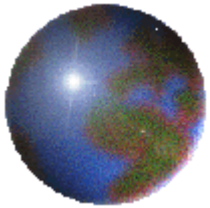
Université Badji Mokhtar Annaba
Departement d'informatique
1 Master SEM
Cours **Projets systèmes embarqués**

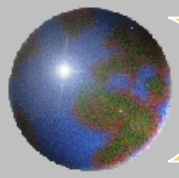


Arduino

Présenté par:
Dr M,A, YAKOUBI

Plan

- Arduino?
- Tp?



Arduino

What is Arduino?

- Arduino is an open source electronic prototyping platform of hardware and software. www.arduino.cc
- The term Arduino contains:
  - The Arduino IDE (PC Software)

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  - The Arduino board (Hardware)
  - The Arduino Firmware (Microcontroller software)

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- The term Arduino contains:
  - The Arduino IDE (PC Software)
  - The Arduino board (Hardware)
  - The Arduino Firmware (Microcontroller software)

- In this course we will use the Arduino UNO board.

Arduino

What we can do with Arduino?

- Robot
- Weather station
- Distance measurement and display
- Fingerprint door lock
- Temperature sensor recording
- …

Arduino

The Arduino IDE

- IDE: Integrated Development Environment
- https://www.arduino.cc/en/main/software

Arduino

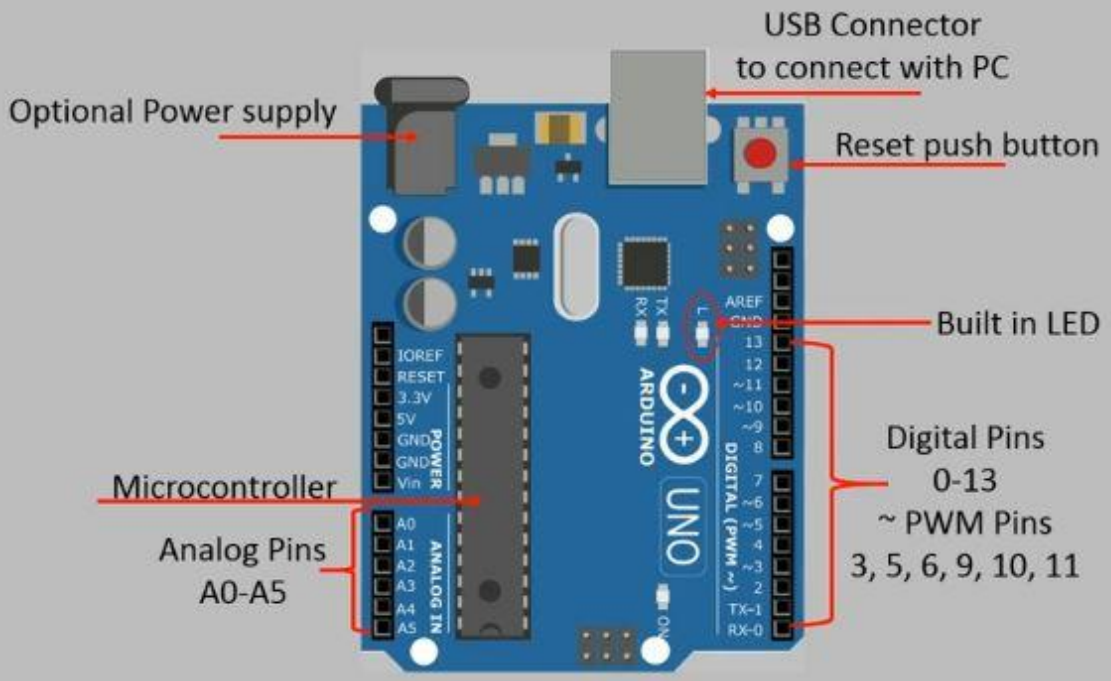
The Arduino IDE

- IDE: Integrated Development Environment
- https://www.arduino.cc/en/main/software

- The place, where we will write our code/ Sketch and download it to the Arduino board

Arduino

The Arduino UNO board

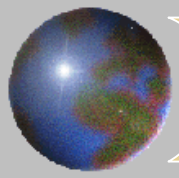


Arduino

What do I need to follow?

- Optional: Arduino Super Learning KIT from LAFVIN

- A registration on Tinkercad.com to use a simulation platform: https://www.tinkercad.com/



Arduino

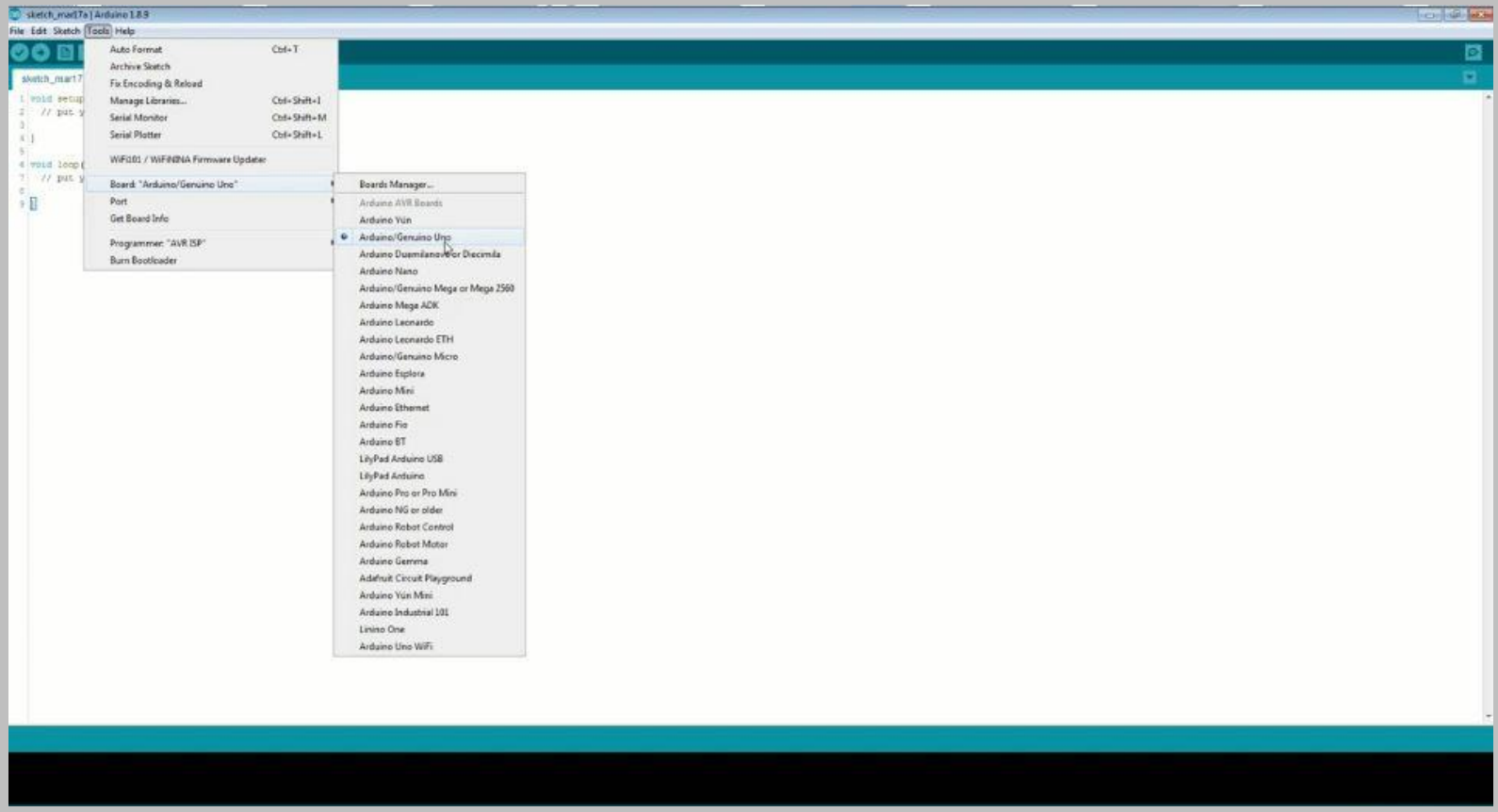
Arduino Basic Course

Lesson2: Setup

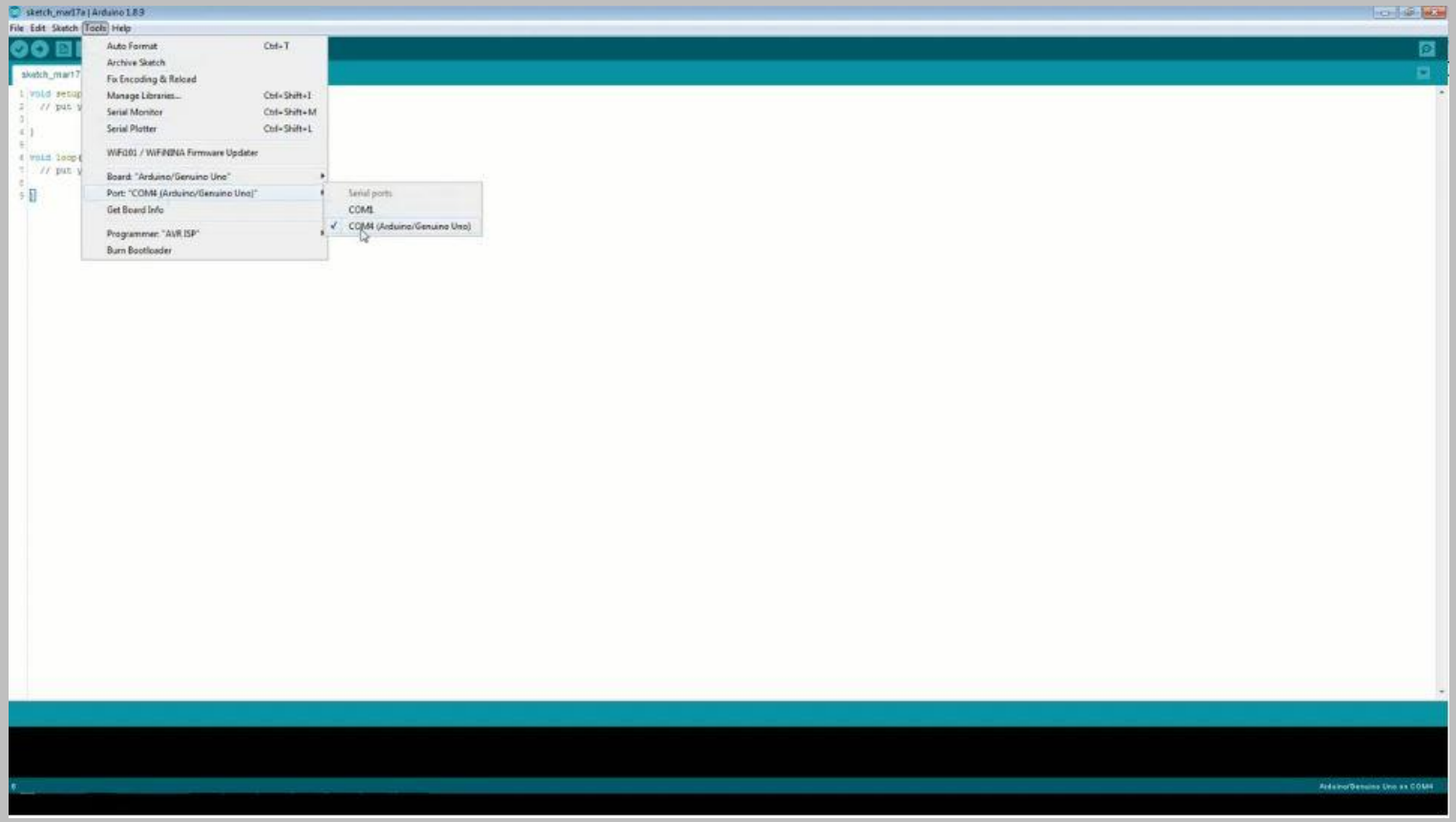
Arduino

- Setup the Arduino IDE
  - Select the correct board
  - Select the correct com port
- Register to www.tinkercad.com
- Write our first program (Blink LED_BUILTIN)

Arduino


File Edit Sketch Tools Help
Auto Format Ctrl+T
Archive Sketch
Fix Encoding & Reload
Manage Libraries... Ctrl+Shift+I
Serial Monitor Ctrl+Shift+M
Serial Plotter Ctrl+Shift+L
WiFi101 / WiFiNINA Firmware Updater
Board: "Arduino/Genuino Uno"
Port
Get Board Info
Programmer: "AVR ISP"
Burn Bootloader
Boards Manager...
Arduino AVR Boards
Arduino Yún
Arduino/Genuino Uno
Arduino Duemilanove or Diecimila
Arduino Nano
Arduino/Genuino Mega or Mega 2560
Arduino Mega ADK
Arduino Leonardo
Arduino Leonardo ETH
Arduino/Genuino Micro
Arduino Esplora
Arduino Mini
Arduino Ethernet
Arduino Fio
Arduino BT
LilyPad Arduino USB
LilyPad Arduino
Arduino Pro or Pro Mini
Arduino NG or older
Arduino Robot Control
Arduino Robot Motor
Arduino Gemma
Adafruit Circuit Playground
Arduino Yún Mini
Arduino Industrial 101
Linino One
Arduino Uno WiFi

Arduino


sketch_mar17a | Arduino 1.8.9
File Edit Sketch Tools Help
Auto Format Ctrl+T
Archive Sketch
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Manage Libraries... Ctrl+Shift+I
Serial Monitor Ctrl+Shift+M
Serial Plotter Ctrl+Shift+L
WiFi101 / WiFiNINA Firmware Updater
Board: "Arduino/Genuino Uno"
Port: "COM4 (Arduino/Genuino Uno)"
Get Board Info
Programmer: "AVR ISP"
Burn Bootloader
Serial ports
COM1
COM4 (Arduino/Genuino Uno)

Arduino


sketch_mar17a | Arduino 1.8.9
File Edit Sketch Tools Help
sketch_mar17a
void setup() {
// put your setup code here, to run once:
}
void loop() {
// put your main code here, to run repeatedly:
}

Arduino


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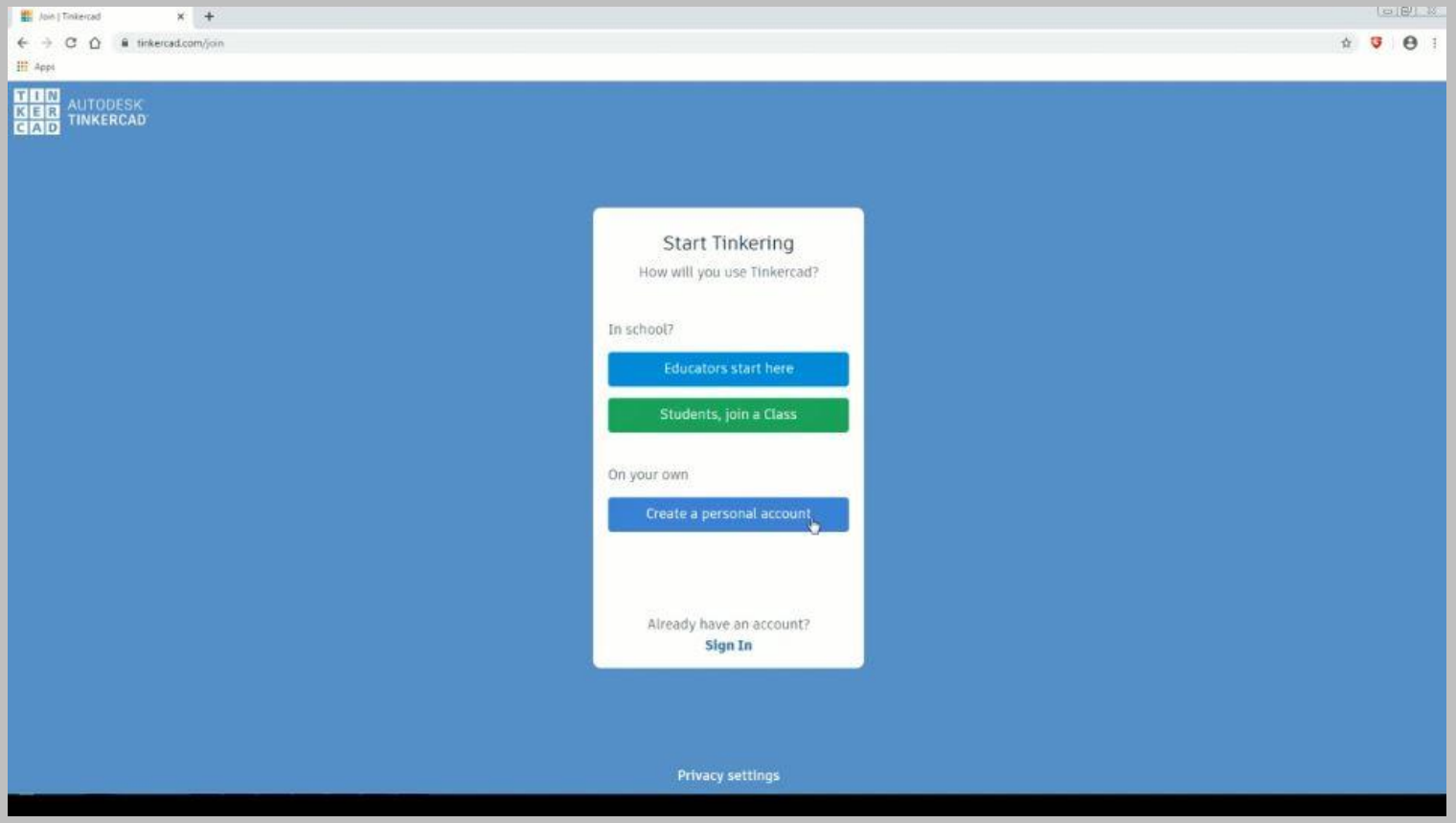
Arduino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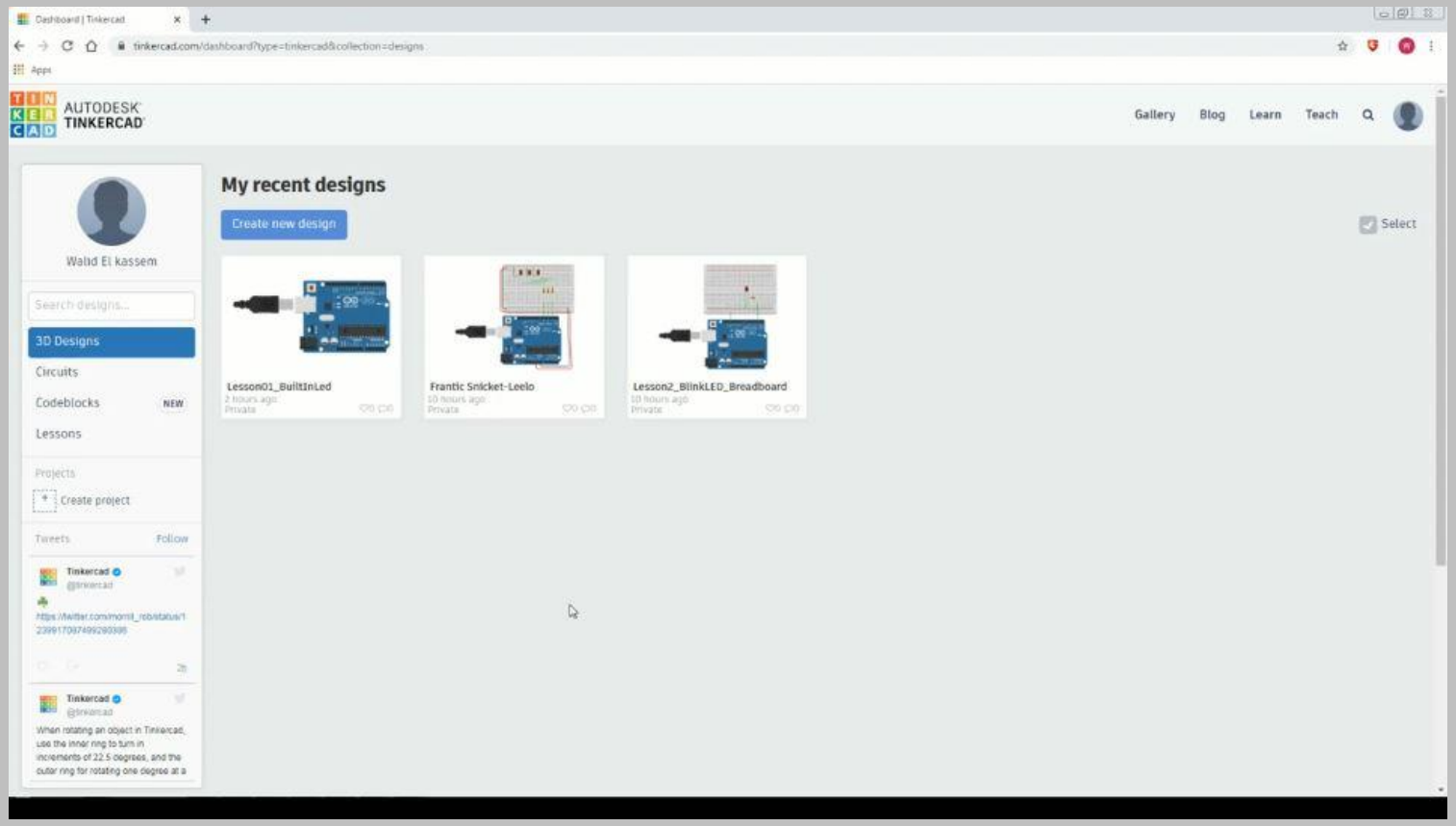
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Search designs...
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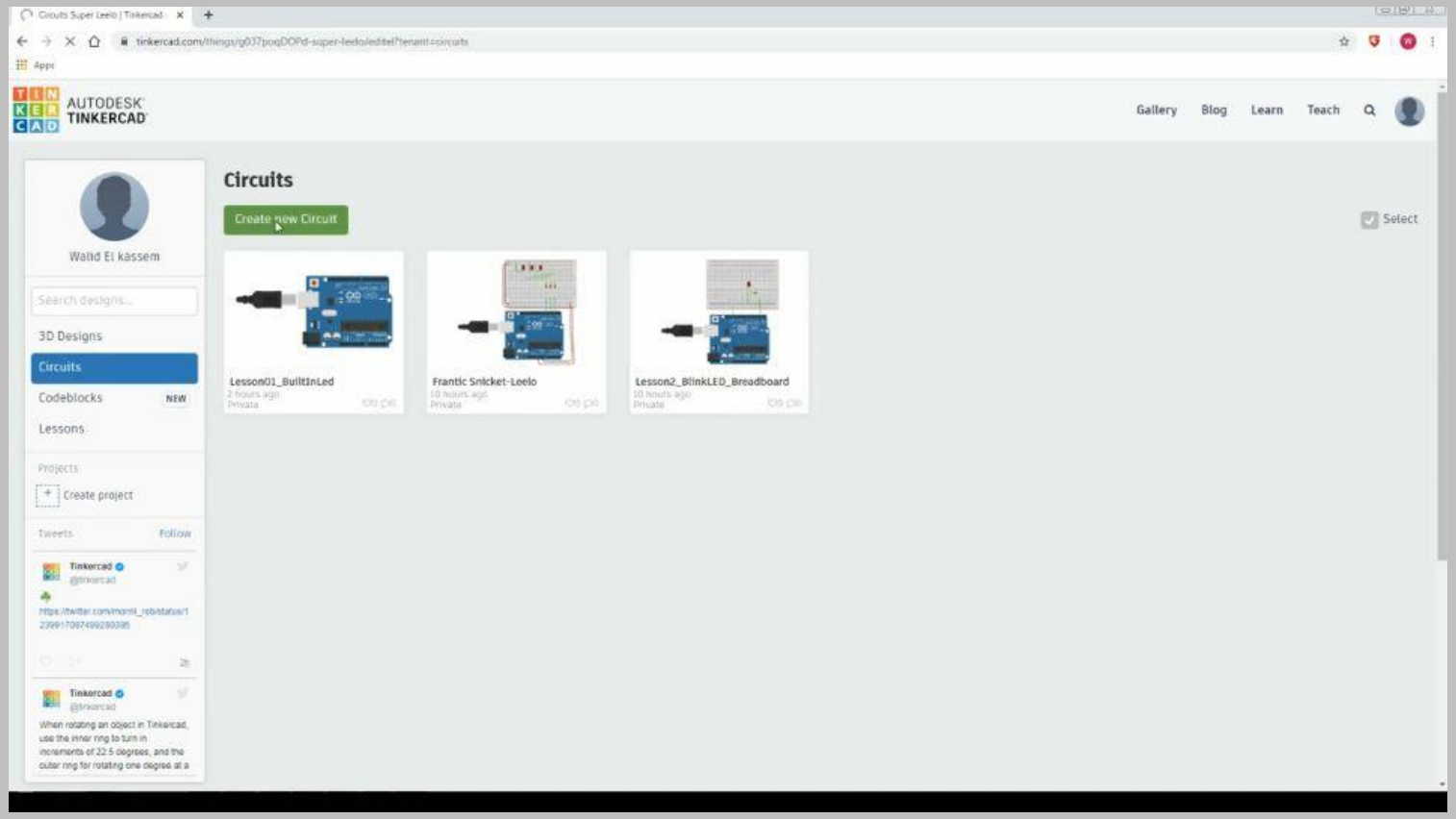
Lesson01_BuiltInLed
Frantic Snicket-Leelo
Lesson2_BlinkLED_Breadboard
Private

Arduino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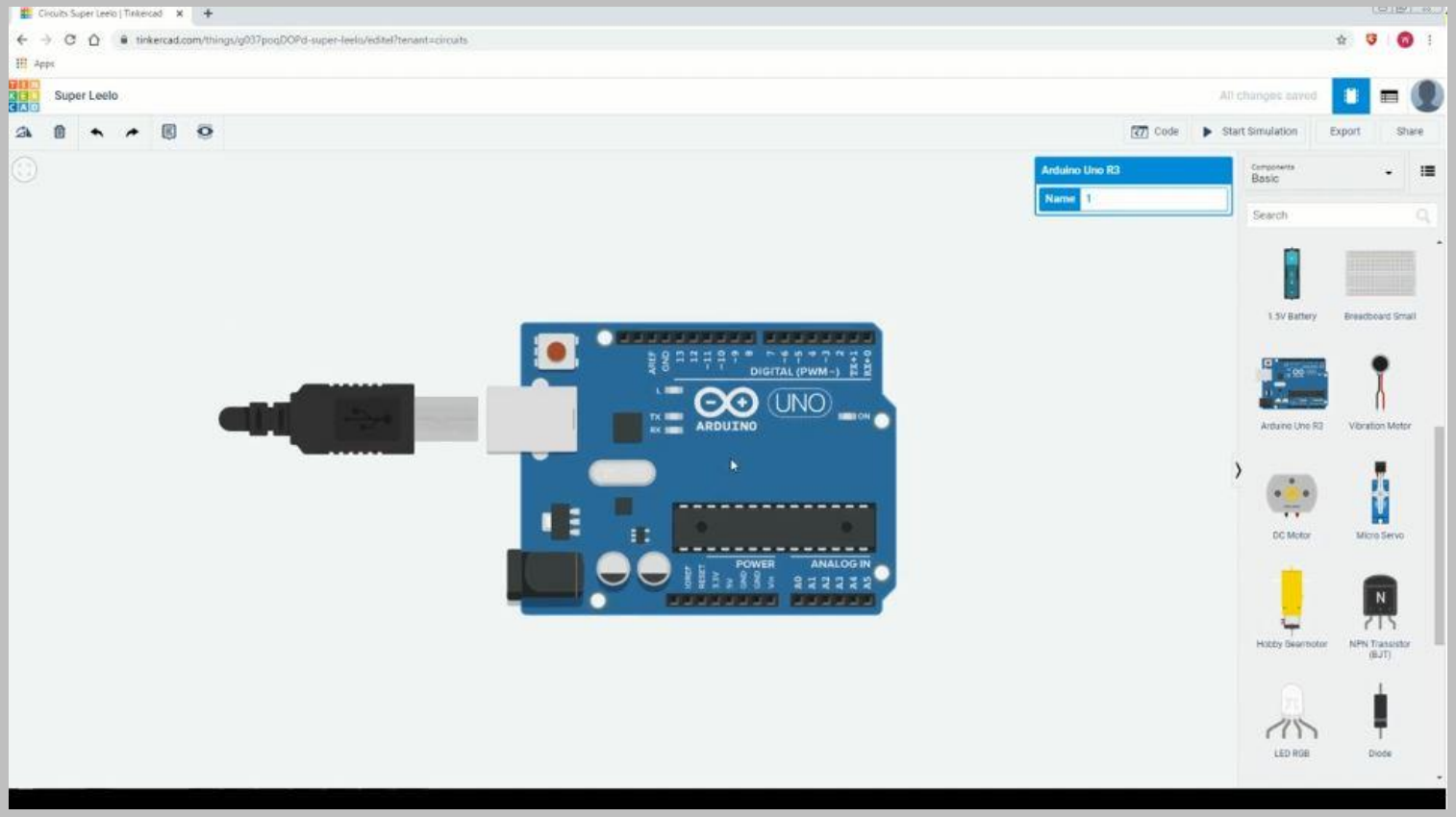
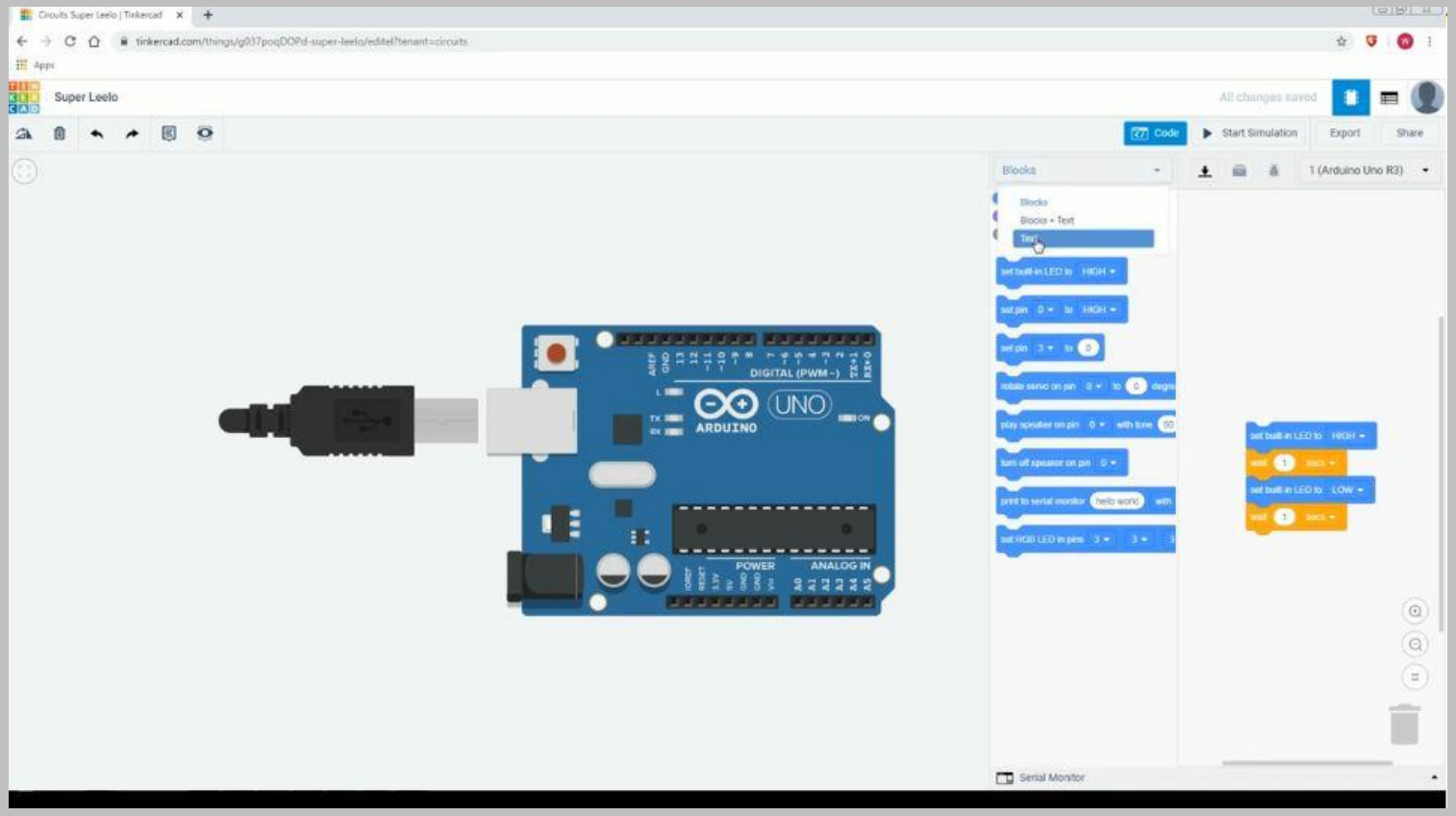
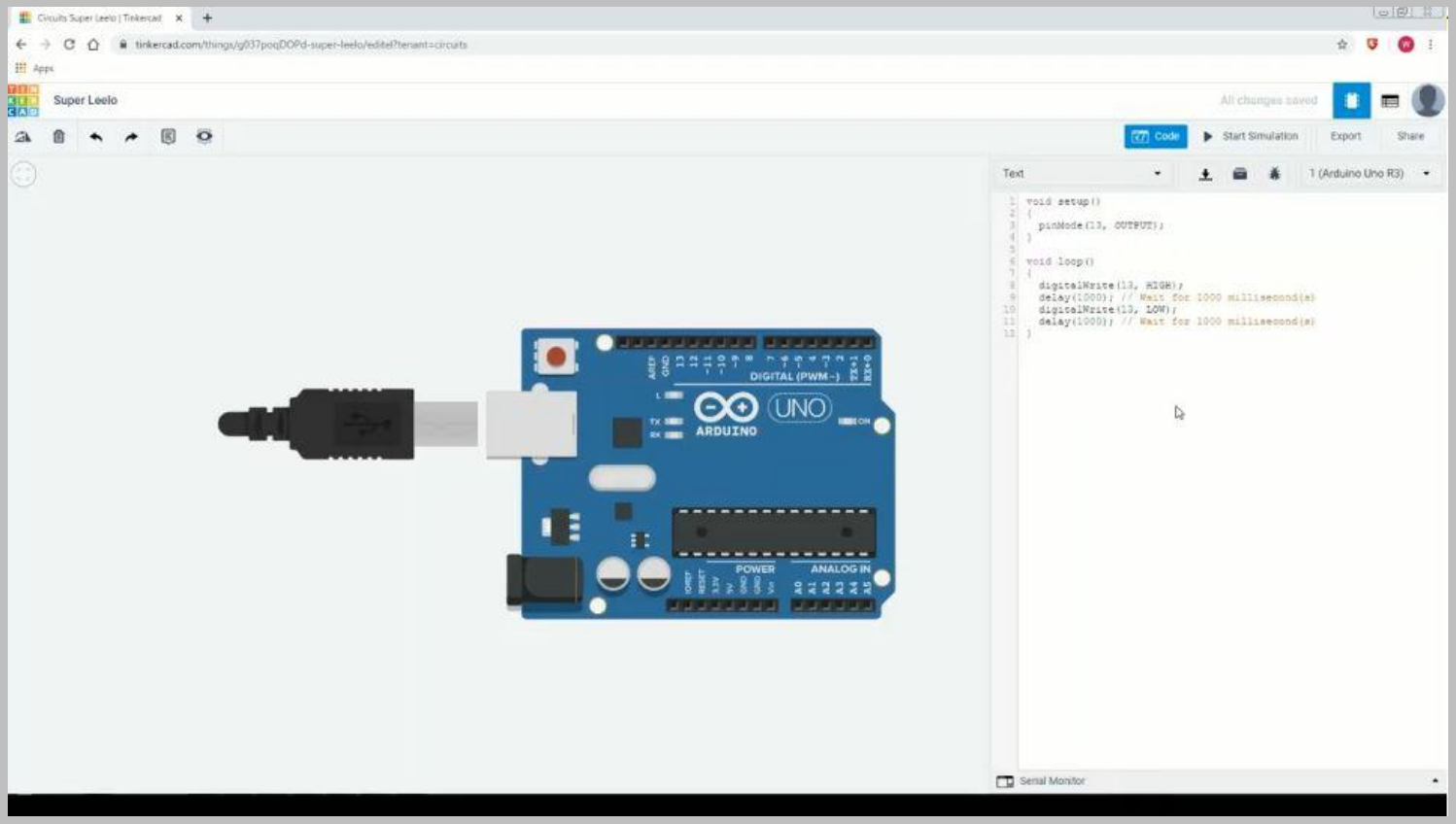
Arduino


Circuits Super Leelo | Tinkercad
tinkercad.com/things/g037poqDOPd-super-leelo/editel?tenant=circuits
Super Leelo
All changes saved
Code
Start Simulation
Export
Share
Arduino Uno R3
Name 1
Components
Basic
Search
1.5V Battery
Breadboard Small
Arduino Uno R3
Vibration Motor
DC Motor
Micro Servo
Hobby Gearmotor
NPN Transistor (BJT)
LED RGB
Diode
DIGITAL (PWM~)
UNO
ARDUINO
POWER
ANALOG IN

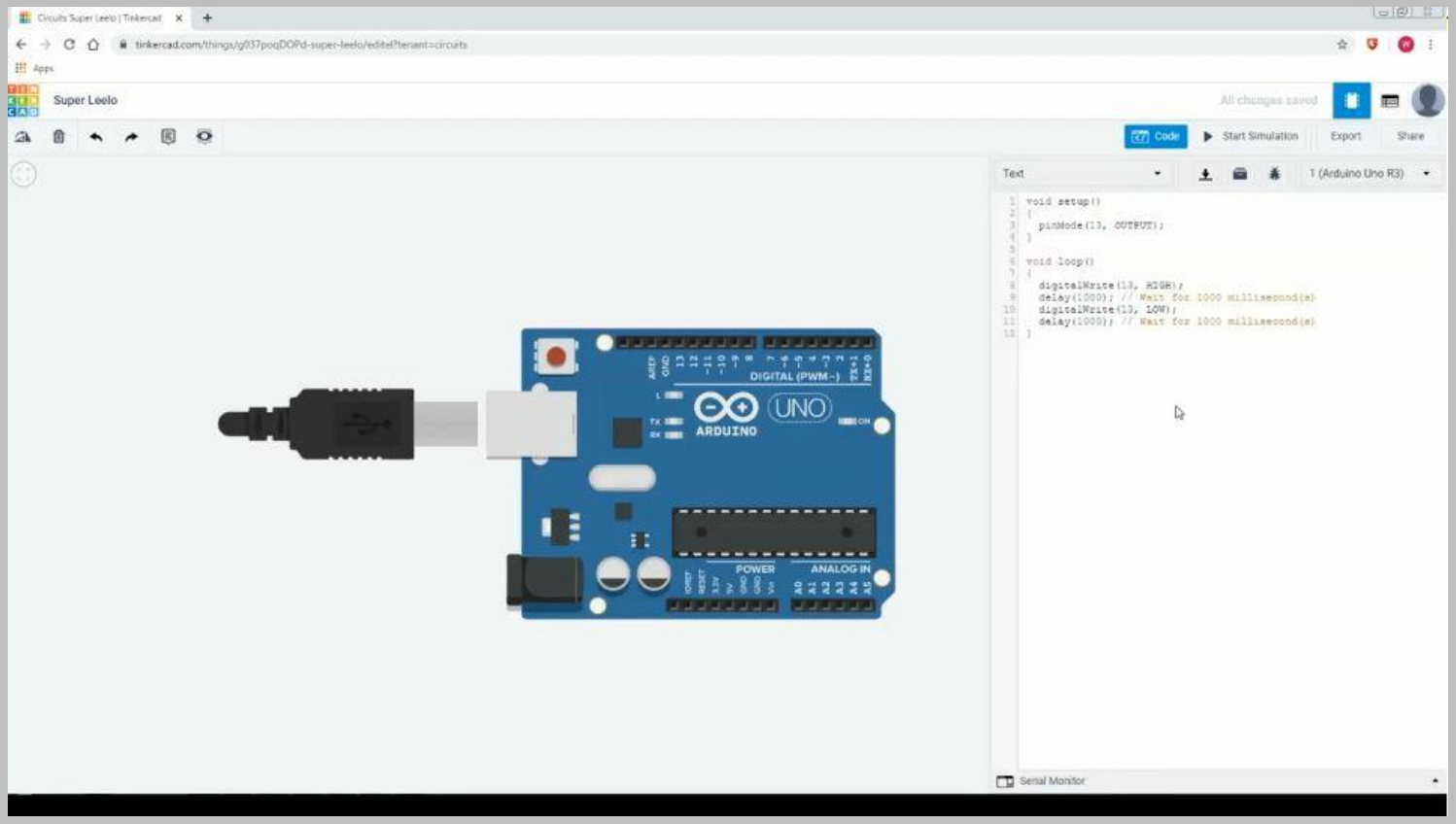
Arduino


Super Leelo
Code
Start Simulation
Export
Share
Blocks
1 (Arduino Uno R3)
DIGITAL (PWM~)
ARDUINO
UNO
POWER
ANALOG IN
Serial Monitor

Arduino


Circuits Super Leelo | Tinkercad
tinkercad.com/things/g037poqDOPd-super-leelo/edit?tenant=circuits
Super Leelo
All changes saved
Code
Start Simulation
Export
Share
Text
1 (Arduino Uno R3)
void setup()
{
pinMode(13, OUTPUT);
}
void loop()
{
digitalWrite(13, HIGH);
delay(1000); // Wait for 1000 millisecond(s)
digitalWrite(13, LOW);
delay(1000); // Wait for 1000 millisecond(s)
}
DIGITAL (PWM~)
UNO
ARDUINO
POWER
ANALOG IN
Serial Monitor

Arduino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UNO
ARDUINO
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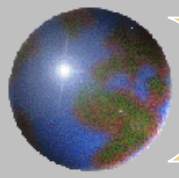
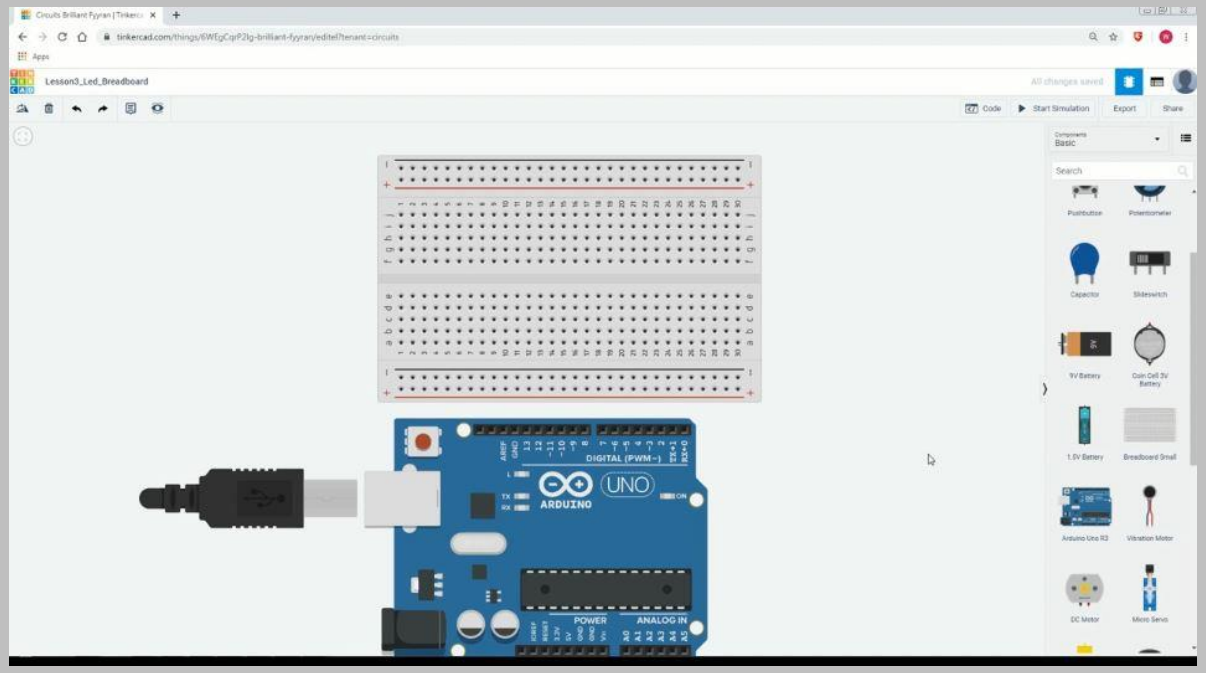
Serial Monitor



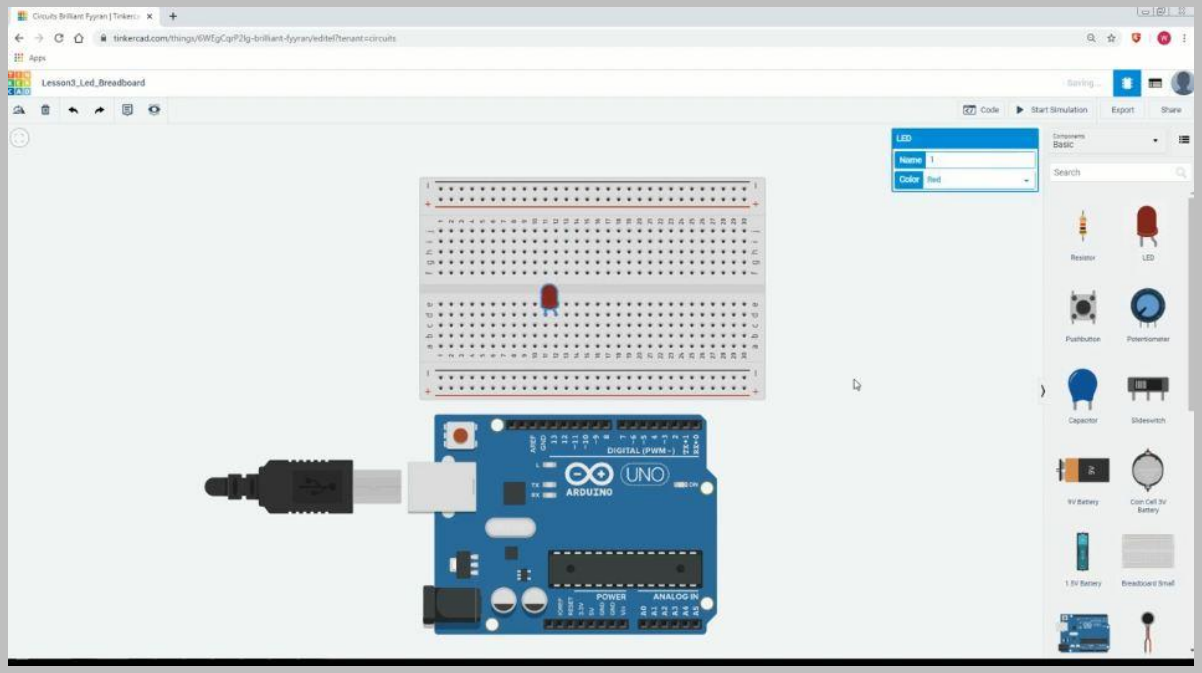
Arduino

- Blink an LED on a bread board
  - Usage of breadboard
  - LED circuit with resistor
- Flash Light with 2 LEDs
  - Using 2 digital pins to control 2 LEDs
- Variable and datatypes

Arduino


Lesson3_Led_Breadboard
Code
Start Simulation
Export
Share
Basic
Search
DIGITAL (PWM~)
ARDUINO
UNO
POWER
ANALOG IN

Arduino


Lesson3_Led_Breadboard
Code
Start Simulation
Export
Share
LED
Name
Color
Red
Basic
Search
Resistor
LED
Pushbutton
Potentiometer
Capacitor
Slideswitch
9V Battery
Coin Cell 3V Battery
1.5V Battery
Breadboard Small
DIGITAL (PWM~)
UNO
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ANALOG IN

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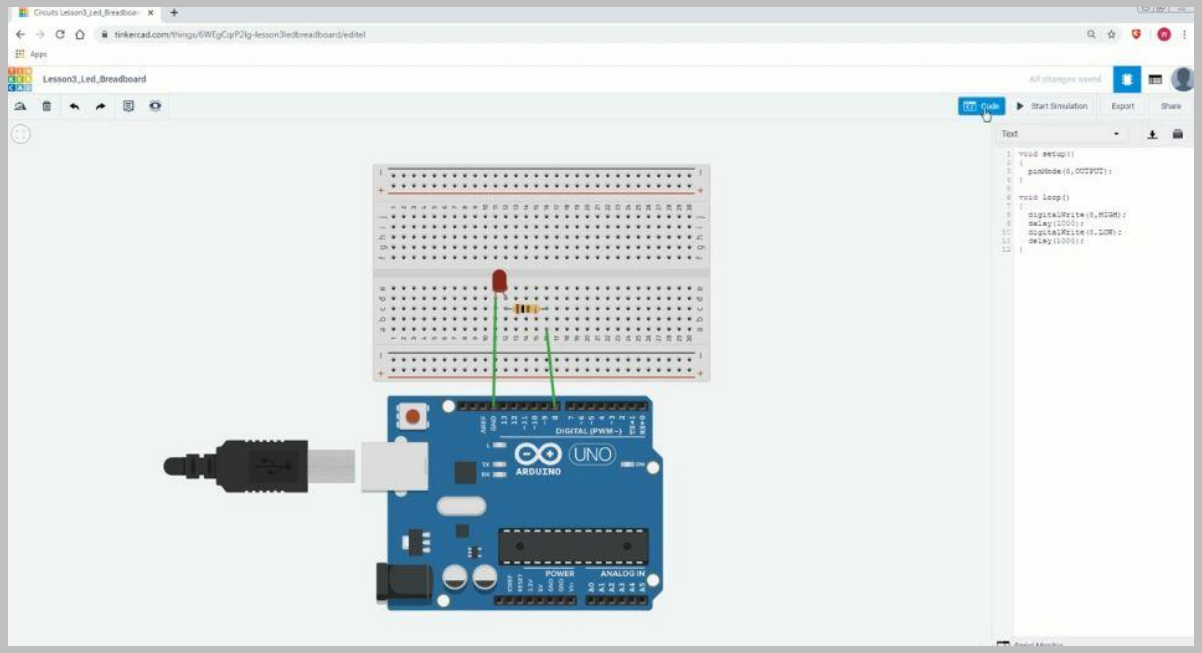
Lesson3_Led_Breadboard
Code
Start Simulation
Export
Share
Text
void setup()
{
pinMode(8,OUTPUT);
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digitalWrite(8,HIGH);
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DIGITAL (PWM~)
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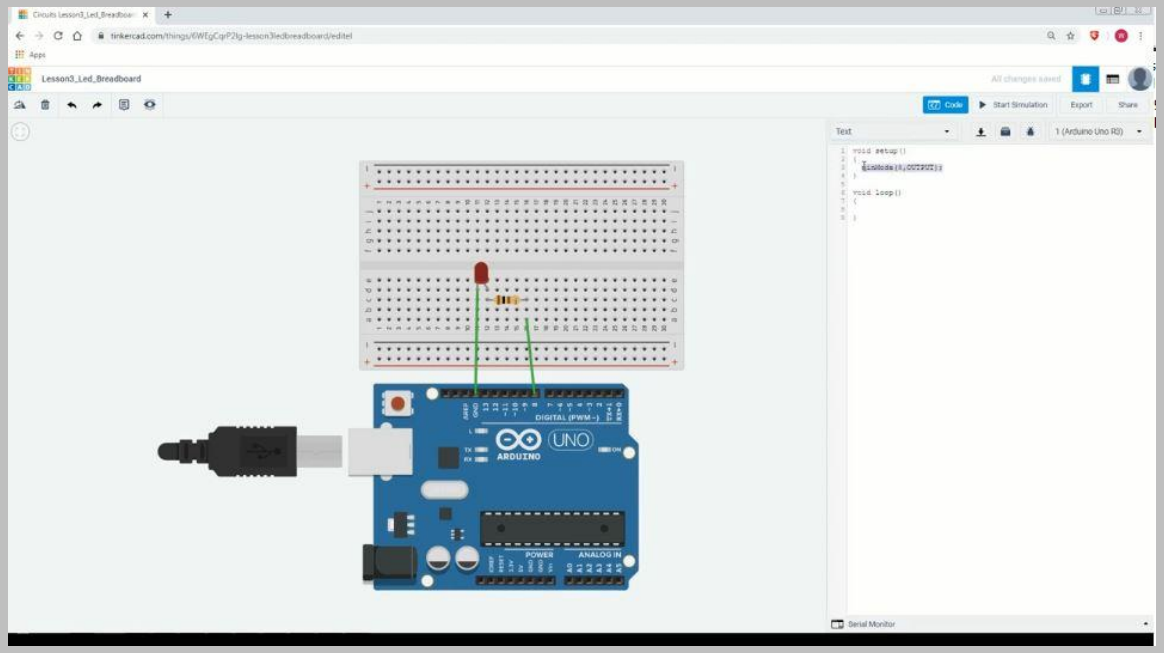
POWER
ANALOG IN

Arduino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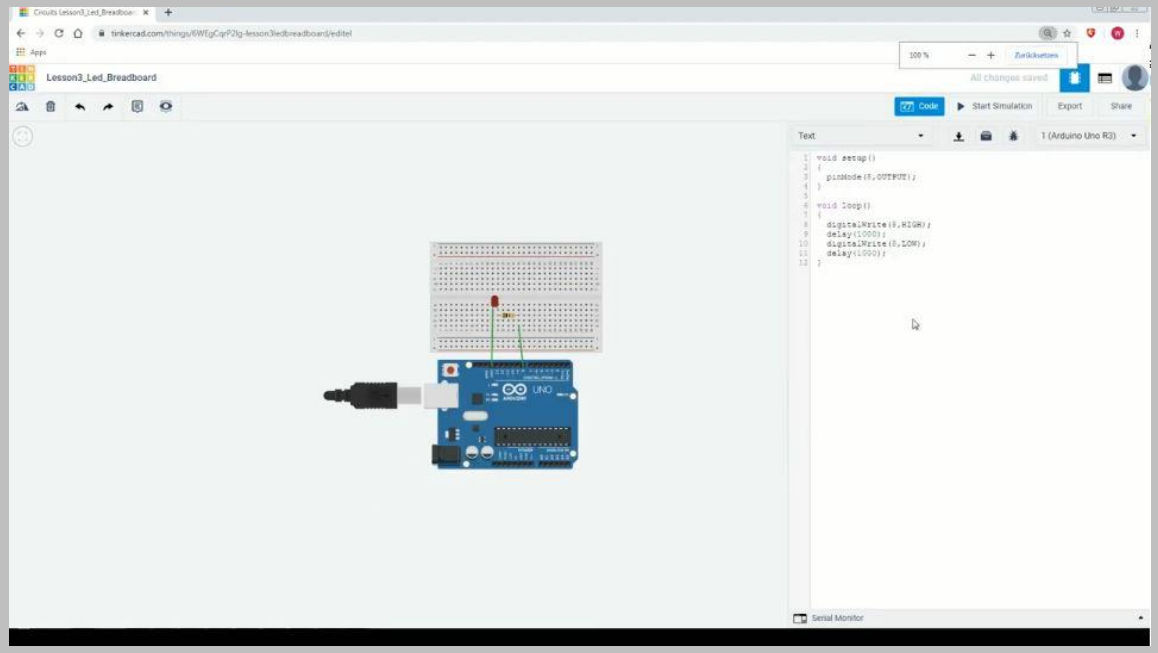
Serial Monitor

Arduino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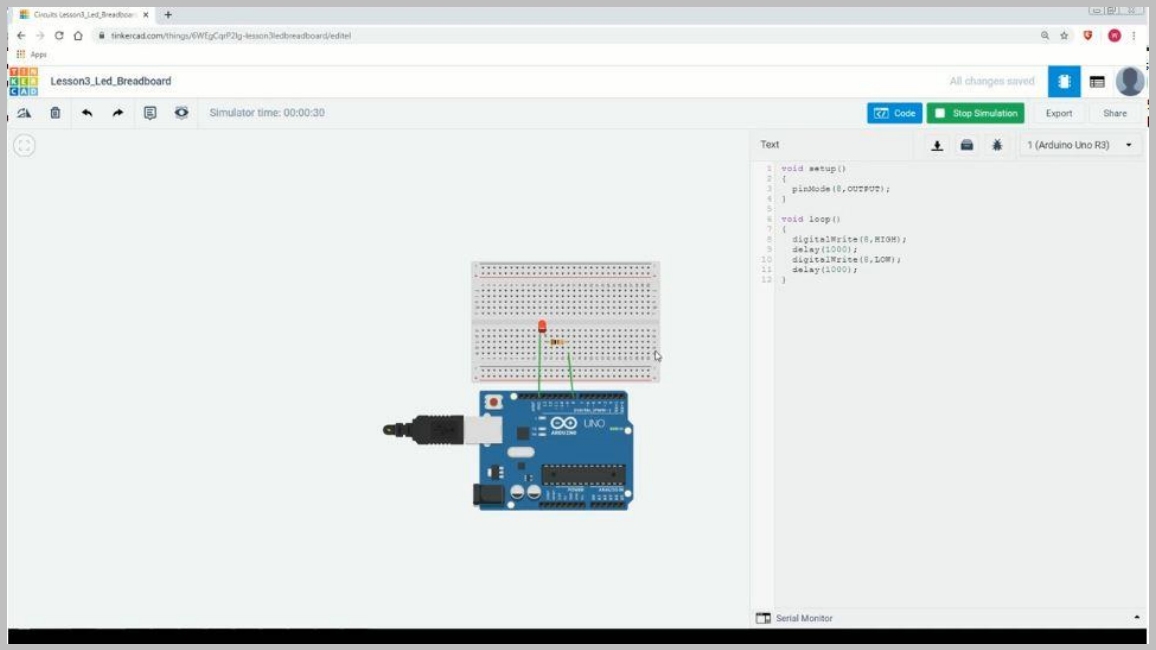
digitalWrite(8,LOW);
delay(1000);
}
Serial Monitor

Arduino


Lesson3_Led_Breadboard
All changes saved
Simulator time: 00:00:30
Code
Stop Simulation
Export
Share
Text
1 (Arduino Uno R3)
void setup()
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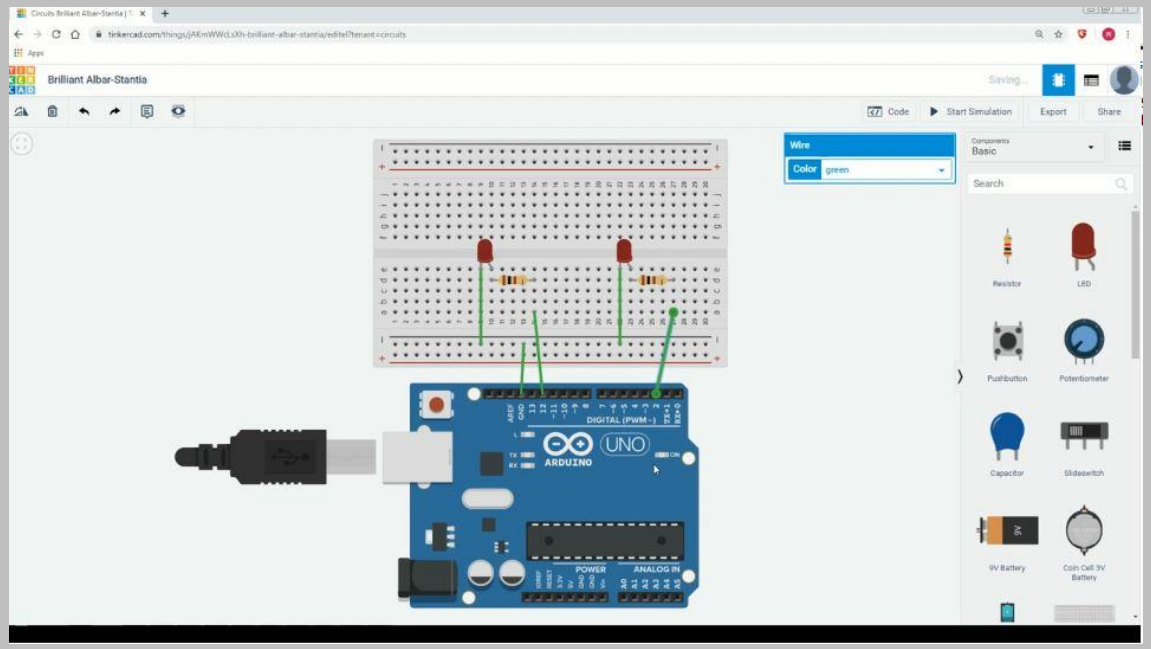
Serial Monitor

Arduino


Brilliant Albar-Stantia
Code
Start Simulation
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Color
green
Components
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Capacitor
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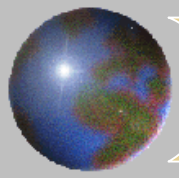
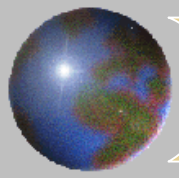


Arduino

Lesson3 Outcomes:

- Blink an LED on a bread board
  - Usage of breadboard
  - LED circuit with resistor
- Flash Light with 2 LEDs
  - Using 2 digital pins to control 2 LEDs
- Variable and datatypes
  - Why using variables
  - Variable scope
  - Which datatype should I use?



Arduino

Datatypes

- Byte: 8-bit, can store numbers from 0 to 255
- Int: 16-bit, can store numbers without decimal points from -32767 to 32768
- Long: 32-bit, can store numbers without decimal points from -2.147.483.647 to 2.147.483.648
- Float: 32-bit, can store numbers with decimal points. (Not Exact!)

Arduino

- Running light with 3 LEDs
  - Connect 3 LEDs to 3 digital pins
  - Set a delay between lighting of each led
  - Write a code with the following sequence:
- What are comments and how to use them?