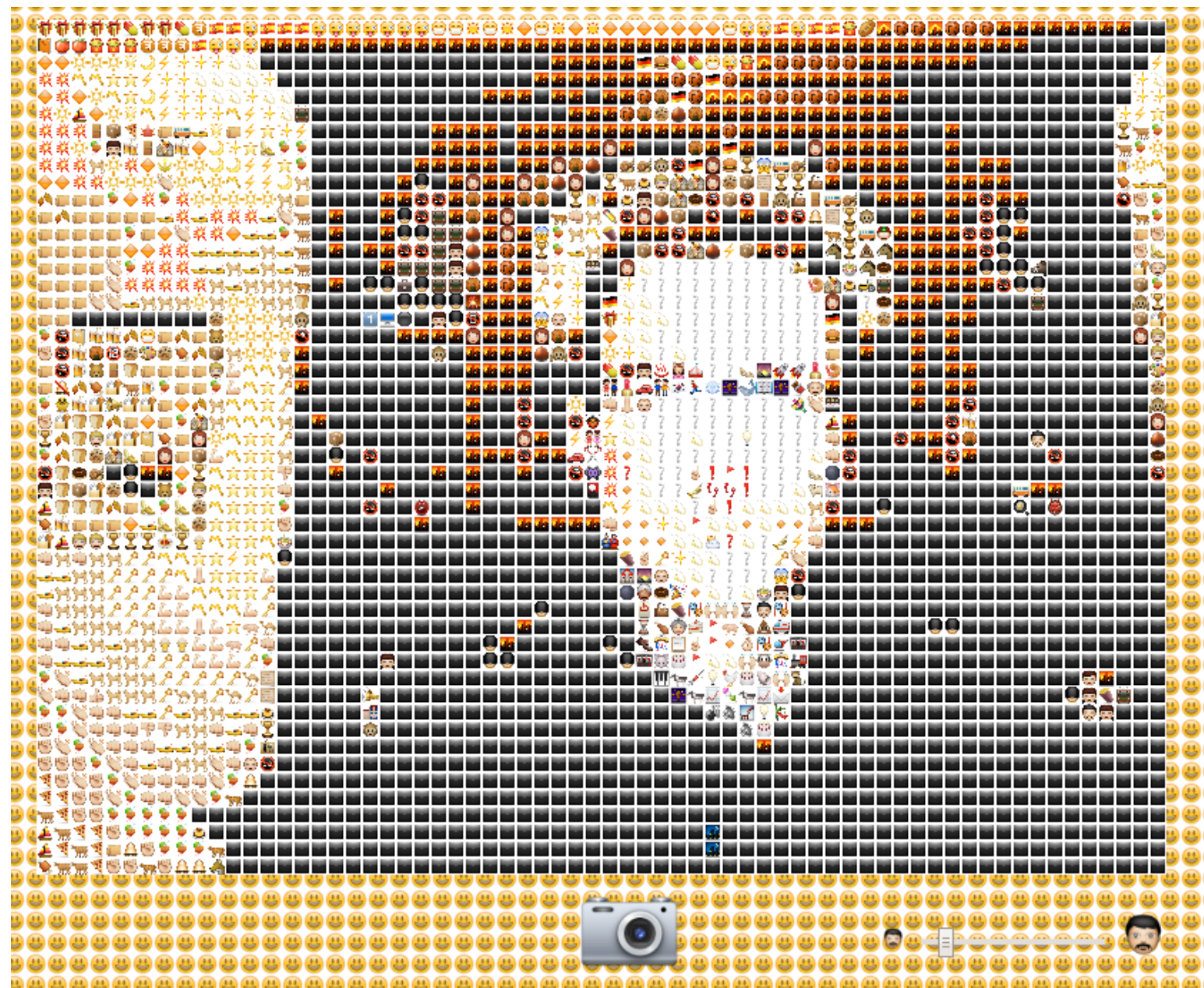
THE REPEATER ORCHESTRA



<https://codepen.io/barefootfunk/pen/ZWoLmo>



<https://nithi-p.github.io/finalproject/>



<https://emojibooth.biz>



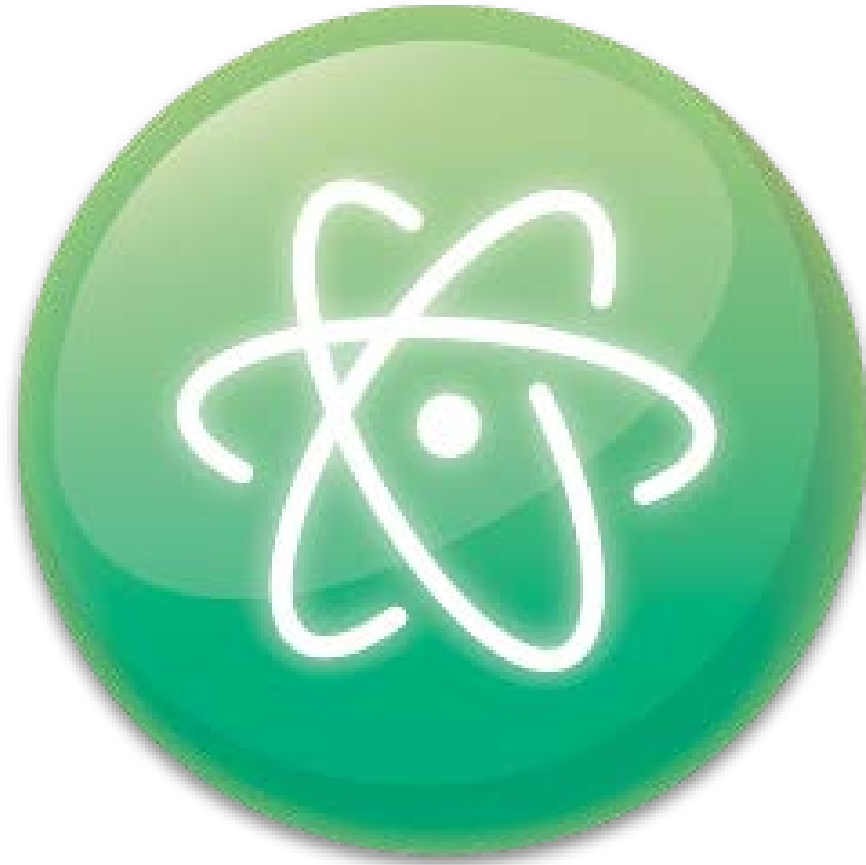
<http://mrdoob.com/projects/harmony/>

Setup

Collabedit

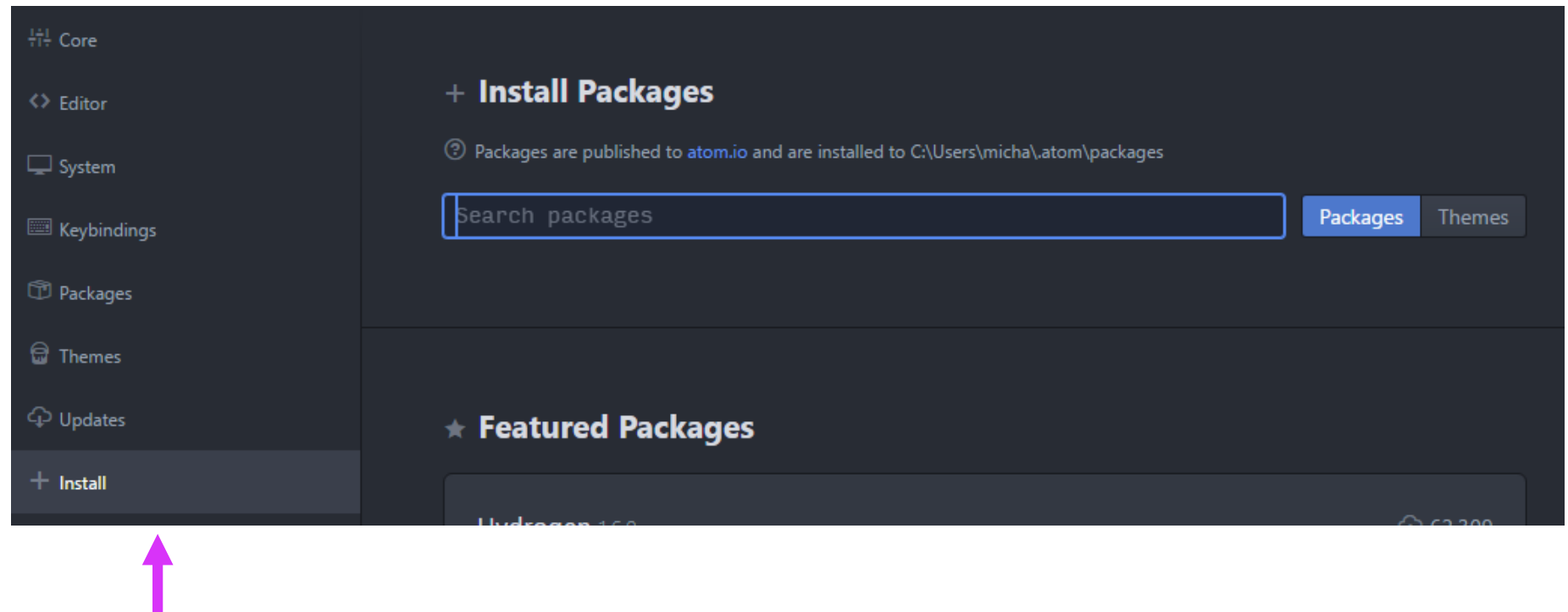
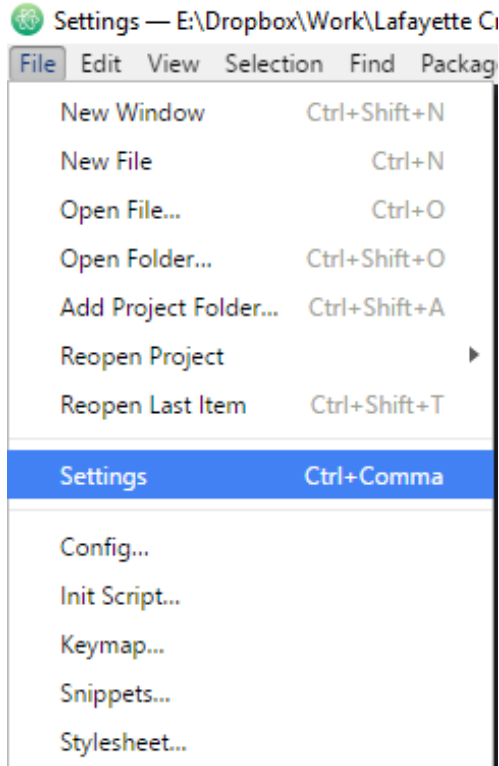
- <http://collabedit.com/ewerf>
- Collective notepad for sharing links and code
- Keep a tab open

Atom.io



<https://atom.io/>


Installing Packages





Installing Packages


atom-live-server 2.1.2

Launch a http server with live reload capability.

 jas-chen


 Uninstall


 Disable


 48,767


linter-eslint 8.1.4


Lint JavaScript on the fly, using ESLint

 AtomLinter

 Settings

 Uninstall

 Disable

 658,871

Alternate Setups

- Openprocessing ([tutorial](#)) – online editor
- Processing 3 IDE ([tutorial](#)) – desktop editor
- Codepen ([tutorial](#)) – online editor

p5.js

Processing, Reinterpreted for JavaScript



What is p5?

- <https://p5js.org/>
- Creative coding library for the web
- It provides:
 - An easy way to use HTML5 Canvas
 - Makes life easier for: mouse tracking, colors, events, images, math, shapes, typography, sounds, etc.
 - Extra libraries for sound, games, geolocation, speech, etc.

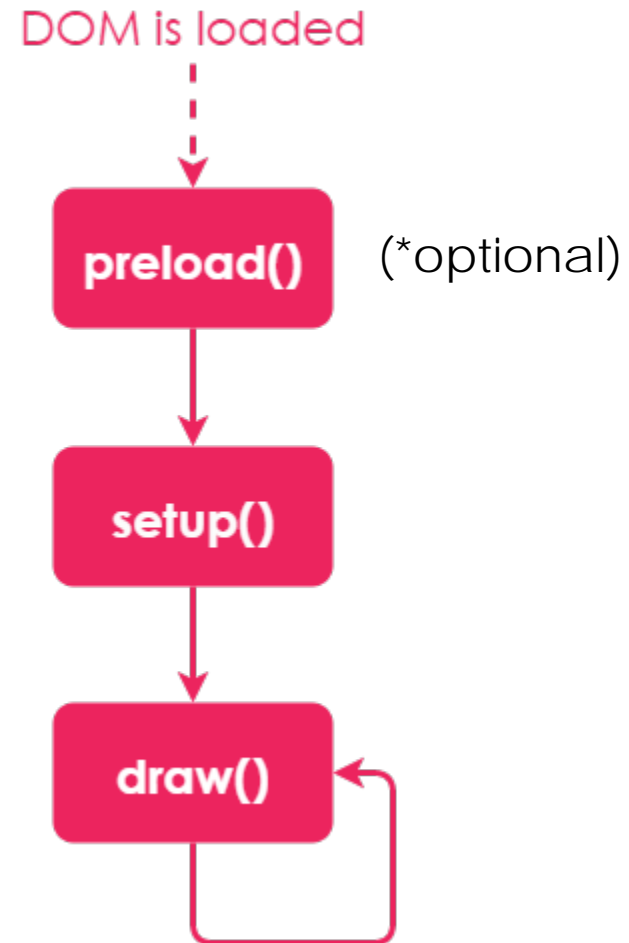


p5 vs Processing

- p5 is JavaScript, whereas Processing is Java
- A p5 sketch is built around web technologies:
 - Easy to put online
 - Can manipulate the webpage around it
 - Can use web technologies – webcam, speech synthesis, etc.
 - Can integrate other JS libraries – face tracking, geolocation, audio synthesis, etc.
- Generally speaking, p5 will not be as fast as Processing

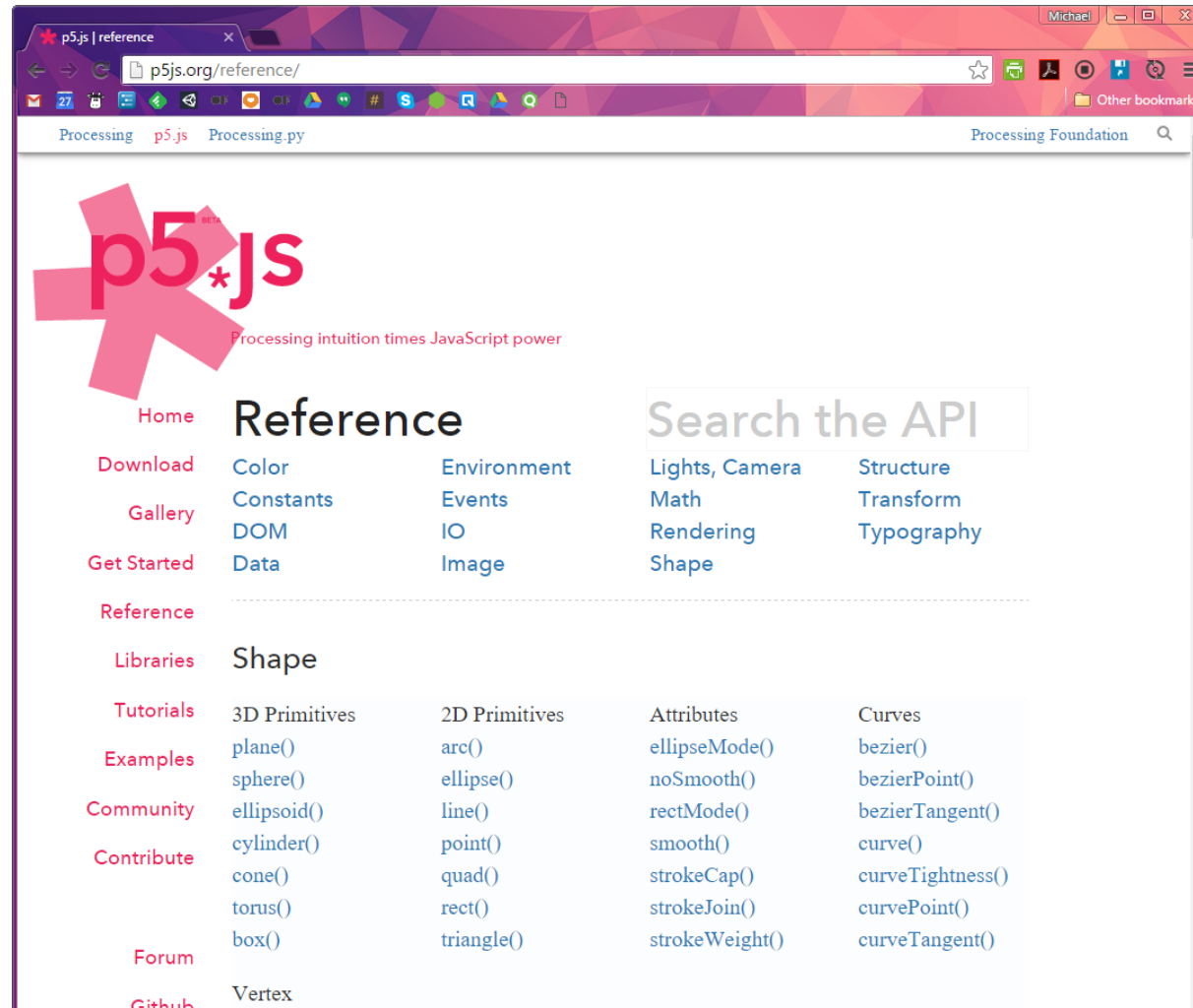


p5 Structure



Reference

(keep this tab open)



01-structure



HTML

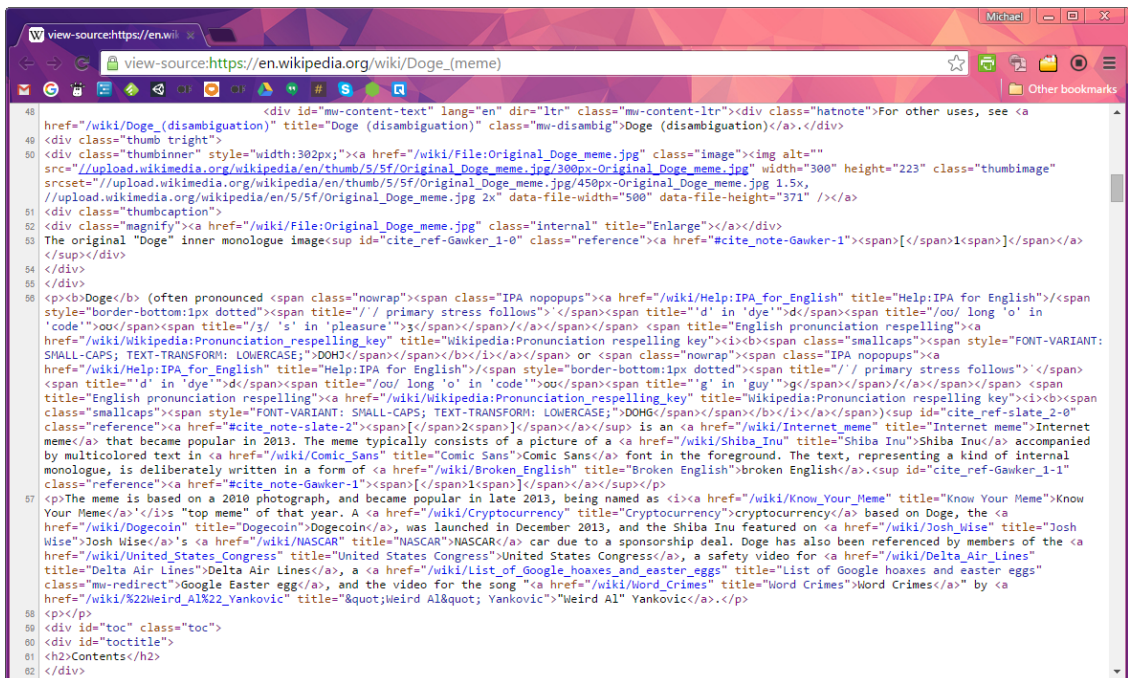


JS



CSS





Transition Guide



Variables

```
var highScore = 24;  
var salesTax = 0.9;  
var message = "Hello dear.";   
var names = ["Mike", "Nadine", "Nikki"];  
var position = {  
    x: 10,  
    y: 20  
};
```



Functions

```
// A function that doesn't return explicitly anything  
// (implicitly returns "undefined")
```

```
function draw() {  
    ellipse(mouseX, mouseY, 20);  
}
```

```
// A function that explicitly returns something
```

```
function getGrayscale(r, g, b) {  
    return 0.2126 * r + 0.7152 * g + 0.0722 * b  
}
```



Arrays

```
// Empty array
var names = [];

// Add elements
names.push("Mike");
names.push("Nadine", "Nikkie");
// -> names = ["Mike", "Nadine", "Nikki"]

// Remove elements
names.splice(1, 2); // Starting at index 1, remove 2 elements
// -> names = ["Mike"]

console.log("First element: " + names[0]);
console.log("Number of elements: " + names.length);
```

Transition Resources


- github.com/processing/p5.js/wiki/Processing-transition
- p5js.org/tutorials
- Examples at p5js.org/reference and p5js.org/examples

Console & DevTools



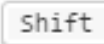






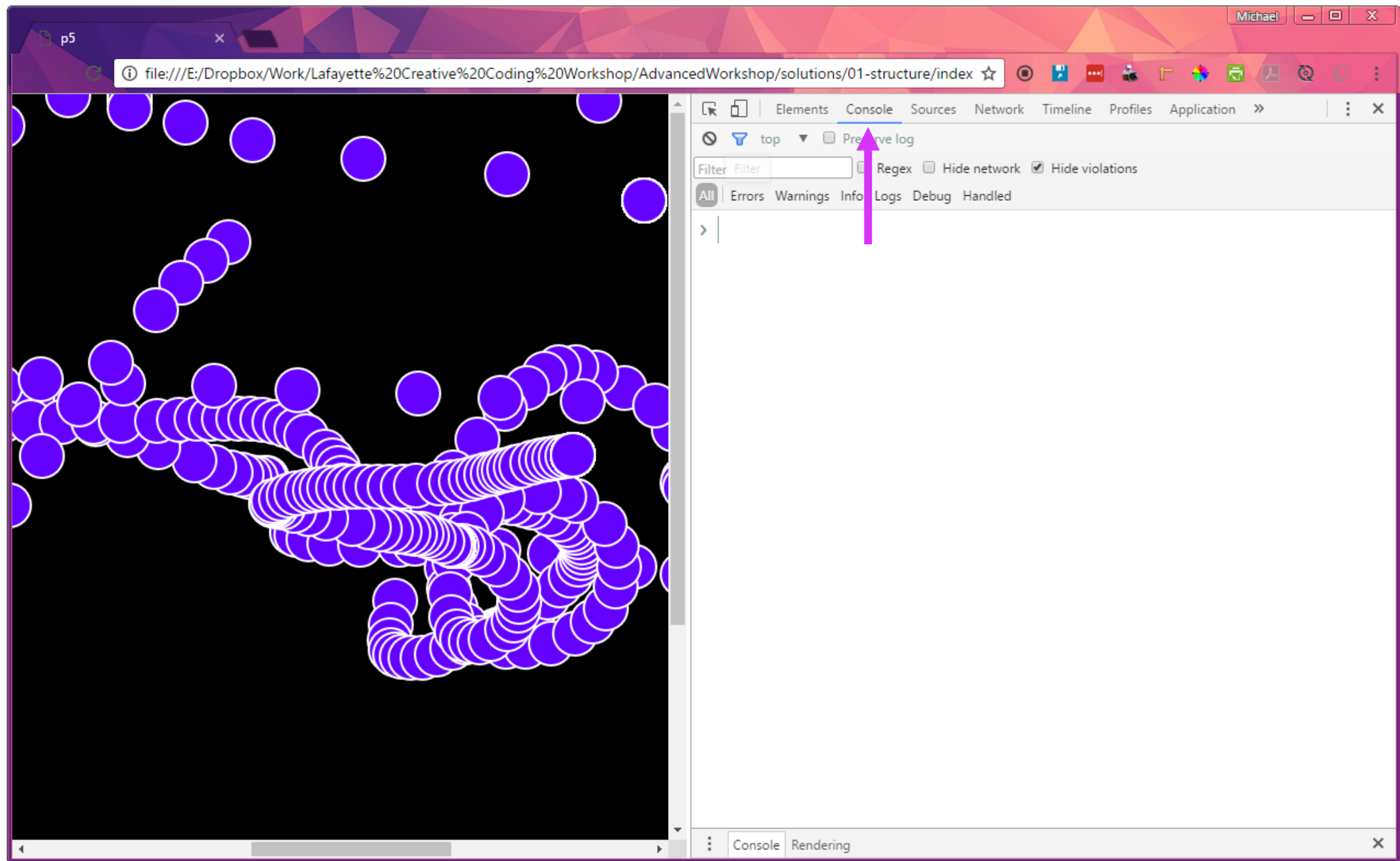
Accessing DevTools

To access the DevTools, on any web page or app in Google Chrome:

- Open the **Chrome menu**  at the top-right of your browser window, then select **Tools > Developer Tools**.
- Right-click on any page element and select **Inspect Element**.


On the keyboard:

Access DevTools	On Windows	On Mac
Open Developer Tools	 ,  +  + 	 +  + 





RGB Color Model


RGB Calculator



rgb(179, 0, 252)
#b300fc
hsl(283, 100%, 49%)

R: 

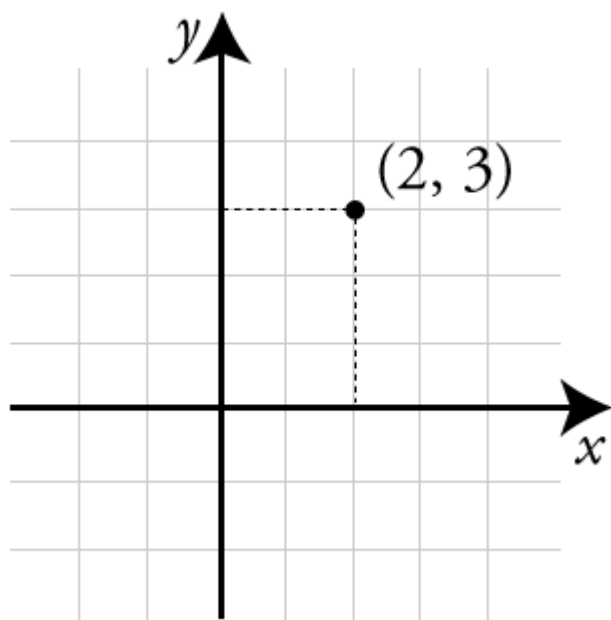
G: 

B: 

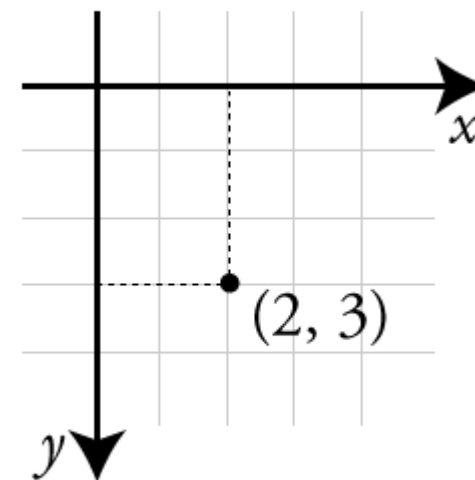
[Use this color in our Color Picker](#)

https://www.w3schools.com/colors/colors_rgb.asp

Coordinates



Coordinates in Math



Coordinates in Graphics

“if” Statement



```
if (score >= 50) {  
    console.log("You passed!");  
}
```


CONDITION

```
if (score >= 50) {  
    console.log("You passed!");  
}
```

RESULT

Comparison Operators

>

>=

<

<=

=== (or ==)

!== (or !=)


“If...else if...else” Statement

```
var score = 90;

// "If...else if...else" statement starting

if (score >= 90) {
    console.log("You aced it!");
}
else if (score >= 50) {
    console.log("You passed!");
}
else {
    console.log("You failed!");
}

// If statement over, the script will continue
```



```
var score = 90;
```

```
// "If...else if...else" statement starting
```

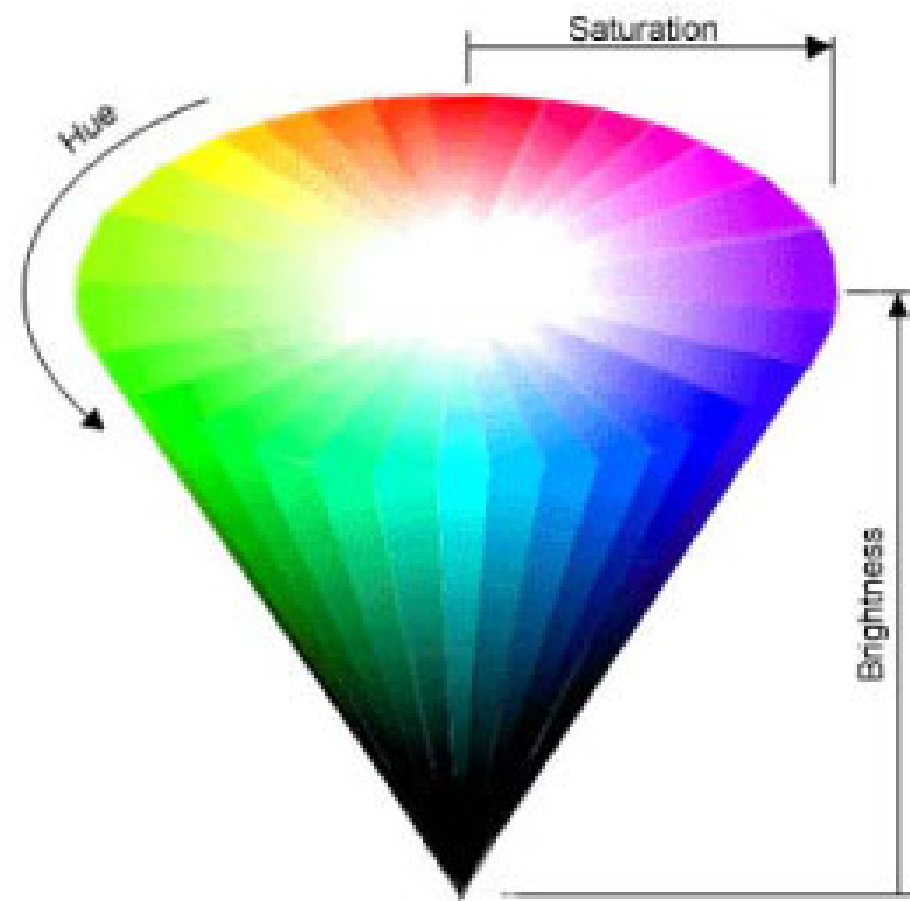
IF STATEMENT	{	<pre>if (score >= 90) {</pre>	}	IF CLAUSE
		<pre> console.log("You aced it!");</pre>		
		<pre>}</pre>	}	ELSE IF CLAUSE
		<pre>else if (score >= 50) {</pre>		
		<pre> console.log("You passed!");</pre>		
		<pre>}</pre>	}	ELSE CLAUSE
		<pre>else {</pre>		
		<pre> console.log("You failed!");</pre>		
		<pre>}</pre>		

```
// If statement over, the script will continue
```

HSB Color Model



<http://alloyui.com/examples/color-picker/hsv/>



<http://www.tomjewett.com/colors/hsb.html>

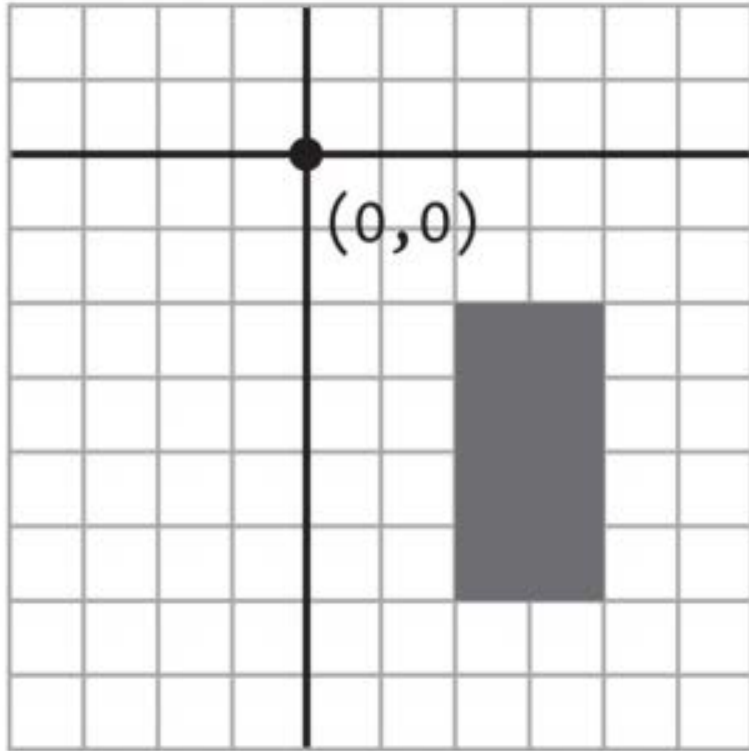
p5 Transformations



Translate, Rotate, Scale

- Push and pop - [Reference](#)
- Gene Kogan's Tutorial: [p5.js Transformations](#)
- Allison Parrish's Tutorial: [Transformation and Functions](#)
- Processing Tutorial: [Transform 2D](#)

```
translate(40, 20);  
rect(20, 20, 20, 40);
```



```
translate(60, 70);  
rect(20, 20, 20, 40);
```

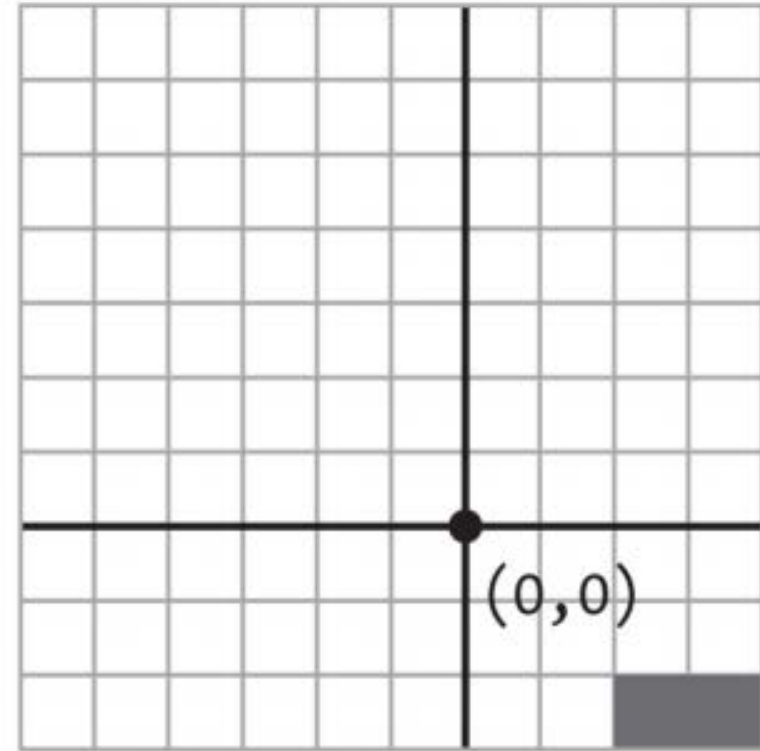
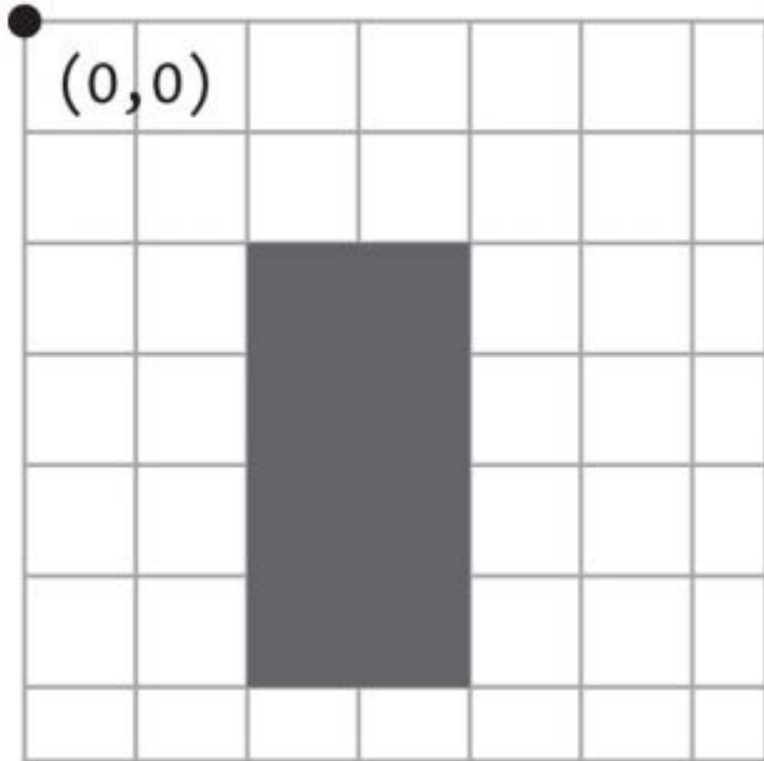


Figure 6-1. Translating the coordinates

```
scale(1.5);  
rect(20, 20, 20, 40);
```



```
scale(3);  
rect(20, 20, 20, 40);
```

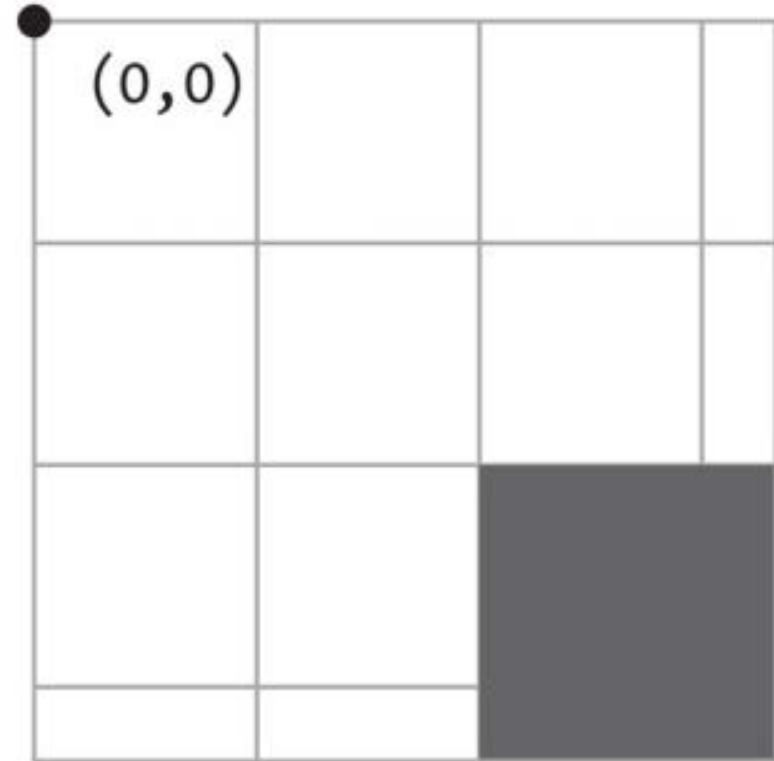
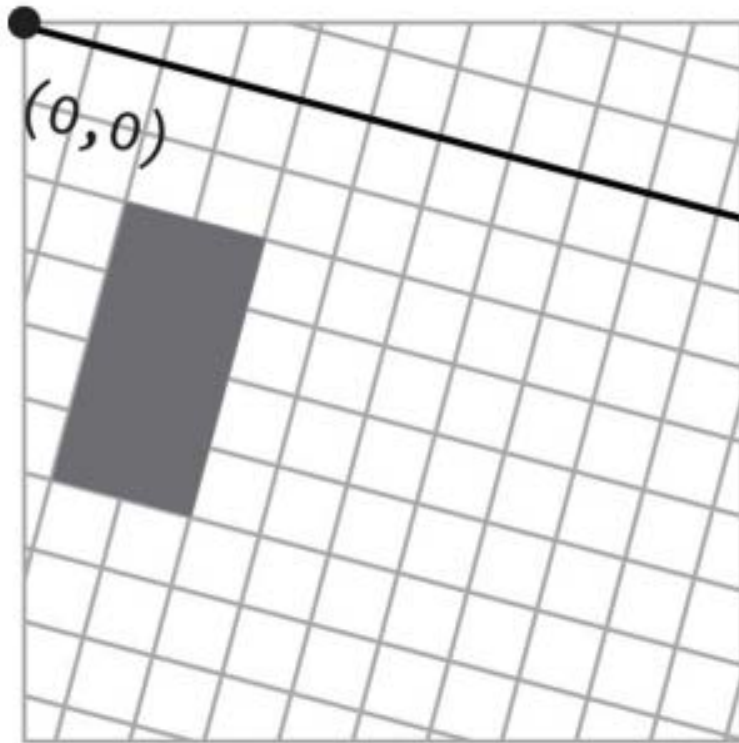


Figure 6-3. Scaling the coordinates

```
rotate(PI/12.0);  
rect(20, 20, 20, 40);
```



```
rotate(-PI/3);  
rect(20, 20, 20, 40);
```

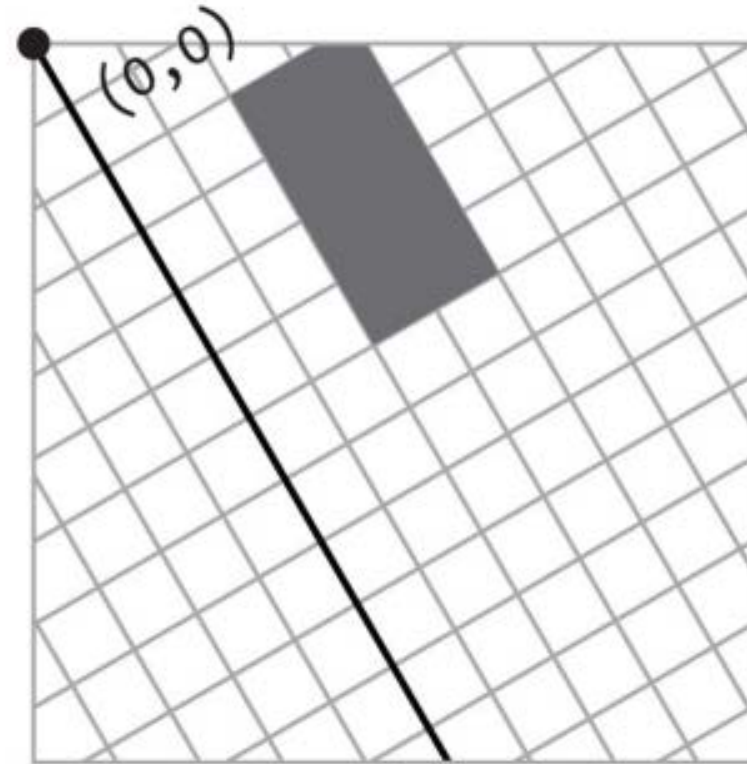


Figure 6-2. Rotating the coordinates

Rotating in Place

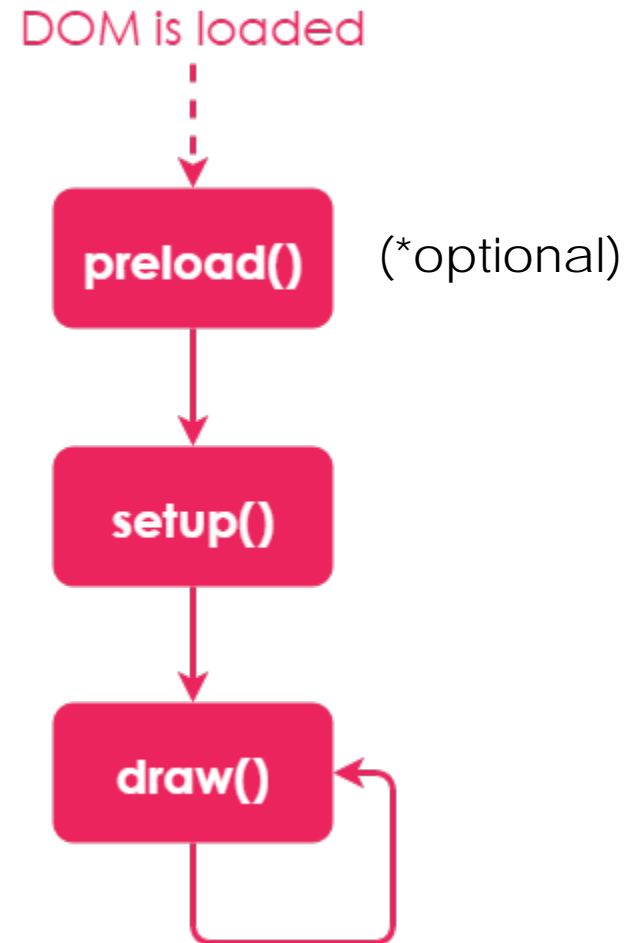
```
rectMode(CENTER);    // Draw rectangles from center
angleMode(DEGREES);  // All angles are now degrees


push();              // Save style/transform
  translate(400, 200); // Move to where you want to draw
  rotate(45);          // Apply desired rotation
  scale(3);            // Apply desired scale
  rect(0, 0, 40, 100);
pop();               // Restore previous style/transform
```


04-images



p5 Structure





```
// Global variable
var img;

function preload() {
  // Load the image before the sketch runs
  img = loadImage("images/catball.png");
}

function setup() {
  createCanvas(windowWidth, windowHeight);
}

function draw() {
  // Draw the image at (0, 0) on the canvas
  image(img, 0, 0);
}
```

05-video



p5.dom

- Documentation: p5js.org/reference/#/libraries/p5.dom
- Optional library to extend p5
 - Must be included in index.html!
- Allows you to create/manipulate HTML elements
 - Text, hyperlinks, images, inputs, video, audio, webcam...
 - Note: site be served over HTTPS for webcam



Browser compatibility

Desktop	Mobile				
Feature	Chrome	Firefox (Gecko)	Internet Explorer	Opera	Safari
Basic support	3.0	3.5 (1.9.1)	9.0	10.50	3.1
<audio>: PCM in WAVE	(Yes)	3.5 (1.9.1)	No support	10.50	3.1
<audio>: Vorbis in WebM	(Yes)	4.0 (2.0)	No support	10.60	3.1 ^[1]
<audio>: Streaming Vorbis/Opus in WebM via MSE	?	36.0 (36.0) ^[2]	?	?	?
<audio>: Vorbis in Ogg	(Yes)	3.5 (1.9.1)	No support	10.50	No support
<audio>: MP3	(Yes) ^[4]	(Yes) ^[5]	9.0	(Yes)	3.1
<audio>: MP3 in MP4	?	?	?	?	(Yes)
<audio>: AAC in MP4	(Yes) ^[6]	(Yes) ^[7]	9.0	(Yes)	3.1
<audio>: Opus in Ogg	27.0	15.0 (15.0)	?	?	?
<audio>: FLAC	No support	51 (51)	No support	No support	No support
<audio>: FLAC in Ogg	No support	51 (51)	No support	No support	No support
<video>: VP8 and Vorbis in WebM	6.0	4.0 (2.0)	9.0 ^[8]	10.60	3.1 ^[9]
<video>: VP9 and Opus in WebM	29.0	28.0 (28.0)	?	(Yes)	?
<video>: Streaming WebM via MSE	?	42.0 (42.0) ^[35]	?	?	?
<video>: Theora and Vorbis in Ogg	(Yes)	3.5 (1.9.1)	No support	10.50	No support
<video>: H.264 and MP3 in MP4	(Yes) ^[4]	(Yes) ^[10]	9.0	(Yes)	(Yes)
<video>: H.264 and AAC in MP4	(Yes) ^[4]	(Yes) ^[11]	9.0	(Yes)	3.1
any other format	No support	No support	No support	No support	3.1 ^[12]

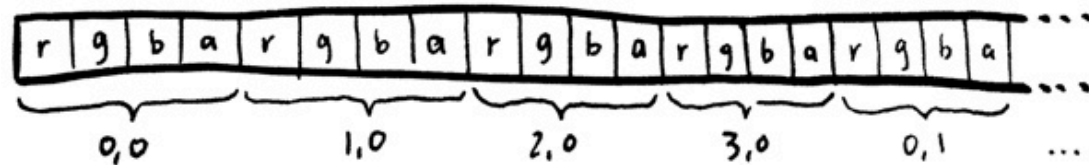


[MDN Reference](#)

how you likely
conceptualize
pixels

	0	1	2	3	→ x
0	rg ba	rg ba	rg ba	rg ba	
1	rg ba	rg ba	rg ba	rg ba	
2	rg ba	rg ba	rg ba	rg ba	
3	rg ba	rg ba	rg ba	rg ba	
↓ y					

how the .pixels
array works



06-audio



p5.sound

- Documentation: p5js.org/reference/#/libraries/p5.sound
- Optional sound library to extend p5
 - Must be included in index.html!
- Built around the [Web Audio API](#) in JavaScript



Browser compatibility

	Desktop	Mobile			
Feature	Chrome	Firefox (Gecko)	Internet Explorer	Opera	Safari
Basic support	3.0	3.5 (1.9.1)	9.0	10.50	3.1
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<audio>: Vorbis in WebM	(Yes)	4.0 (2.0)	No support	10.60	3.1[1]
<audio>: Streaming Vorbis/Opus in WebM via MSE	?	36.0 (36.0)[2]	?	?	?
<audio>: Vorbis in Ogg	(Yes)	3.5 (1.9.1)	No support	10.50	No support
<audio>: MP3	(Yes)[4]	(Yes)[5]	9.0	(Yes)	3.1
<audio>: MP3 in MP4	?	?	?	?	(Yes)
<audio>: AAC in MP4	(Yes)[6]	(Yes)[7]	9.0	(Yes)	3.1
<audio>: Opus in Ogg	27.0	15.0 (15.0)	?	?	?
<audio>: FLAC	No support	51 (51)	No support	No support	No support
<audio>: FLAC in Ogg	No support	51 (51)	No support	No support	No support
<video>: VP8 and Vorbis in WebM	6.0	4.0 (2.0)	9.0[8]	10.60	3.1[9]
<video>: VP9 and Opus in WebM	29.0	28.0 (28.0)	?	(Yes)	?
<video>: Streaming WebM via MSE	?	42.0 (42.0)[35]	?	?	?
<video>: Theora and Vorbis in Ogg	(Yes)	3.5 (1.9.1)	No support	10.50	No support
<video>: H.264 and MP3 in MP4	(Yes)[4]	(Yes)[10]	9.0	(Yes)	(Yes)
<video>: H.264 and AAC in MP4	(Yes)[4]	(Yes)[11]	9.0	(Yes)	3.1
any other format	No support	No support	No support	No support	3.1[12]

[MDN Reference](#)



Playing an Audio File

```
// Global variable
var musicTrack;

function preload() {
    // Load the sound file (mp3 format is your best bet)
    musicTrack = loadSound("audio/baths-aminals.mp3");
}

function setup() {
    createCanvas(windowWidth, windowHeight);
    // Start playing the audio file
    musicTrack.play();
}
```

Getting the Volume

```
var musicTrack;  
var amplitude;  
  
function preload() {  
  musicTrack = loadSound("audio/baths-animals.mp3");  
}  
  
function setup() {  
  createCanvas(windowWidth, windowHeight);  
  background(0);  
  
  // Start the music playing  
  musicTrack.play();  
  // Get the amplitude of all p5 sounds  
  amplitude = new p5.Amplitude();  
}  
  
function draw() {  
  // Get the volume of the sounds at this moment  
  var level = amplitude.getLevel(); // Number between 0 and 1  
}
```

Additional Resources

Need Help?

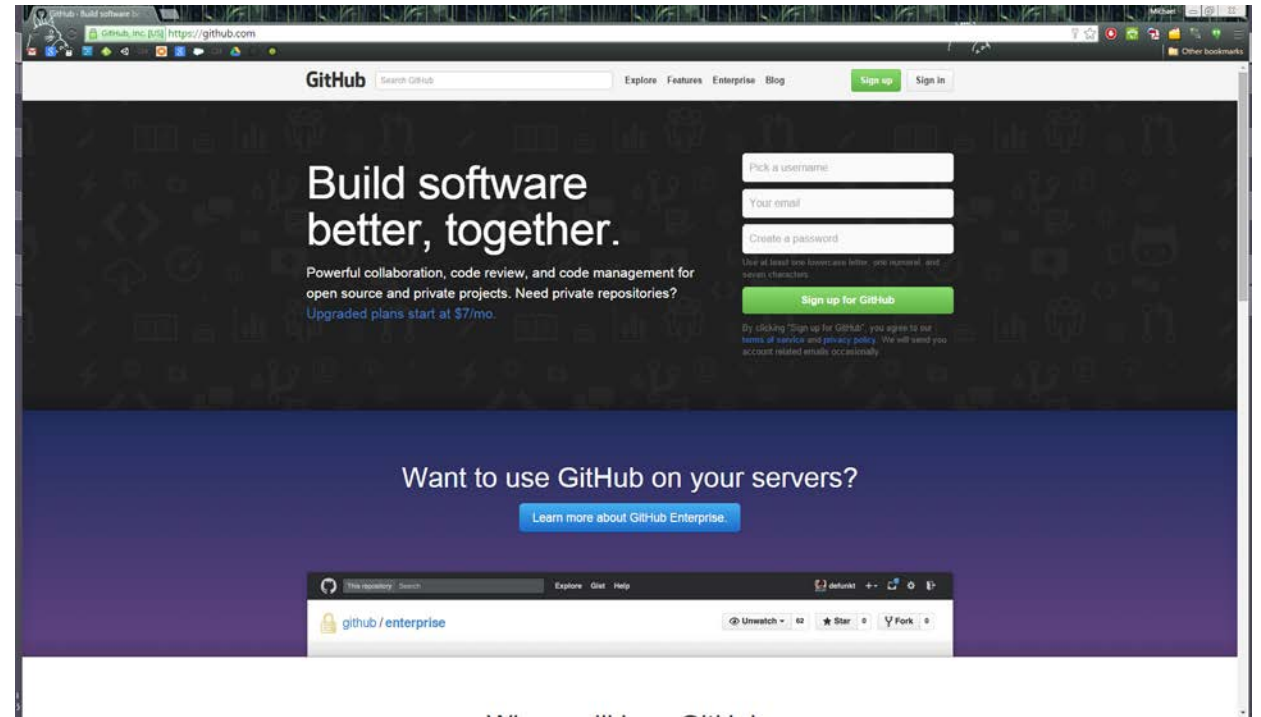
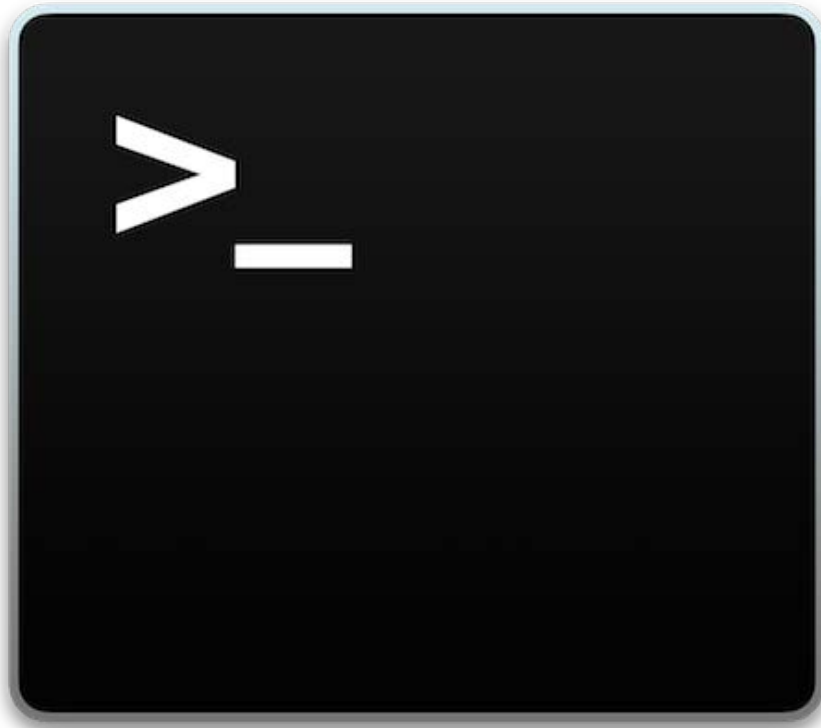
- Dan Shiffman's [video tutorials](#)
- Getting Started with p5.js [book](#)
- Kadenze [online course](#) on p5
- Email me (mikewesthad@gmail.com)
- p5 [tutorials](#)
- p5 [reference](#) page
- p5 forums: [general](#), [programming](#), [libraries](#)
- Online [materials](#) from p5 courses
 - [RISD – p5.js Code As Medium](#) – lots of examples
 - [Visualizing Music with p5.js](#) – slides & examples



GitHub Pages

“Free” Web Hosting

Git vs GitHub



First Time Setup

- Sign up for a GitHub account
- Pick a reasonable account name
 - It will be a part of your website URL
- Make sure to verify your email on your account!
 - Hosting won't work otherwise.



Creating a “Repository”

Git Repository

(a folder with a history)



7/15/15 at 10:30p
First draft of website



7/16/15 at 11:30p
Fixed IE bug



7/17/15 at 12:00a
Public release!



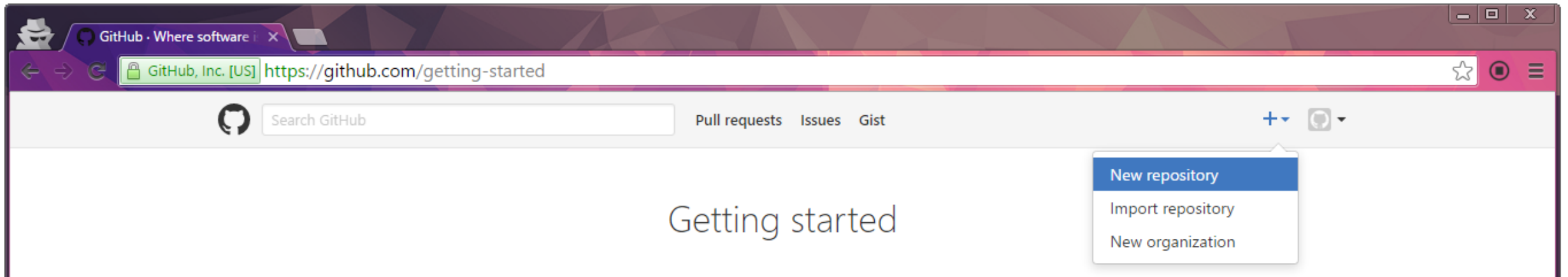
7/17/15 at 12:05a
Everything broke...
Hopefully this fixes it?



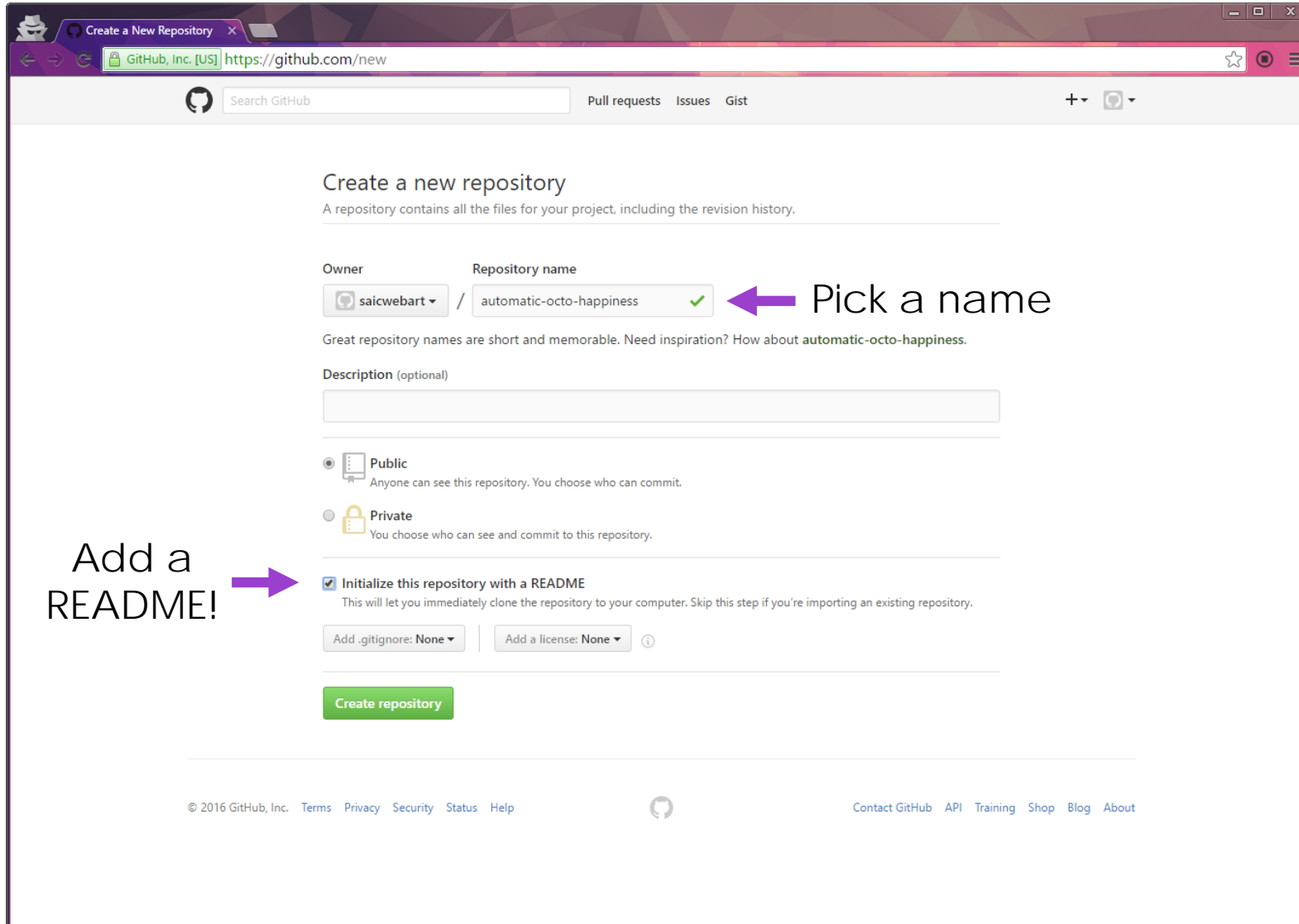
Default Project URL

[http://**username.github.io/repository**](http://username.github.io/repository)

Create New Repository on GitHub



Create New Repository on GitHub



The screenshot shows the GitHub 'Create a New Repository' page. The browser address bar displays 'https://github.com/new'. The page title is 'Create a new repository'. Below the title, a subtitle states: 'A repository contains all the files for your project, including the revision history.'

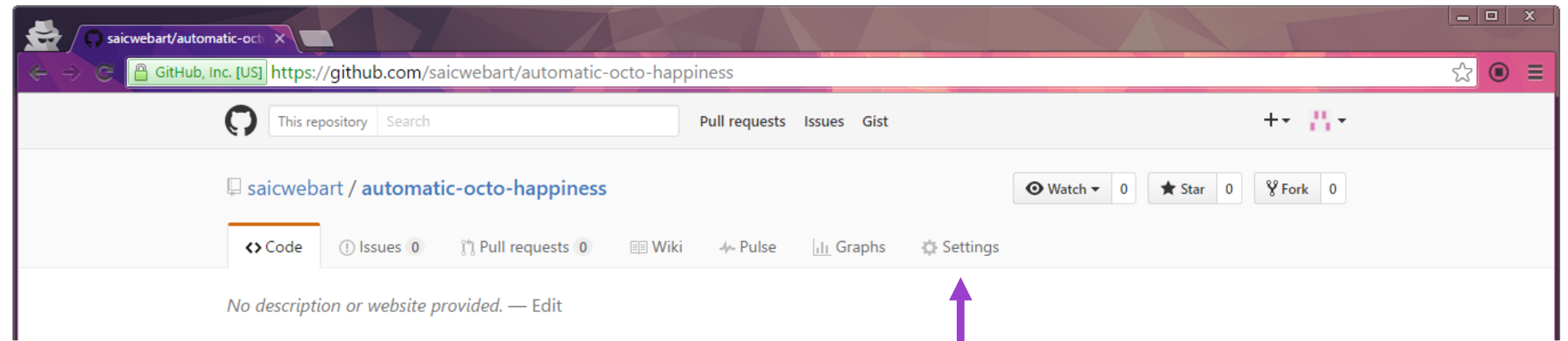
The form includes the following fields and options:

- Owner:** A dropdown menu showing 'saicwebart'.
- Repository name:** A text input field containing 'automatic-octo-happiness', which is marked with a green checkmark. A purple arrow points to this field with the text 'Pick a name'.
- Description (optional):** A text input field.
- Visibility:** Two radio buttons: 'Public' (selected) and 'Private'.
- Initialize this repository with a README:** A checked checkbox. A purple arrow points to this checkbox with the text 'Add a README!'.
- Add .gitignore:** A dropdown menu showing 'None'.
- Add a license:** A dropdown menu showing 'None'.

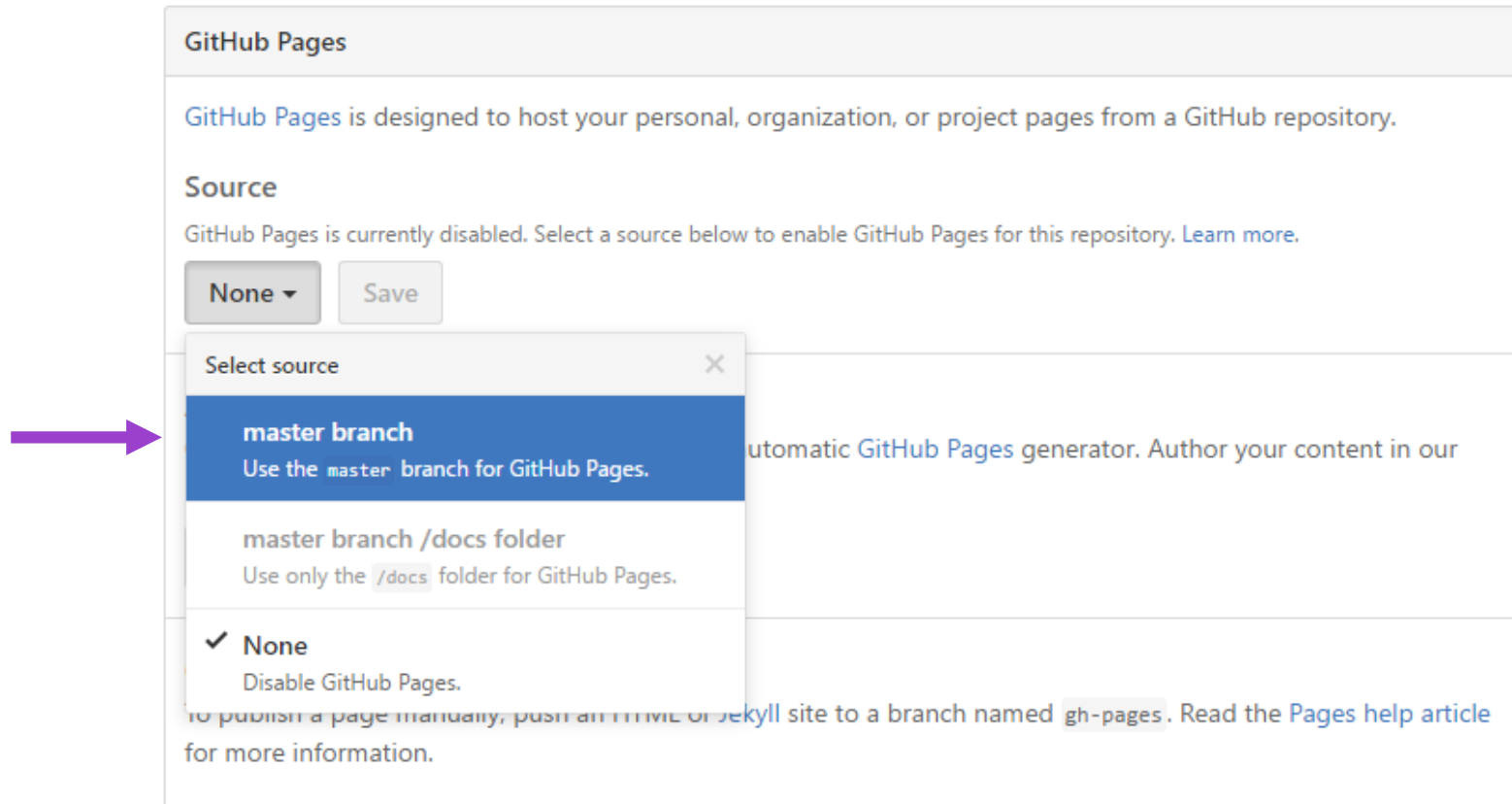
A green 'Create repository' button is located at the bottom of the form.

The footer of the page contains copyright information: '© 2016 GitHub, Inc.' and links to 'Terms', 'Privacy', 'Security', 'Status', and 'Help'. On the right side of the footer, there are links to 'Contact GitHub', 'API', 'Training', 'Shop', 'Blog', and 'About'.

Go to Settings



Setup for GitHub Pages





Repository Setup Done



GitHub Pages

Your site is ready to be published at <https://saicwebart.github.io/automatic-octo-happiness/>.

GitHub Pages is designed to host your personal, organization, or project pages from a GitHub repository.

Source

Your GitHub Pages site is currently being built from the `master` branch. [Learn more.](#)

master branch ▾

Save

Custom domain

Custom domains allow you to serve your site from a domain other than `saicwebart.github.io`. [Learn more.](#)

Save

Update your site

To update your site, push your HTML or [Jekyll](#) updates to the `master` branch. Read the [Pages help article](#) for more information.

Overwrite site

Replace your existing site by using our automatic page generator. Author your content in our Markdown editor, select a theme, then publish.

Launch automatic page generator

☒ **Enforce HTTPS** — Required for your site because you are using the default domain (`saicwebart.github.io`)
HTTPS provides a layer of encryption that prevents others from snooping on or tampering with traffic to your site.
When HTTPS is enforced, your site will only be served over HTTPS. [Learn more.](#)





Uploading Files

Branch: master ▼

New pull request

Create new file

Upload files

Find file

Clone or download ▼



mikewesthad committed on GitHub Delete DisneyHorror.jpg

Latest commit ef73e45 just now



README.md

Initial commit

5 hours ago



README.md

miniature-succotash



miniature-succotash /



Drag files here to add them to your repository
Or [choose your files](#)



Commit changes

Add files via upload

Add an optional extended description...

- ☒ Commit directly to the `master` branch.
- ☐ Create a new branch for this commit and start a pull request. [Learn more about pull requests.](#)



Commit changes

Cancel



Where's My File?

- Files are relative to:
 - `http://username.github.io/repository`
- “index.html” would be:
 - `https://saicwebart.github.io/stunning-octo/index.html`
- “second-page.html” would be:
 - `https://saicwebart.github.io/stunning-octo/second-page.html`

Branch: master ▾


New pull request

Create new file





Upload files

Find file

Clone or download ▾

 saicwebart committed on GitHub Add files via upload

Latest commit 5fd46ff just now


 face-tracking	Add files via upload	just now
 README.md	Initial commit	a minute ago
 index.html	Add files via upload	just now
 second-page.html	Add files via upload	just now





Where's My File?

- Same repository
- “index.html” inside of face-tracking/ would be:
 - <https://saicwebart.github.io/stunning-octo/face-tracking/index.html>
- “nose-tracker.html” inside of face-tracking/ would be:
 - <https://saicwebart.github.io/stunning-octo/face-tracking/nose-tracker.html>

Branch: master ▾ [stunning-octo-invention](#) / [face-tracking](#) / [Create new file](#) [Upload files](#) [Find file](#) [History](#)

 **saicwebart** committed on **GitHub** Create nose-tracker.html Latest commit d42484d just now

..		
 index.html	Add files via upload	3 minutes ago
 nose-tracker.html	Create nose-tracker.html	just now