

Introduction à l'électronique digitale

Microcontrôleurs

TP n. 1 Introduction à Arduino

EPFL

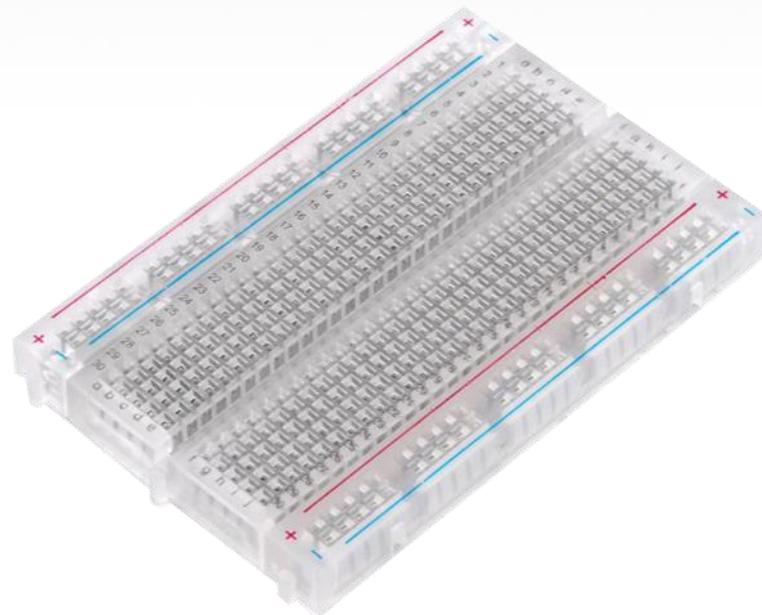
Section de Physique

D. Mari, C. Meinen

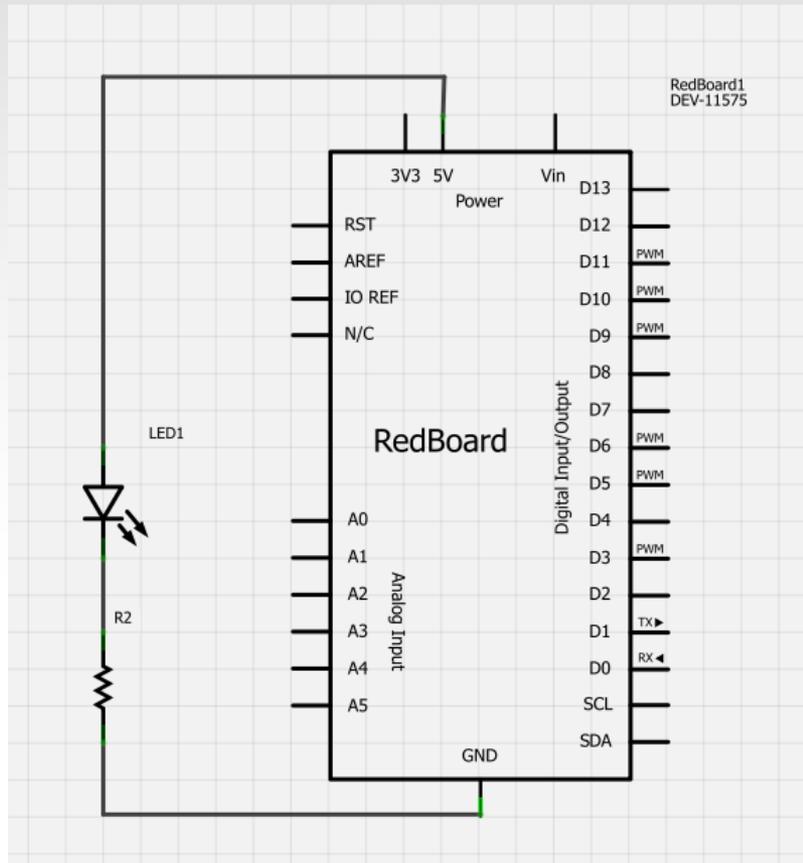
Prototypage de Circuits Solderless Breadboard

L'outil de base pour la conception de circuits:
Le plus important :

- Un breadboard c'est plus facile que souder
- Bien savoir quels trous sont connectés



Alimenter un circuit simple



Utiliser le breadboard pour illuminer une LED. On a 5V à l'alimentation donc on limite le courant à 15 mA avec une résistance de ~ 300 Ohm (Orange-Orange-Marron).

Note: la patte longue de la LED est le + et la patte courte le -

Vérifier la valeur du courant avec le multimètre

Image du Circuit

On utilise la sortie analogique à 5 V.

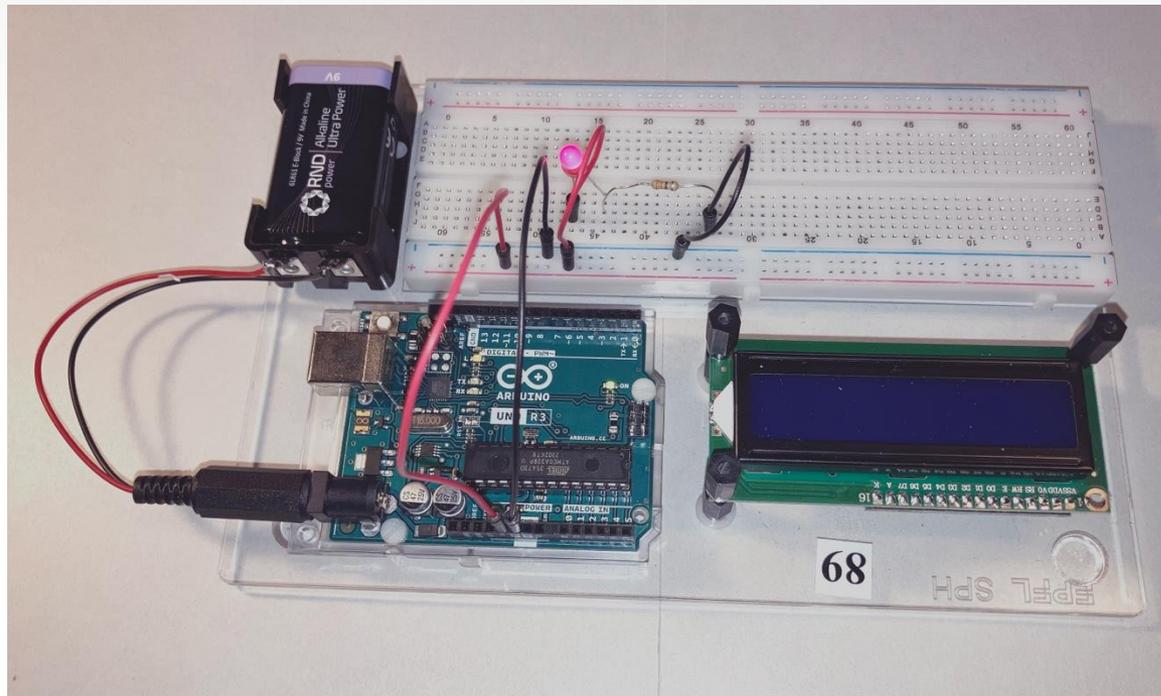


Image du Circuit

On utilise la sortie
analogique à 5 V.

Ajouter les LEDs
jaune et verte

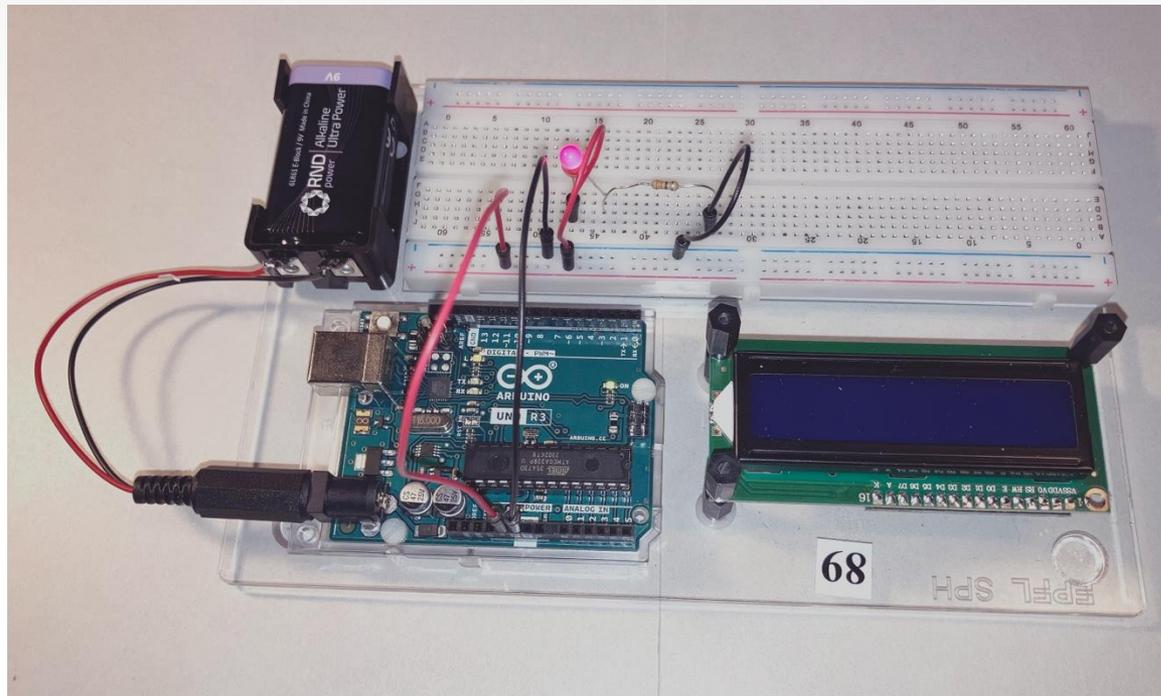
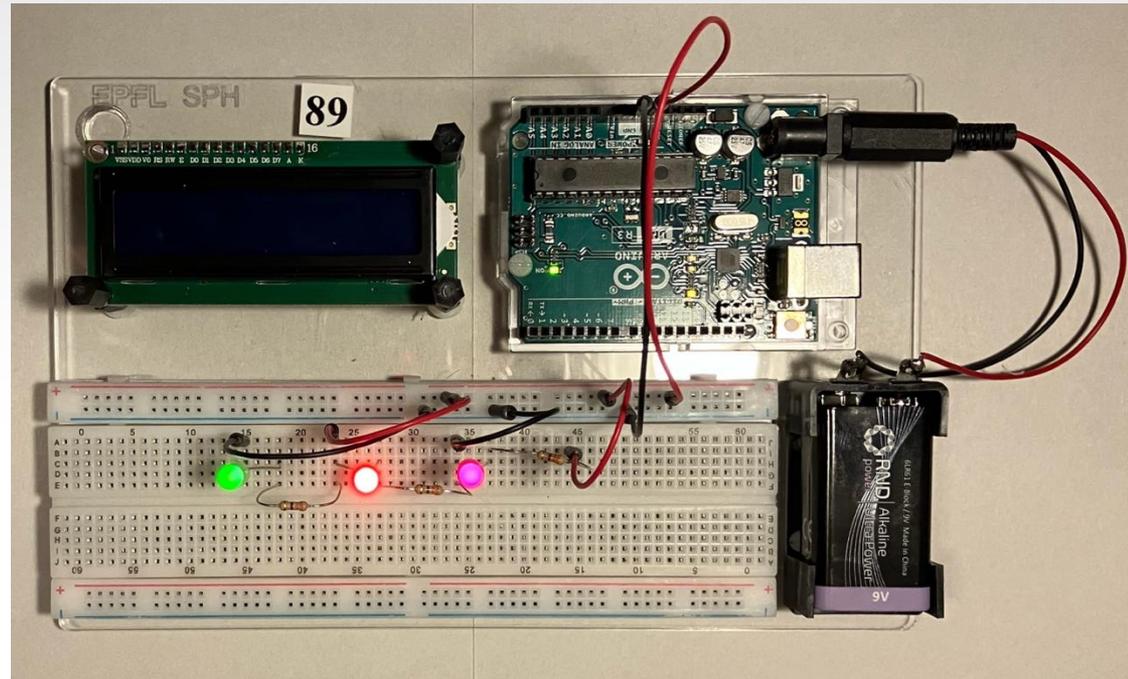
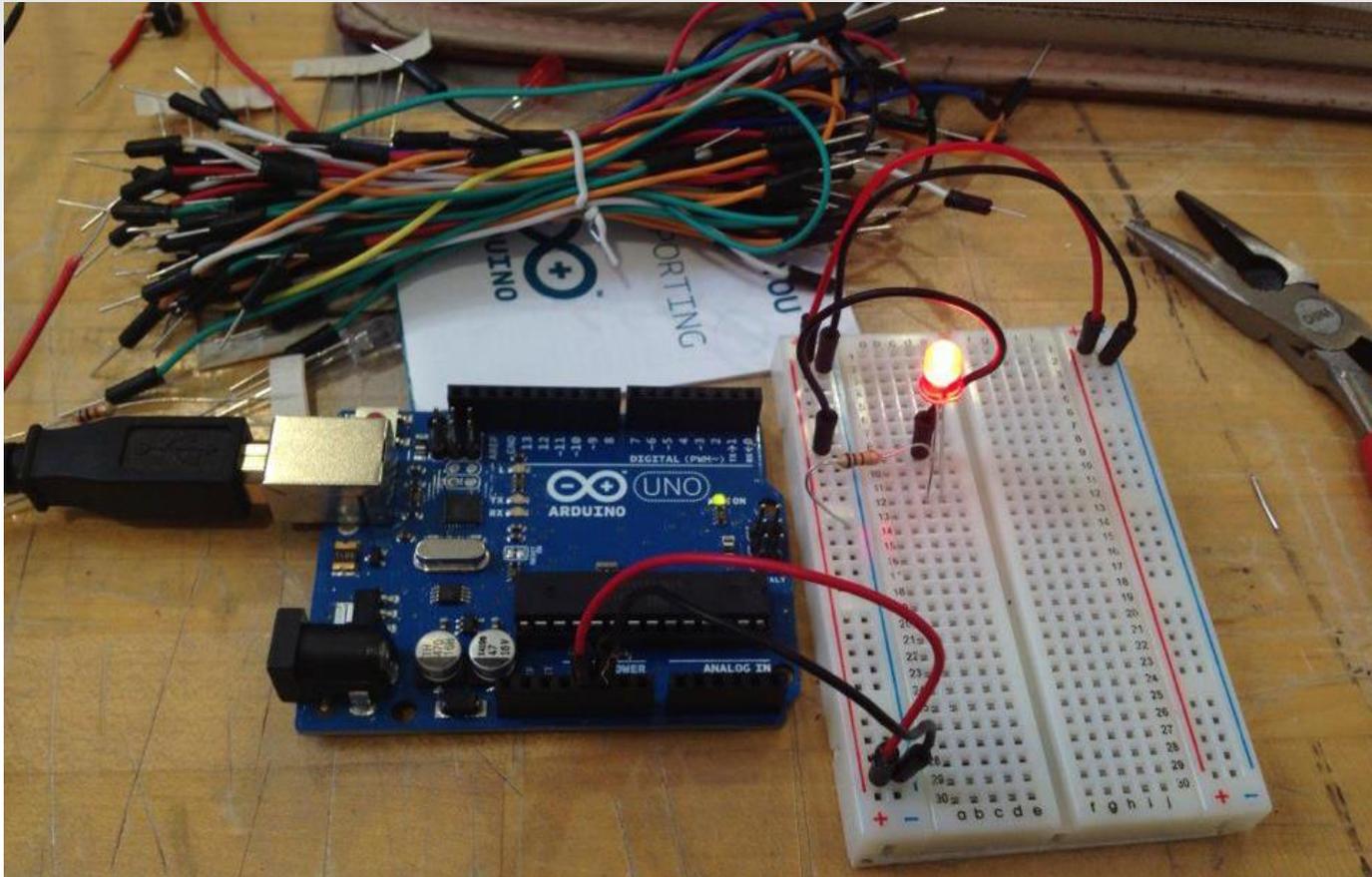


Image du Circuit

Ajouter les LEDs
jaune et verte



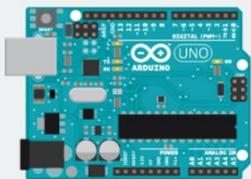
Adding control – let's use the Arduino and start programming!!!



Adding control – let's use the Arduino and start programming!!!



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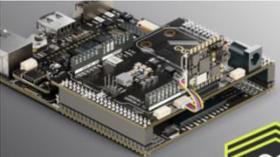
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BLOG



Arduino Lab for MicroPython

```
1 # This program was created in Arduino Lab for MicroPython
```

BLOG



Adding control – let's use the Arduino and start programming!!!

The screenshot displays the 'Sketches' page in the Arduino IDE. On the left is a sidebar navigation menu with the following items: Home, Sketches (highlighted), Devices, Things, Dashboards, Triggers (with a lock icon), Templates (with a 'NEW' badge), Resources, Courses, Integrations, and Plan Usage. The main content area is titled '</> Sketches' and features a search bar with the text 'Search and filter Sketches', a keyboard shortcut '%K', a settings icon, a 'View' button with a grid icon, and a 'CREATE' button. Below this is a table with the following columns: Name, Device, Associated Thing, Visibility, and Last modified. The table contains one entry: a checkbox, a code icon, the name 'new_sketch_1739869935687', a dash for Device, a dash for Associated Thing, 'Private' for Visibility, and '18 Feb 2025 at 10:12' for Last modified. In the bottom right corner, there is a promotional banner with the text 'Your sketches, IoT tools' and a small thumbnail of the sidebar menu.

<input type="checkbox"/> Name ↑	Device	Associated Thing	Visibility	Last modified
<input type="checkbox"/> <code></></code> new_sketch_1739869935687	-	-	Private	18 Feb 2025 at 10:12

Arduino

Integrated Development Environment (IDE)



Two required functions /
methods / routines:

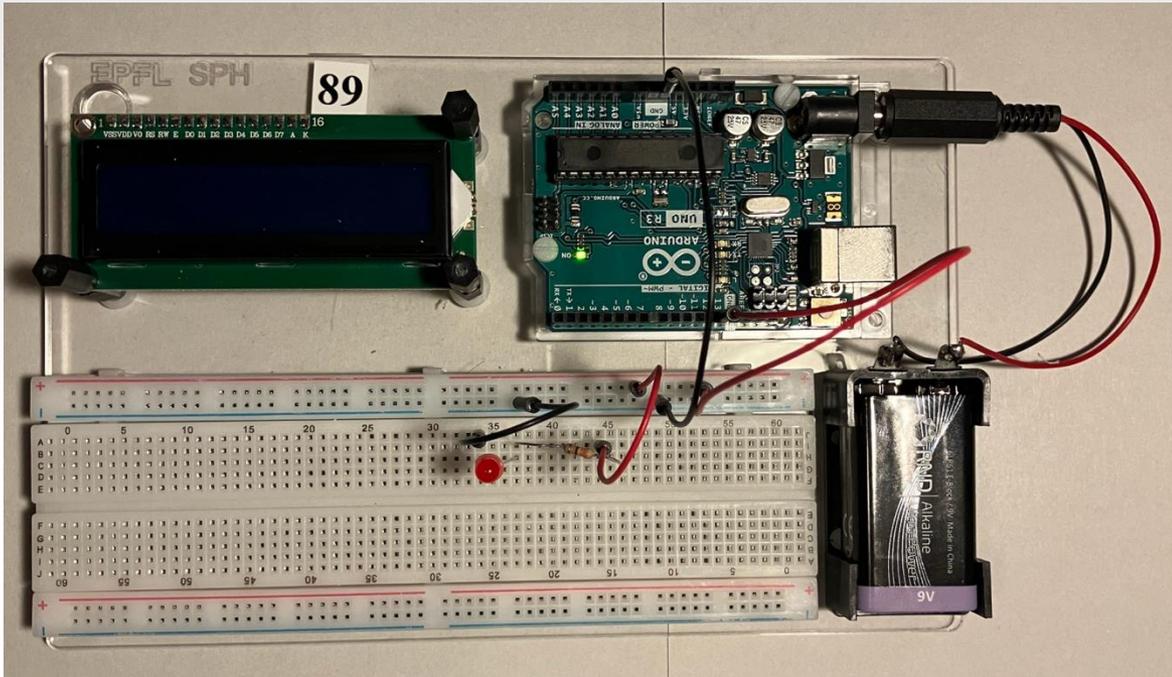
```
void setup()  
{  
    // runs once  
}
```

```
void loop()  
{  
    // repeats  
}
```

3 Commandes à savoir...

- `pinMode (pin, INPUT/OUTPUT) ;`
- ex: `pinMode (13, OUTPUT) ;`
- `digitalWrite (pin, HIGH/LOW) ;`
- ex: `digitalWrite (13, HIGH) ;`
- `delay (time_ms) ;`
- ex: `delay (2500) ; // delay de 2.5 sec.`
- **// NOTE: -> commands are CASE-sensitive**

Project #1: Blink



Déplacer le pin d'alimentation depuis le power bus au pin 13 (ou autre Digital I/O pin) sur Arduino.

Les premiers programmes

Let's make LED#13 blink!

Utiliser le programme LED_blink.ino
Charger ou copier le fichier texte sur Moodle

Challenge 1a – clignote avec un intervalle de 200 ms.

Challenge 1b trouver le clignotement le plus rapide que l'oeil humain peut détecter...

1 ms delay? 2 ms delay? 3 ms delay ?

Ajouter les autres LEDs

Modifier le programme LED_blink.ino

Faire clignoter chacune des LED avec des périodes choisies



Sémaphore