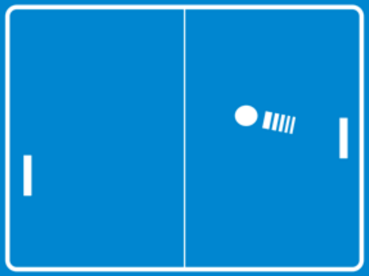
UNIT PLAN

# Build a Pong Game

## with the Intel® Galileo Gen 2 board



Created by Oliver Chen, Cheryl Daisin, Shammi Jayaraj, Luis Avitia,
Raad Hashim, and Jesus Espinoza on on August 30, 2014

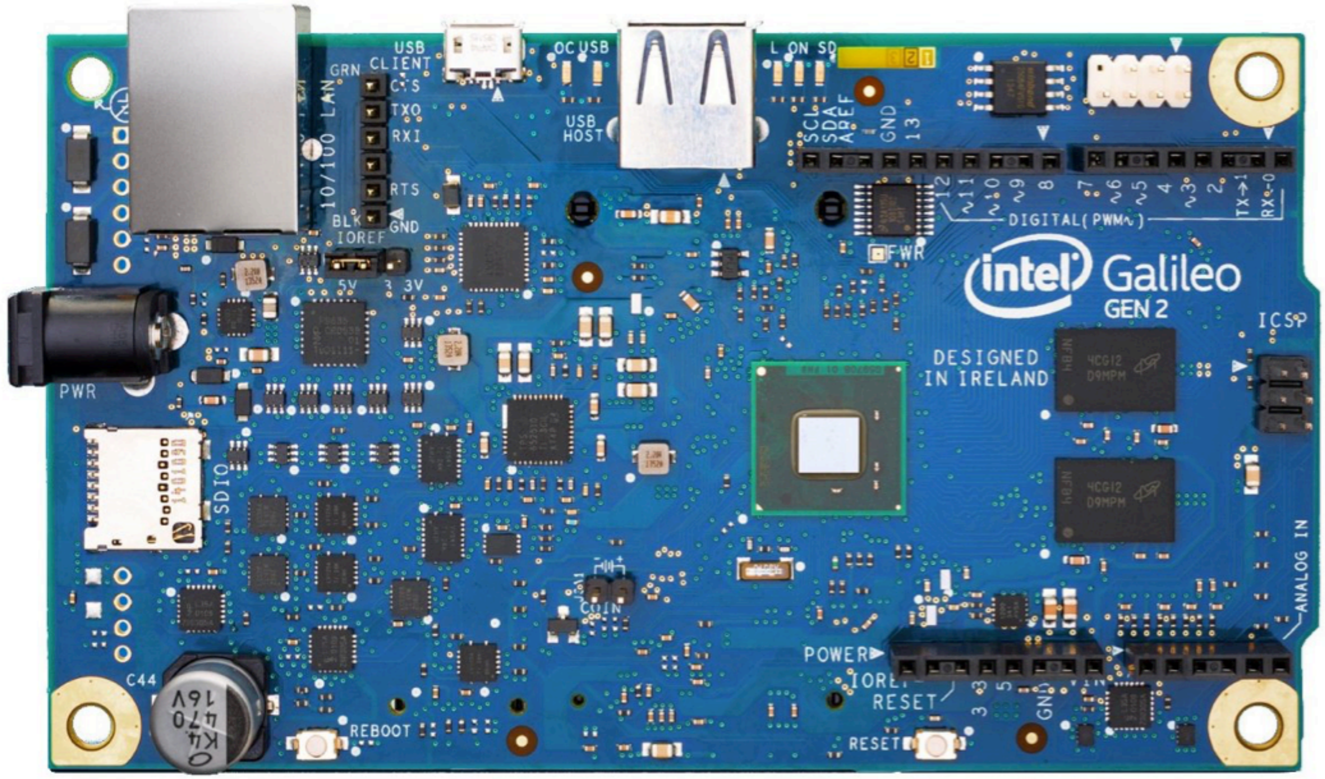
Last modified by Tom Seaman on September 25, 2015

# What Are Sensors?

A sensor is a device that responds to a stimulus, such as heat, light, or pressure. It then generates a signal that can be measured or interpreted.

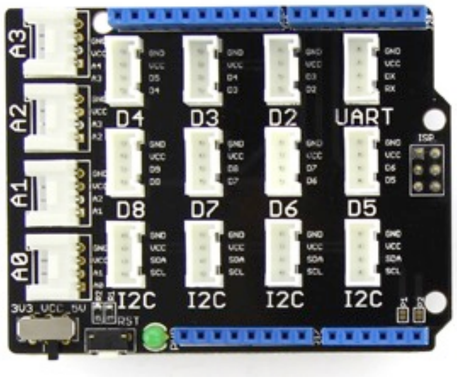
Humans, animals and even plants have sensors that can detect the world around them.

# The Intel® Galileo Circuit Board



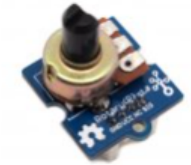
What will you make?

# What You Will Need from the Grove Kit

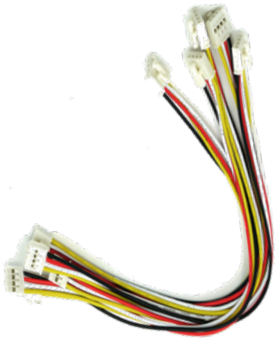


The shield is hidden under the pink Styrofoam that the RGB Backlight LCD sits on top of.

**Shield**



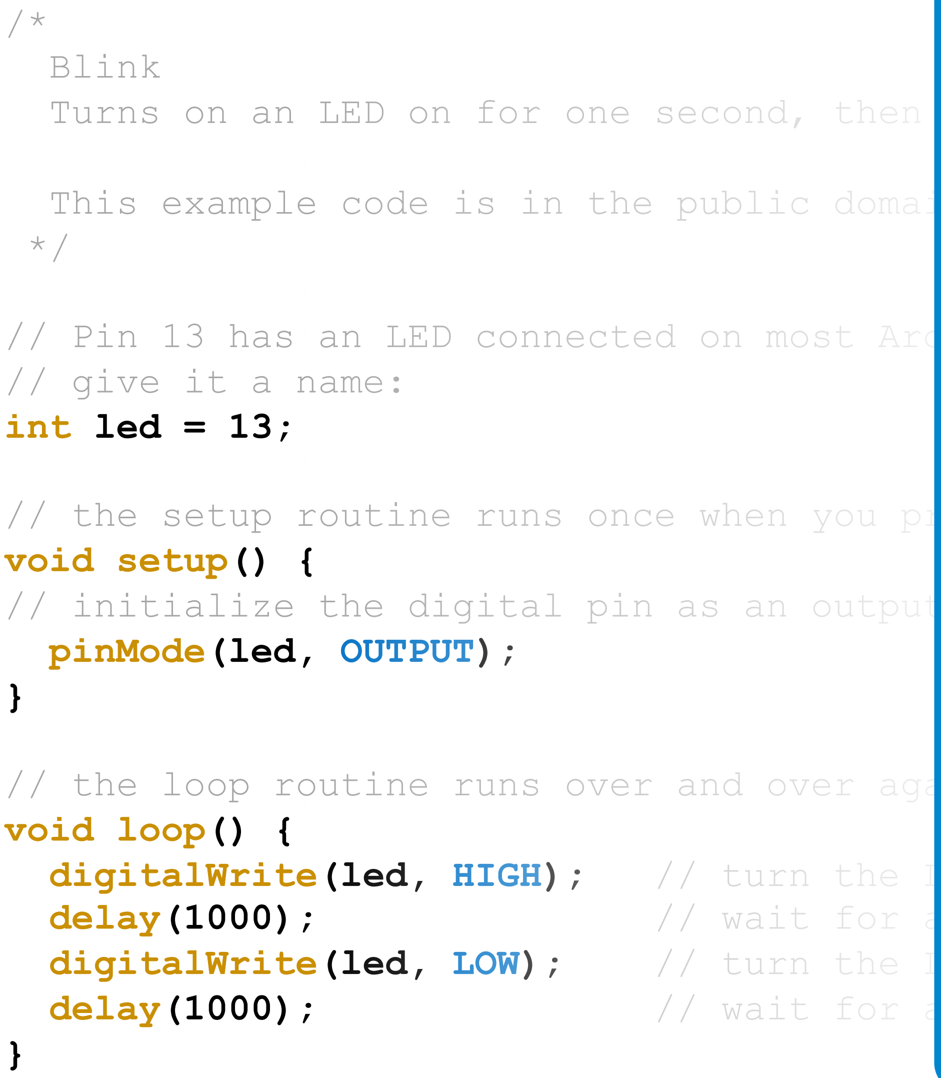
**Dial x 2**



**Cables**

Figure 1

# Coding Tips



```
/*
  Blink
  Turns on an LED on for one second, then

  This example code is in the public doma
 */

// Pin 13 has an LED connected on most Ar
// give it a name:
int led = 13;

// the setup routine runs once when you p
void setup() {
// initialize the digital pin as an output
  pinMode(led, OUTPUT);
}

// the loop routine runs over and over aga
void loop() {
  digitalWrite(led, HIGH);   // turn the I
  delay(1000);               // wait for a
  digitalWrite(led, LOW);    // turn the I
  delay(1000);               // wait for a
}
```

## { Curly Brackets }

Any code you write inside the curly brackets will be executed when the function is called.

## // Comments

Comments are notes you leave for yourself that the computer ignores. To write a comment, add two slashes // before you’re the text you want ignored.

## Case sensitivity

Pay attention to the case sensitivity in your code.

Created by Oliver Chen, Cheryl Dalsin, Shammi Jayaraj

# Connect the Galileo Board and Install Software

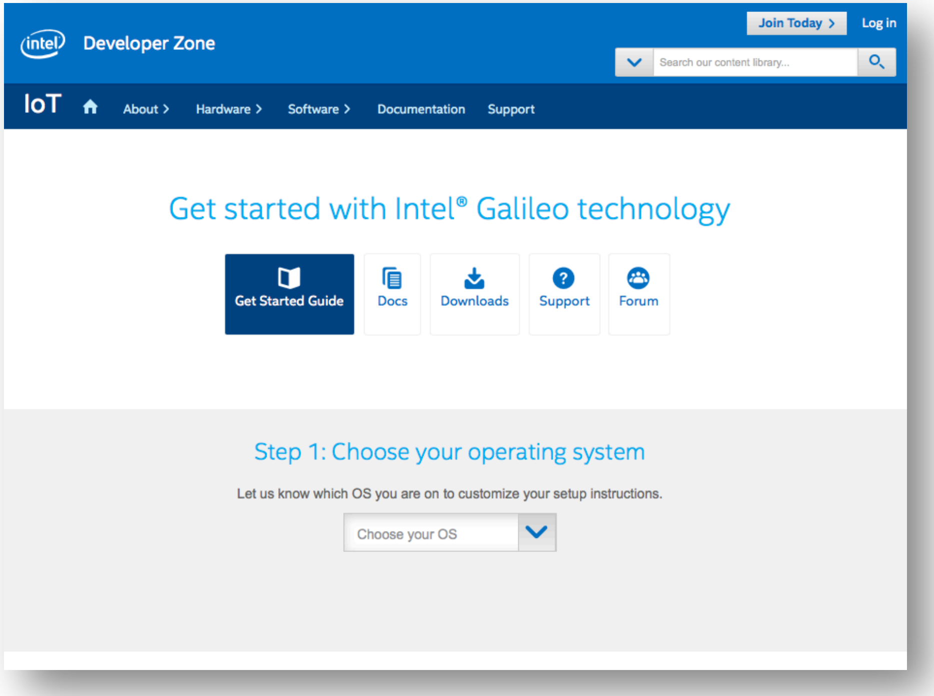
*Note:  If the set-up is done ahead of time, skip this step and proceed to the next slide, Build the Circuit.*

Step-by-step instructions for connecting Galileo are found here:

[https://software.intel.com/en-us/iot/library/galileo-getting-started](https://software.intel.com/en-us/iot/library/galileo-getting-started).

Within the step-by-step instructions, when prompted to choose a development environment, choose Arduino.

Proceed all the way through the getting started exercise to the point where you blink the LED on the Galileo board. This affirms the set-up was done correctly.



Get started with Intel® Galileo technology

Step 1: Choose your operating system

Let us know which OS you are on to customize your setup instructions.

***Caution!***

*Always make sure the Galileo board is plugged in BEFORE connecting the USB cable to the computer!*

*Also, always unplug the USB cable BEFORE disconnecting the power from the Galileo.*

*Doing these steps in the wrong order can permanently damage your board.*

# Install the Sketches

*Note: If the set-up is done ahead of time, skip this step and proceed to the "Build the Circuit" slide.*

*Instructions for Windows or Mac:*

1. Download to the PC's desktop the file called **IESC.zip**. (The file is attached to the unit plan "Make a Mini-Arcade" housed in the Idea Showcase in engage.intel.com.)
2. Unzip the file. This will unpack the zip file and place all the relevant files in a folder called **IESC** it creates for you on the desktop.
3. Remember to tell your students that the sketches they will need to run for the activities are located inside this **IESC** folder.

# Install Processing IDE

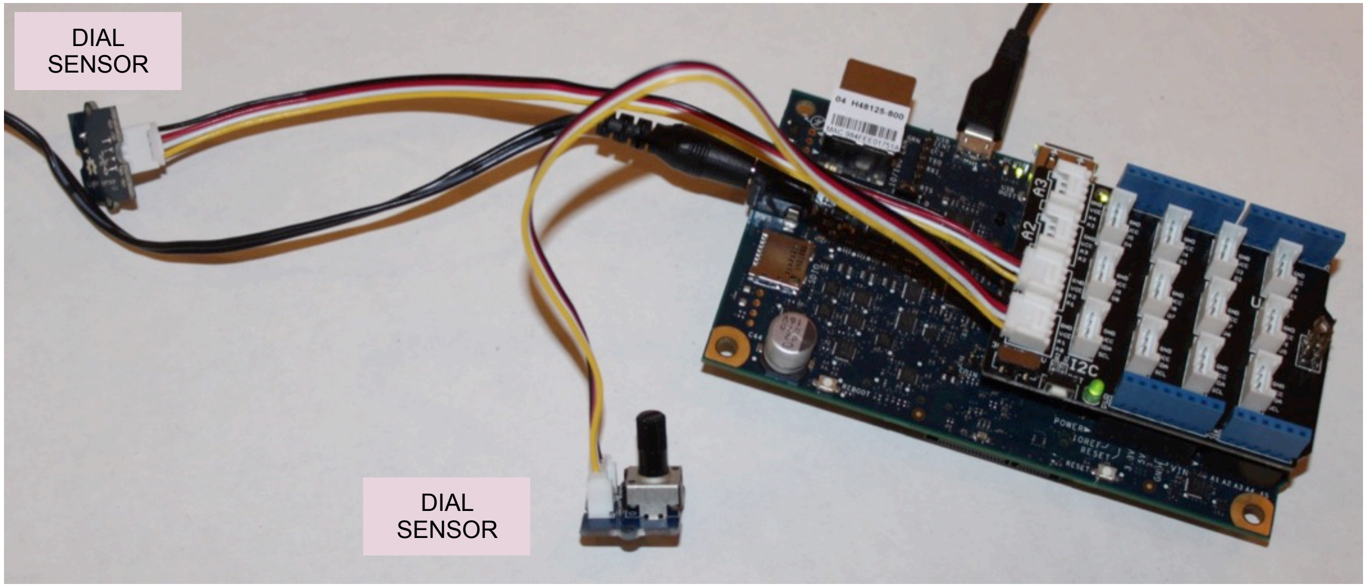
You will need to download the Processing IDE to run the Processing sketch.

1. Processing can be downloaded here: https://processing.org/download/?processing
2. Extract to the desktop

*for Windows users:*

3. Navigate to the file you just downloaded
4. Right click on processing.exe and select create a short cut
5. Drag processing.exe shortcut to Desktop.

# Build a Pong Game



**Build the Circuit**

1. Carefully attach shield to Galileo as shown in figure 2
2. Connect Grove Rotary Angle Sensor(dial) to A0
3. Connect Grove Rotary Angle Sensor(dial) to A1
4. Turn on shield with its switch

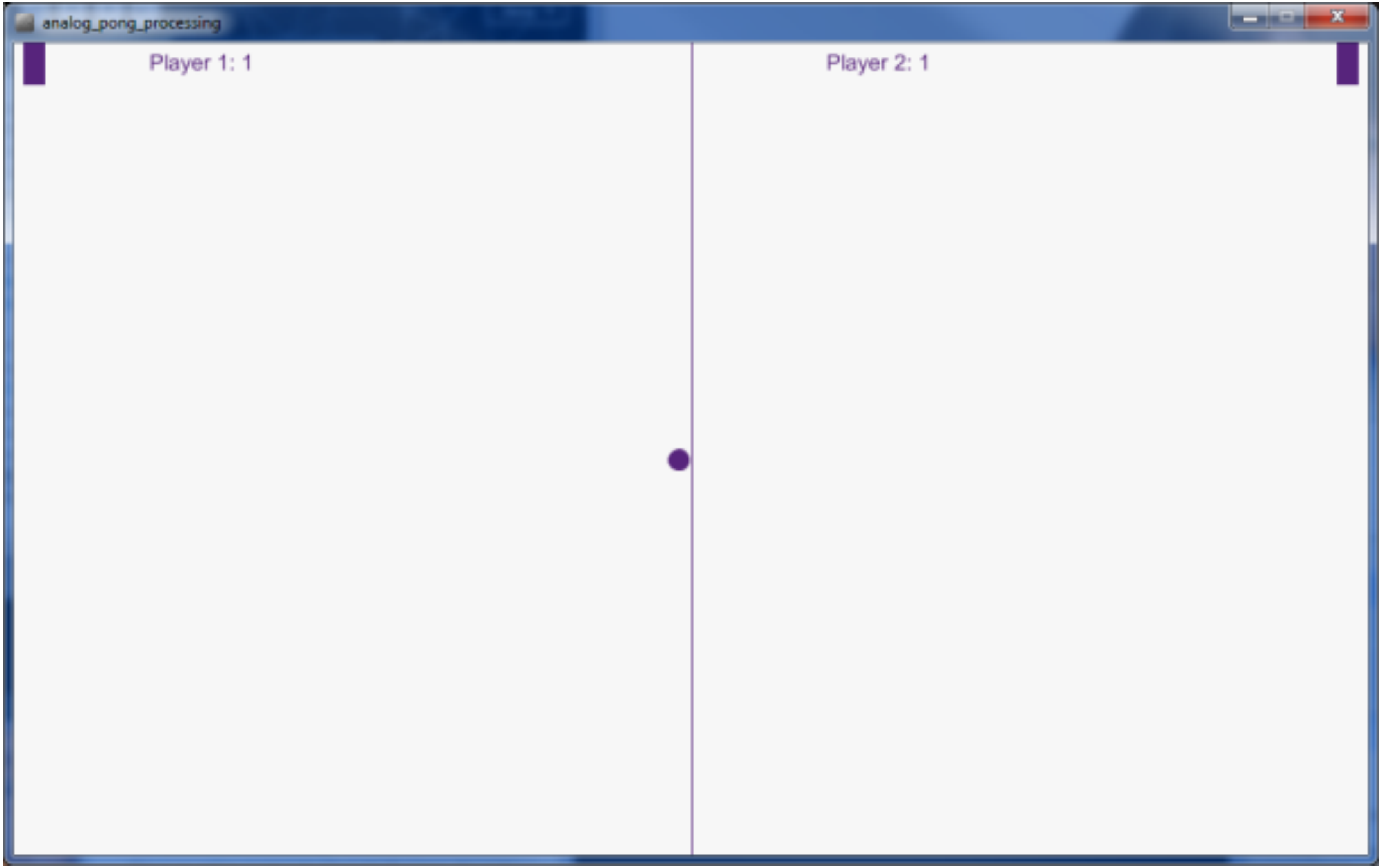
**Load the Sketches**

1. Open the Arduino IDE software
2. In Arduino IDE: **File → Open**
3. On the desktop, open in succession the folders **IESC → pong**
4. Within the **pong** folder, select the file called **pong.ino**
5. Click ***Verify*** (checkmark)
6. Click ***Upload*** (right arrow)
7. Open Processing IDE software
8. Select **File → Open** and locate and select **pong_processing.pde**

**Play Pong!** Use the dials to bat the ball back and forth.

**Challenge:** Can you change the interface to use Ethernet?

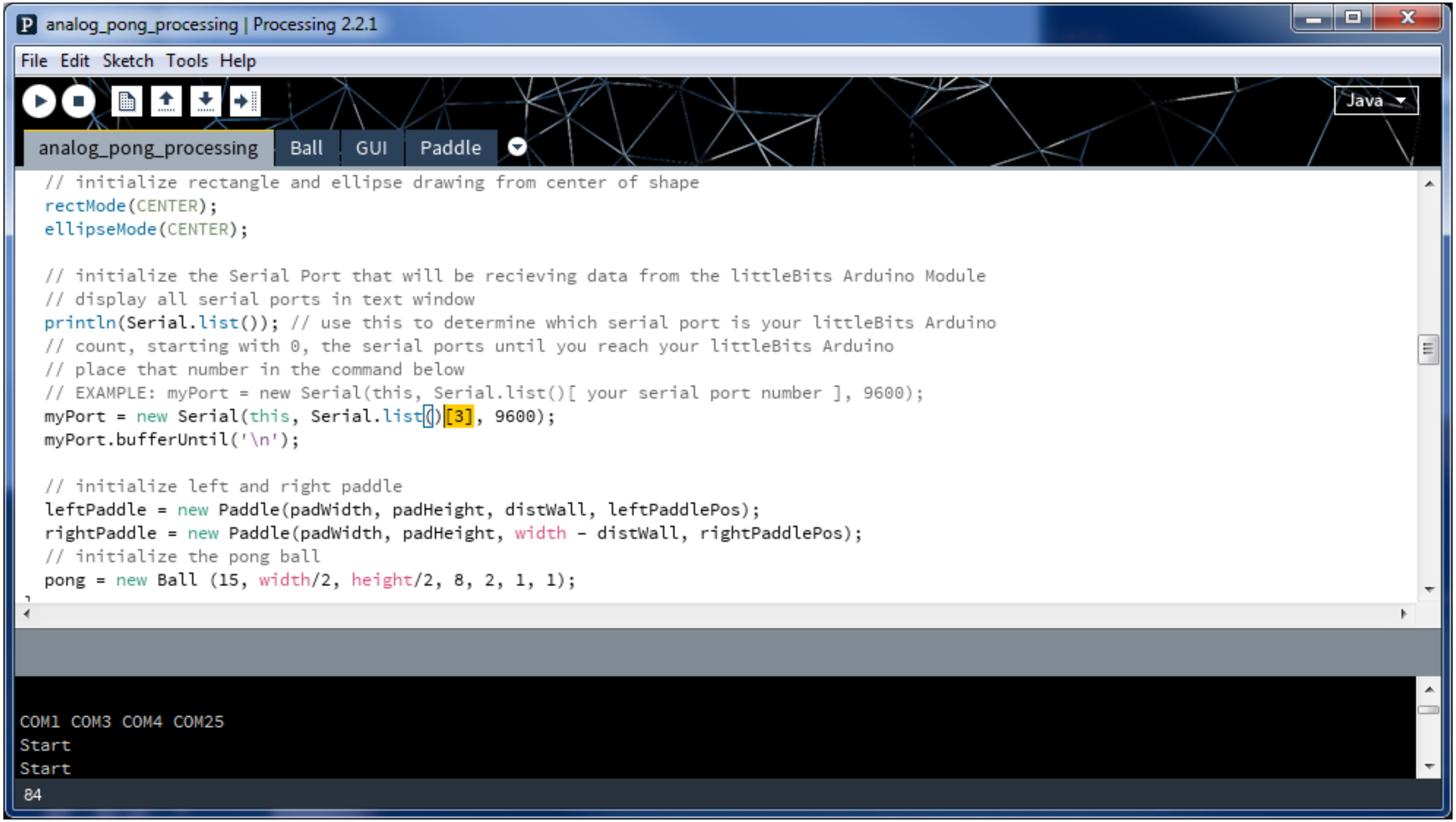
# Pong



# Did it work?

If not, check to be sure the **pong_processing.pde** is using the right COM port as the processing pde starts.  For example, to set COM25 as serial port for processing:  In code use N-1 where N in this example is 4:  N - 1 = 4 -1 = 3

***Need more help?*** See troubleshooting page in this document


analog_pong_processing | Processing 2.2.1
File Edit Sketch Tools Help
Java
analog_pong_processing
Ball
GUI
Paddle

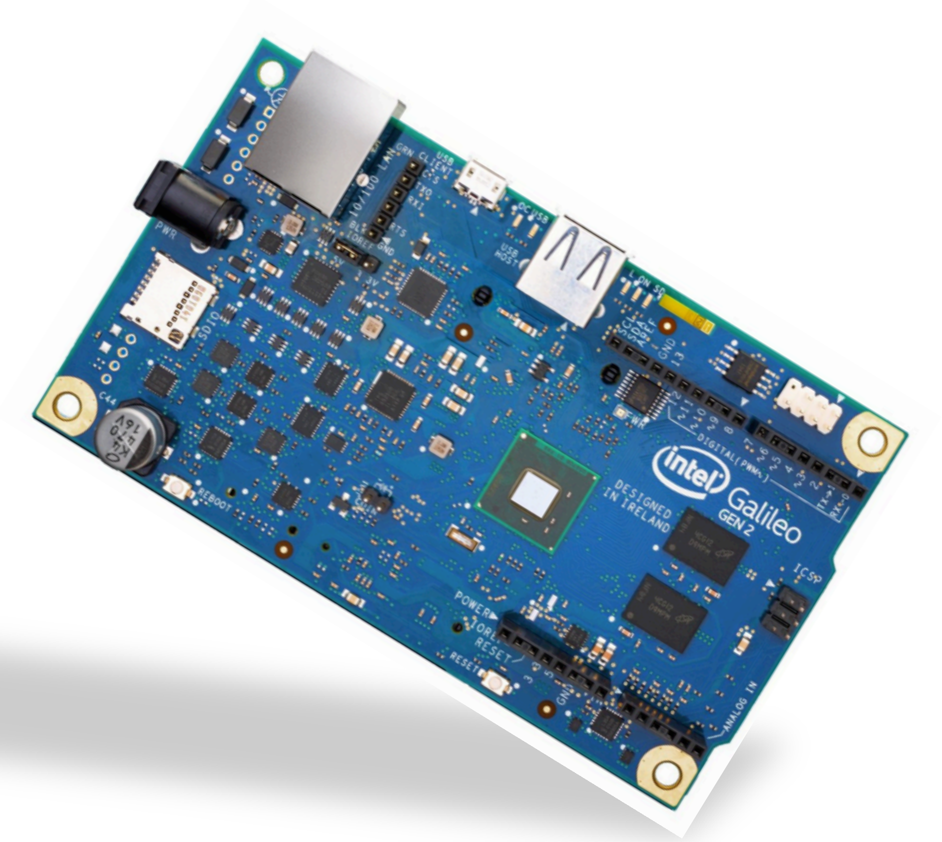
```
// initialize rectangle and ellipse drawing from center of shape
rectMode(CENTER);
ellipseMode(CENTER);

// initialize the Serial Port that will be recieving data from the littleBits Arduino Module
// display all serial ports in text window
println(Serial.list()); // use this to determine which serial port is your littleBits Arduino
// count, starting with 0, the serial ports until you reach your littleBits Arduino
// place that number in the command below
// EXAMPLE: myPort = new Serial(this, Serial.list()[ your serial port number ], 9600);
myPort = new Serial(this, Serial.list()[3], 9600);
myPort.bufferUntil('\n');

// initialize left and right paddle
leftPaddle = new Paddle(padWidth, padHeight, distWall, leftPaddlePos);
rightPaddle = new Paddle(padWidth, padHeight, width - distWall, rightPaddlePos);
// initialize the pong ball
pong = new Ball (15, width/2, height/2, 8, 2, 1, 1);
```

```
COM1 COM3 COM4 COM25
Start
Start
```

# Wrap-Up Discussion



What did we learn?

Using the Intel® Galileo board and the same set of sensors and output devices, what are some other types of video games we could create?

Can you think of any interesting ideas for innovative Interactive devices for the home?

How about ideas for wearable technology?

What kinds of careers are available to people who enjoy this kind of activities?

# Troubleshooting Guide

| Problem | Resolution |
|---|---|
| Sketch not working | 1. Check Arduino IDE set to correct model, and Port<br>2. Check Galileo Port visible in device manager<br>3. Try resolution for port not visible<br>4. Try upgrading the firmware<br>    1. Aurdino IDE Help -> Galileo Firmware Update<br>    2. Click OK, if you have external power (This step should take ~5 minutes) |
| Galileo port not visible in device manager | 1. Unplug USB<br>2. Unplug and replug power<br>3. Replug USB<br>4. Wait<br>5. If not visable after 2.5 minutes, reboot PC and repeat steps 1-4.<br>6. If still not visable check if *Gadget Serial v2.4* is in device manager |
| *Gadget Serial v2.4* in device manager | 1. Install Galileo Driver |
| Sketch upload complains about missing /dev/tty** Or upload just hangs | Port may be locked, try steps under Galileo port not visible. |
| Sketch upload complains about missing libraries | 1. Close all arduino IDE instances<br>2. Install Grove libraries page 10<br>3. Restart arduino IDE |

# If you like this unit plan, you might like one of these other unit plans introducing students to making and coding:

## For Teaching Coding and Computer Science

Let's Learn Computer Science 1
Let's Learn Computer Science 2
Let's Learn Computer Science 3
Let's Learn Computer Science 4
Create Your Own Flappy Game

## For Teaching Making, Engineering, and Science

Creating with Technology
What Will You Make?
Electrical Engineer for a Day
Unlocking Possibilities
Inspiring Young Engineers
Make a Pong Video Game
Make a Mini Arcade
Make a Smart Toy
Make a Smart Light Sensor
Make a Smart Temperature Sensor

## Additional Resources

For an introduction to the benefits of teaching making and coding, and tips for bringing hands-on activities to your classroom, see Gary Stager's paper, "Guide to Creating and Inventing with Technology in the Classroom," found here:

http://innovationtoolbox.intel.com.au/wp-content/uploads/2015/05/18009_IntelEdu_Guide2Making_FA_LR_singles.pdf

To download these and other open-source unit plans, please visit
https://engage.intel.com/community/teachersengage/showcase