



Lesson 10

(Prototype / Test + Servo or LCD)

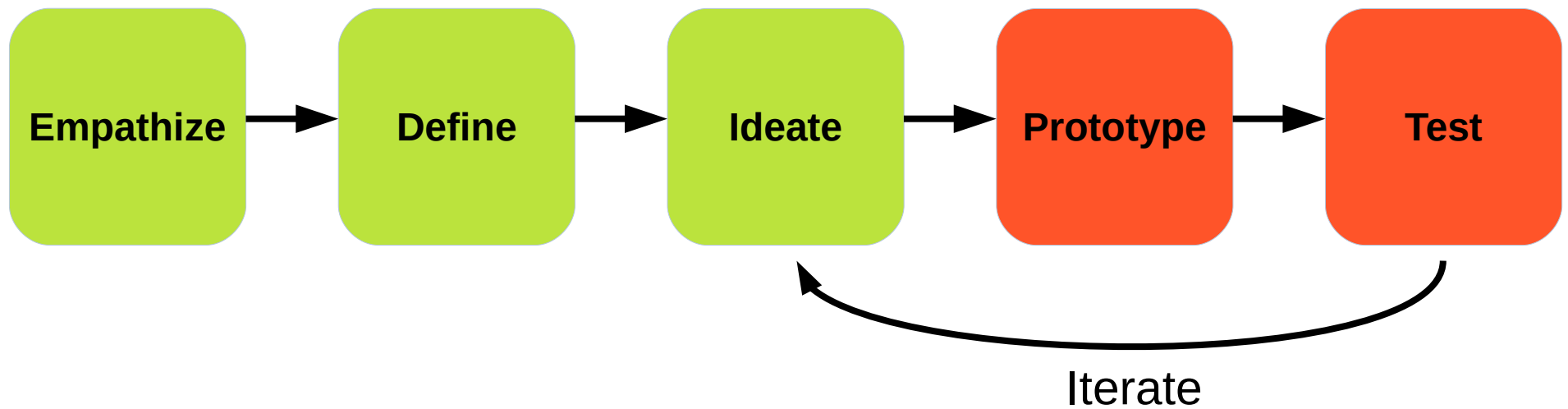


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Target for Today!

- Design Thinking: Prototype & Test
- Learn how to use Servo or LCD

Design Thinking Process



Why Prototype?

- Before mass producing your product, you had better know you have a winning design
- Prototyping – rapidly create a cheap version of your product

Testing

- Version 1 – **some features** testable
- Final / Demo – **all features** testable
- A prototype's worth is in its ability to allow for testing/demonstration before the final investment

Refinement & Iteration

- No product ever gets made in one iteration
- Testing & Refinement should be expected and built-in
- Always keep a skeptical, critical mindset
 - Will this actually work?
 - How can this be improved?
 - Did I test every circumstance?

Refinement & Iteration

- Let **Users** review, test and critique your design/product
 - Analyze all critiques
 - Decide if it's appropriate and worth making a change over
 - Not all criticism mandates design changes...

Parts & Tools

- It's time to make some tough choices.
- You have to provide a detailed list of items you predict you will need for your project:
 - **Sensors** (Ultrasonic, Tilt, Heart Monitor, etc)
 - **Actuators** (LED, Buzzer, Pump, Motor, LCD, etc)
 - **Fabrication** (Cardboard, Design Paper, Popsicle Sticks, Glue, Staples, etc)
 - **Tools** (Glue Gun, Scissors, Coloring, etc)
 - Anything else...

Parts List / Design Review

Worksheet

Review / Refine (2-5 min)

- Pitch idea to teachers, listen to critique, and refine problem statement & solution, if necessary

Shopping List (15 min)

- Sensors
- Actuators
- Fabrication Materials
- Tools
- Anything Else

ALP Project

Keep what you have written!

You'll need to include it into your
ALP Project write-up.

Servo Motor

motor



attachments



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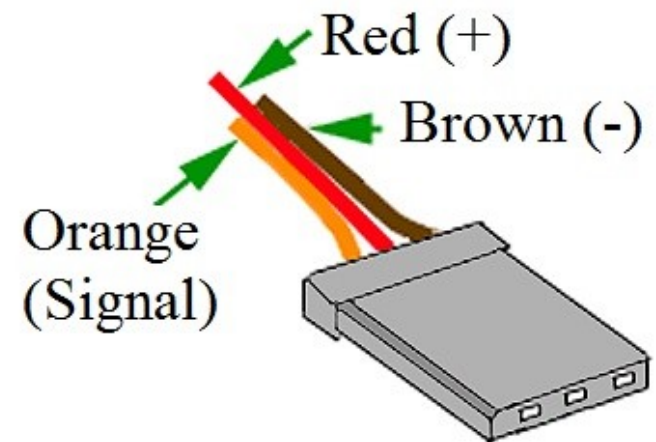
Servo Motor

- Common Model: Micro Servo sg90
- Rotation Range: $\sim 180^\circ$
- Uses internal potentiometer to maintain position
- Input: analog/PWM voltage

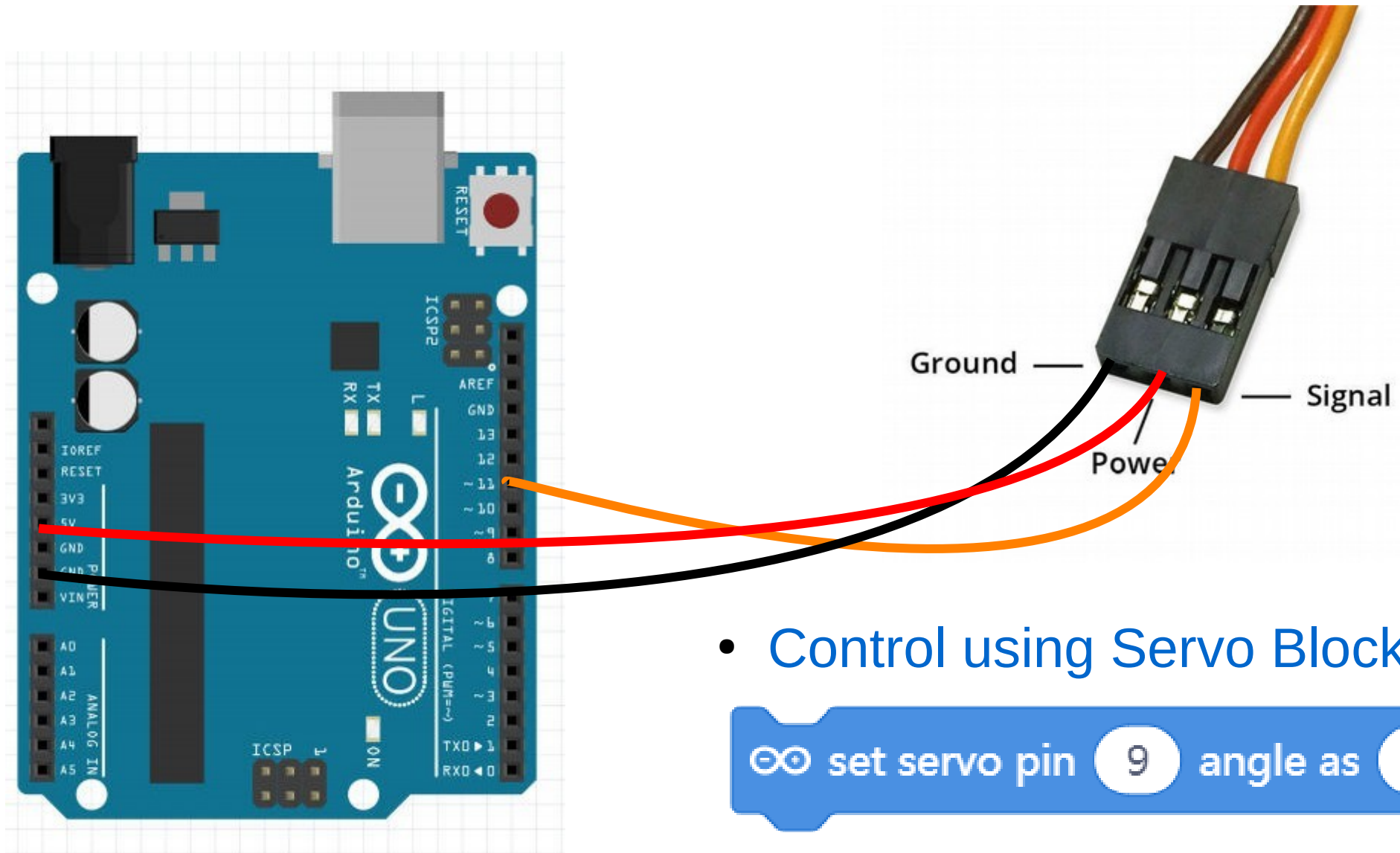


Servo Motor

Servo Wire	Arduino Pin
Red (+)	5V
Brown (-)	Gnd
Orange (S)	Any ~PWM I/O Pins

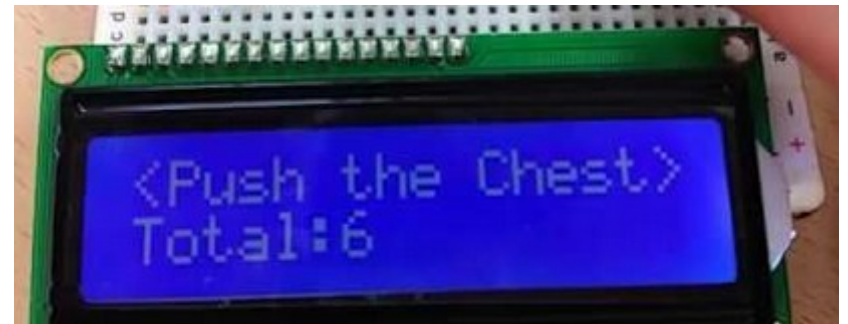


Servo Motor

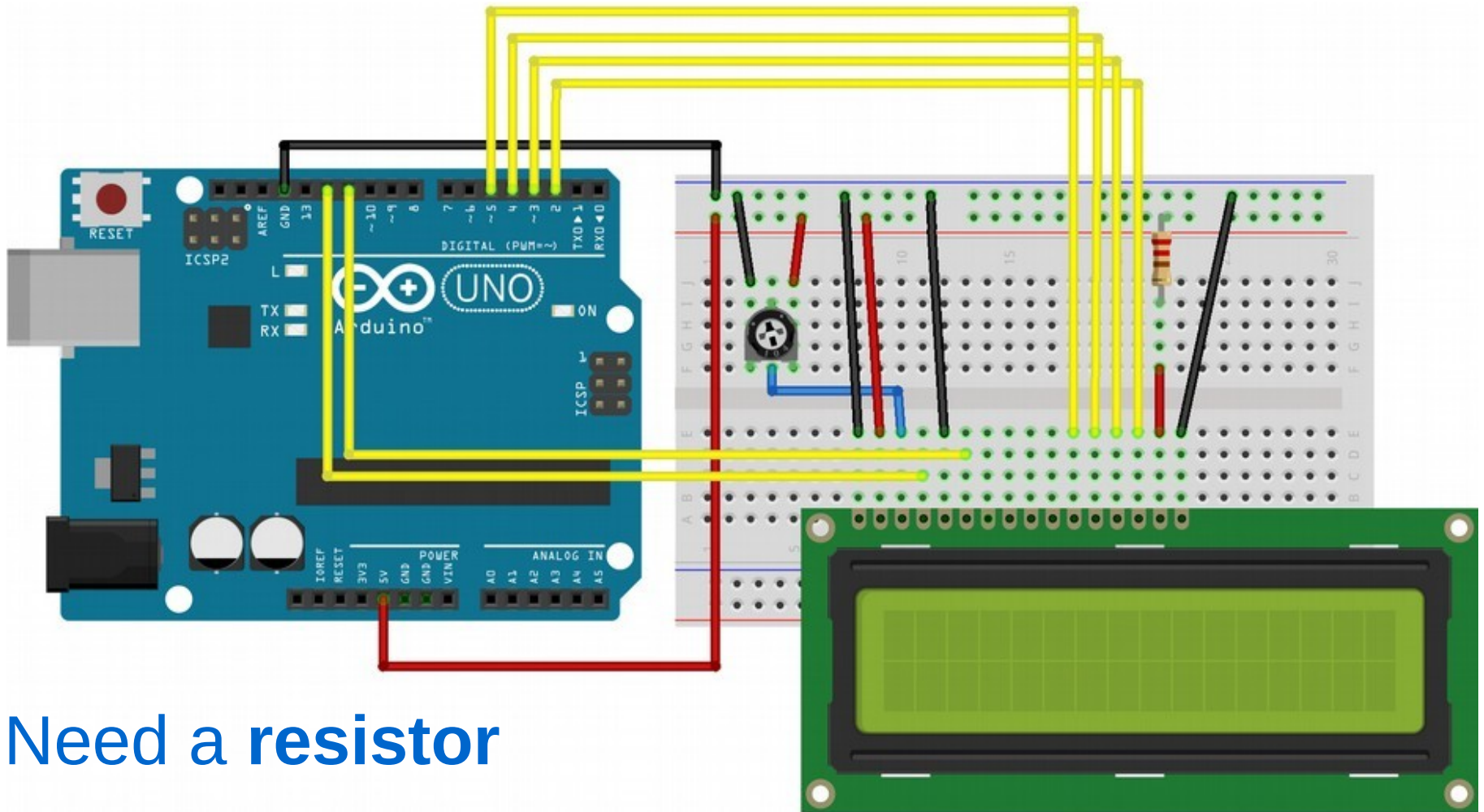


LCD

- Liquid Crystal Display
 - Cheap, monochrome version of LCD TV
 - Can display 2 lines of text, 16 chars each
 - Only works in Upload mode
 - Pairs well in projects using Ultrasonic
 - When you want tell user things that are hard to communicate with just LEDs

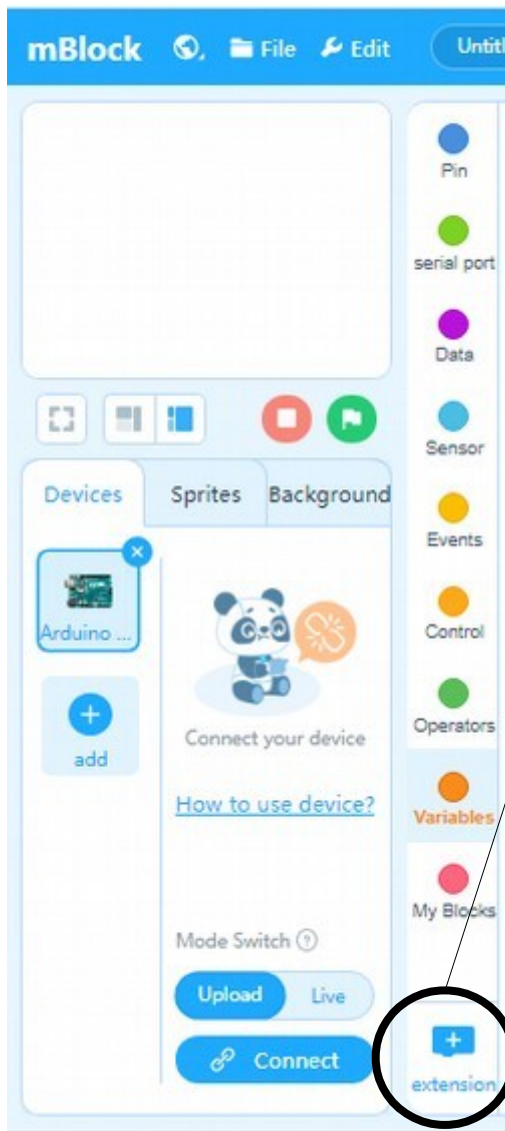


LCD Pins



- Need a resistor
- And a potentiometer

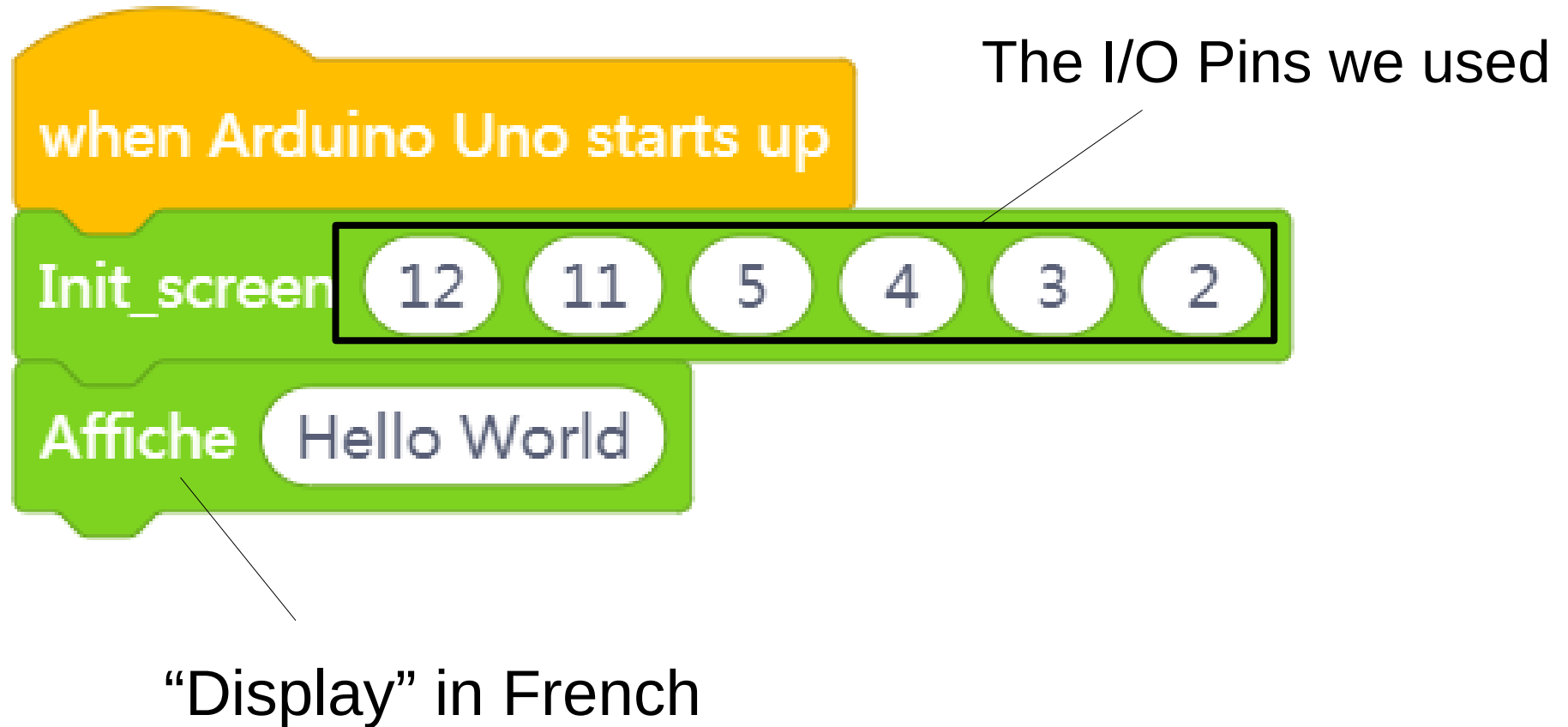
LCD Extension



Find CodeDojo LCD Extension
"CDG_LCD"

Add to Arduino Device

Using LCD Extension



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