ID2116_Week3: introduction to p5.js

https://p5js.org/

What is p5.js ?

- A JavaScript library for **“Creative Coding”.**
  - https://p5js.org/
- Created by Lauren McCarthy & Developed by Open-source community.
- You can create web applications that run on a web browser.
  - graphic / sound / video / 3D / network

hello.p5.js

http://hello.p5js.org/

What can we create with p5.js?

- Interactive Installation: https://visionsofthefuture.sg/exhibition/rewind
- Interactive Web App: (e.g. **PATATAP** https://patatap.com/)
- NFT Art: (Generative Mask https://generativemasks.on.fleek.co/#/)
- Machine Learning: https://learn.ml5js.org/#/
- More examples can be found on
    - Open Processing https://www.openprocessing.org/
    - p5.js examples https://p5js.org/examples/

What you will be able to create after this course

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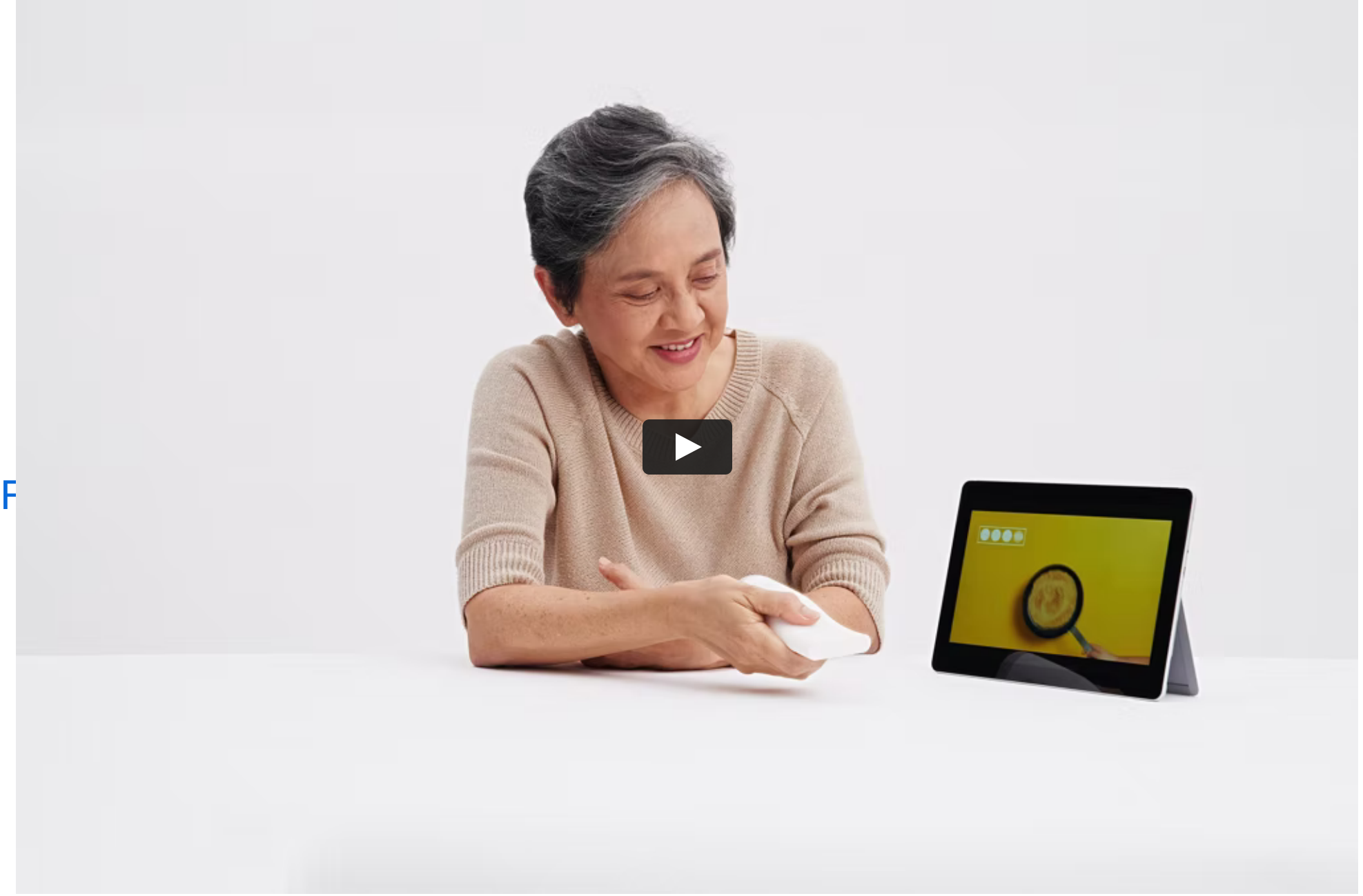
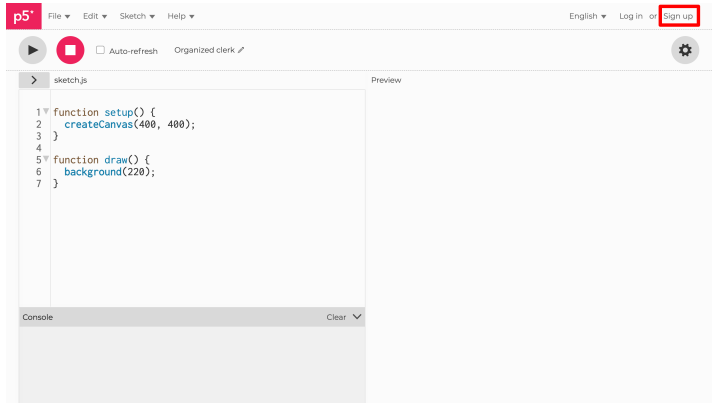


Getting Started with p5.js

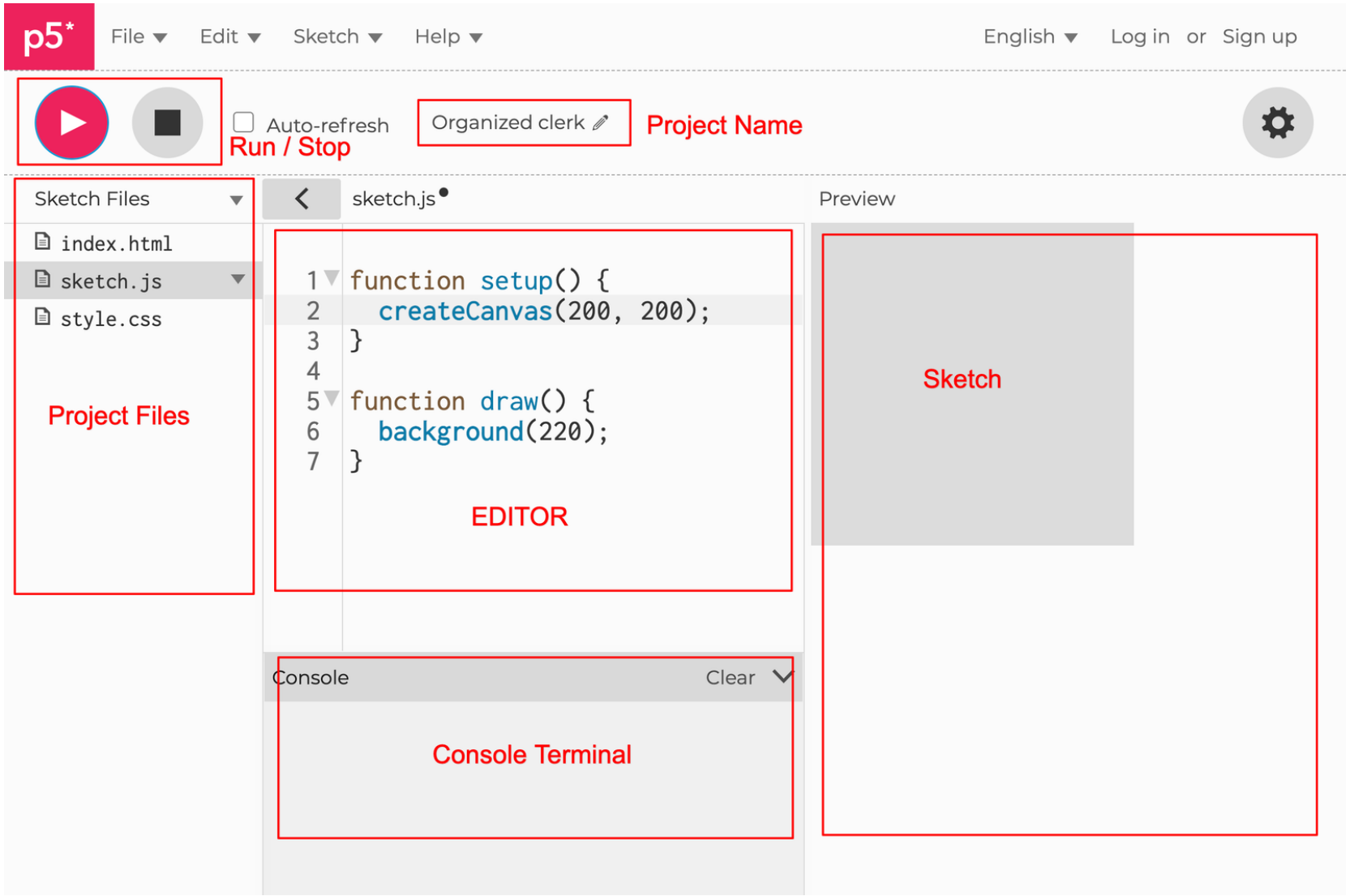
Create a p5.js account

1. Open p5.js web editor
   https://editor.p5js.org/
2. Click “Sign up” → Select Login with Google or Sign Up with your email address.



3. Now you can save and share your sketches!!!

p5.js Web Editor

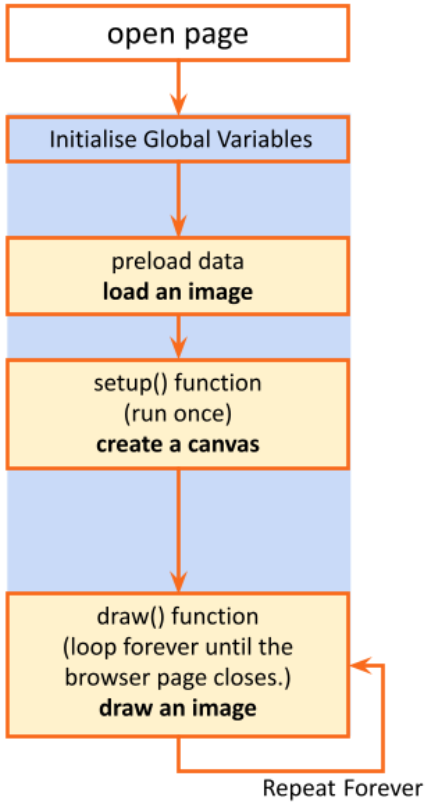


p5.js Fundamentals

p5.js Program Loop

- **preload()**:
  load large
  files(image,video,sound etc)
  before the page is loaded.
- **setup()**:
  run once when the script is
  loaded.
- **draw()**:
  repeatedly execute code at a
  refresh-rate specified with
  frameRate()
  (e.g. frameRate(30): 30 fps)

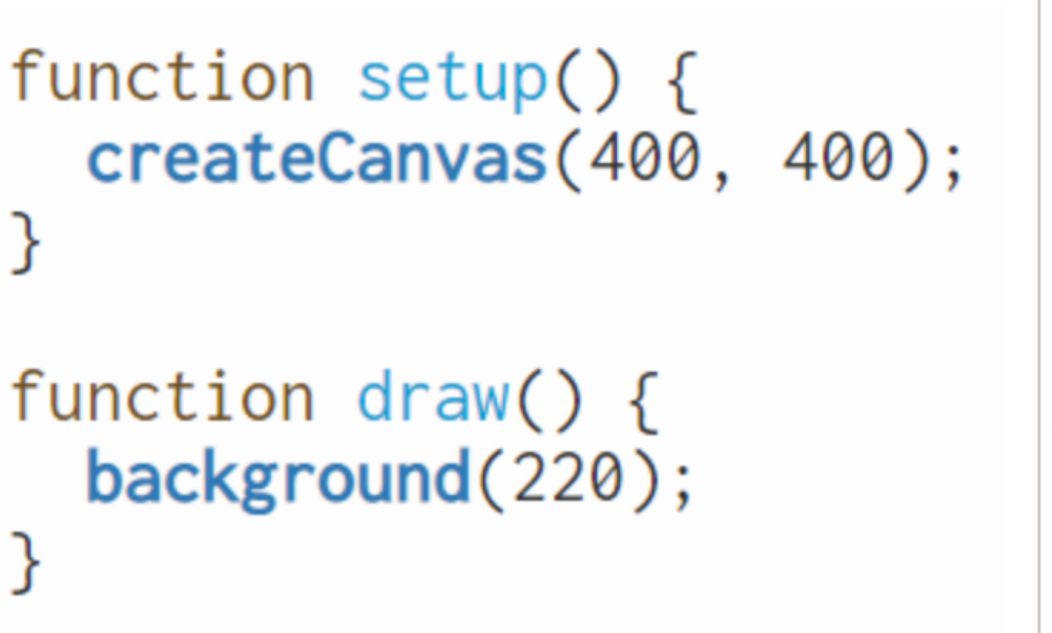
```
// Declare Global Variables
let img ;

// The preload() event runs once, when the sketch starts
function preload()  {
 // load image
 img = loadImage("assets/image.jpg");
}

// The setup() event  runs once, when the sketch starts
function setup()  {
 // create a canvas of 400x400px.
   createCanvas(400,400);
}

// the draw() event runs over and over again,
// as long as the sketch is loaded on a browser.
function draw()
{
   //draw something here
   image(img,100,100,20,20);
}
```



Program loop: micro:bit vs p5.js

on start → setup() : run once

forever → draw() : repeat forever

micro:bit	p5.js
	


```
function setup() {
  createCanvas(400, 400);
}

function draw() {
  background(220);
}
```

p5.js Programming Fundamentals

Variable, Conditionals, Loop, Functions

ID2116
Programming Fundamentals 1

Variables

Operators

Conditionals

Functions

ID2116
Programming Fundamentals 2

Functions

Arrays

Loops

Week3 P5.JS Hands-On

H01: Drawing a Smiley

let's draw a smiley face with p5.js!

- What steps do we need to go through to draw this smile?
- What are the properties of the face?
- Use the problem decomposition technique we learned last week and try to figure it out in a minute.

steps for drawing a face

```
- Draw the outline.
    - Paint the inside with color.
- Draw the eyes (right eye and left eye)
- Draw the mouth
- Draw the text
```

p5*js steps for drawing a face

1. crete a drawing area: createCanvas(width,height);
2. Set the background color of the canvas: background(color);
3. Set the color and thickness of the lines stroke(color); strokeWidth(lineWidth);
4. Set the Fill Color fill(color);
5. Draw the outline: circle(x,y,w,h);
    i. Draw the eyes (right eye and left eye)
    line(x1,y1,x2,y2);
    ii. Draw the mouth: arc(x,y,w,h,start,stop);
    iii. Draw the text textSize(size); text(text, x, y);

p5*js smiley

https://editor.p5js.org/didny/sketches/d_QxCFCRy

```
function setup() {
  //create a drawing area
  createCanvas(400, 400);
}

function draw() {
  //set background color
  background(220);

  //set color and weight of lines
  stroke(0);
  strokeWeight(10);
  //set fill color
  fill(255,255,0);
  //draw the outline
  circle(200,200,200);

  //draw the eyes
  line(170,150,170,220);
  line(230,150,230,220);

  //draw the mouth
  arc(200,230,100,100,0,PI);

  //draw a text
  fill(0);
  textSize(50);
  text("YAY!!!",130,350);
}
```

E01: Challenges

- the position and size of each part of the face is specified directly.
  Define variables for these so that they can be moved freely.
- Once the variables are defined, let's try to create faces that represent other emotions by adjusting the values of the variables.
- Create functions that draw faces representing different emotions, such as sadFace().
- Referring back to the MicroBits exercise, define a new variable, the hunger value, and create a conditional that changes the emotion depending on its value.

E02: Smiley Image Version

Next, let's try loading images or videos instead of the drawing with graphic functions.

To do so, we need to follow the steps below.

1. Upload image(s) to p5.editor.
2. Specify the image path and load the image into the variable.
3. Read the image drawing function and display the image.

E02: Upload Image to p5.editor

- create folder "img"
- upload images

https://www.youtube.com/watch?v=1Rs_MT82hl4

E02: Create variables to load images

- use loadImage("path/filename")

```
// define global variables for image
let sadFaceImage;
let neutralFaceImage;
let happyFaceImage;

function preload() {
  // load images
  sadFaceImage = loadImage("img/sad.png");
  neutralFaceImage = loadImage("img/neutral.png");
  happyFaceImage = loadImage("img/happy.png");
}
```

References 1/2:

p5*js cheat sheet

https://docs.google.com/document/d/12d8zkS8sLMzR_0oCEbfXAOM8GmB3X5LDrMvxU9ggp34/edit?usp=drivesdk

p5.js Refereces:

https://p5js.org/reference/

Coding Train by Daniel Shiffman

https://thecodingtrain.com/beginners/p5js/

References 2/2:

w3school: JavaScript Tutorial

https://www.w3schools.com/js/

CodeAcademy JavaScript tutorial

https://www.codecademy.com/learn/introduction-to-javascript

p5.play

https://molleindustria.github.io/p5.play/