École Polytechnique Fédérale de Lausanne

Product development and engineering design

Engineering drawings, schematics and algorithms
Group 8

List of elements included in this file

1. CAD render of the gripper: detailed render from multiple viewpoints
2. 2D drawings
    - I-slider
    - Mounting plate connector
3. Bill of materials: table showing all gripper components and their properties
4. Block diagram: shows how the different components in the system communicate together
5. Electronic circuit: simplified schematic using the breadboard layout of the electronic components
6. Pseudo-code representation: control and decision making when opening and closing the gripper

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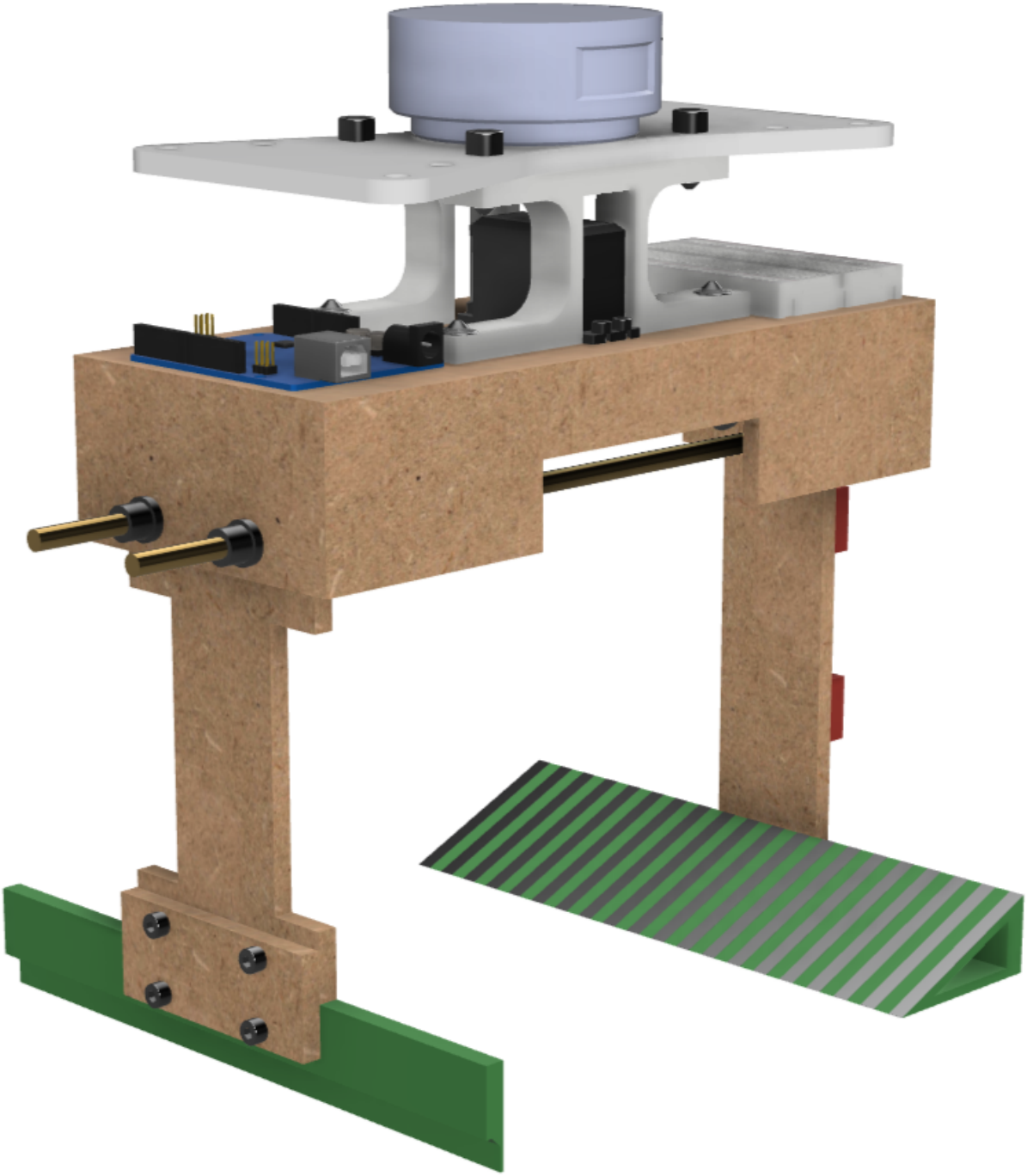
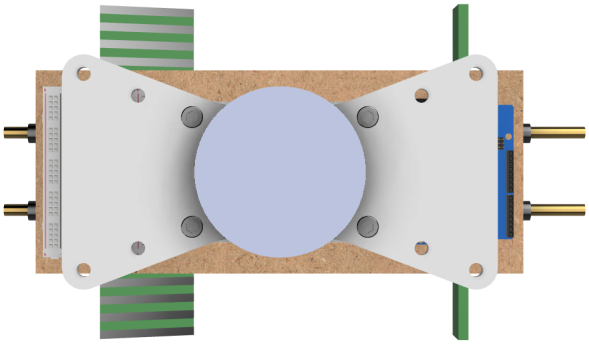
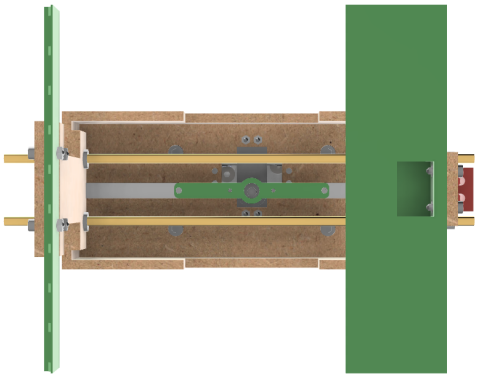


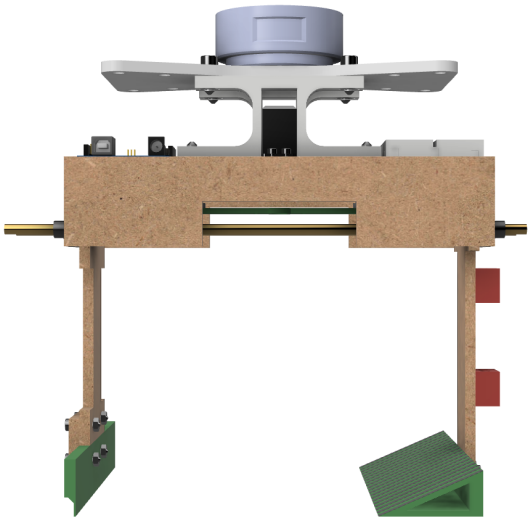


(a) Top view

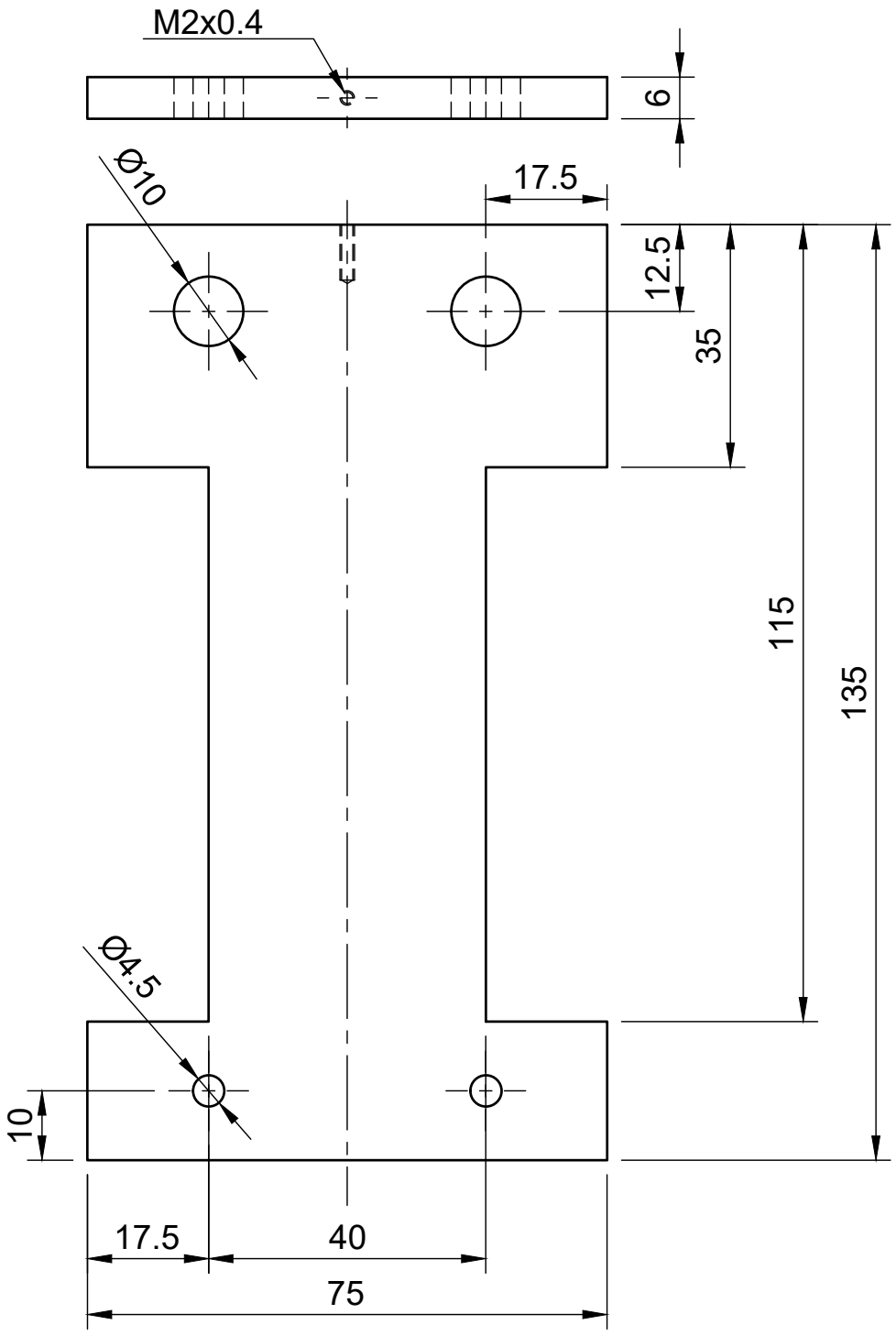


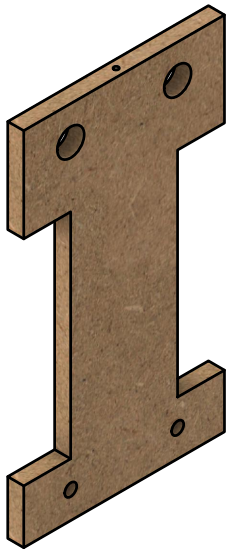
(b) Bottom view

(c) Right view



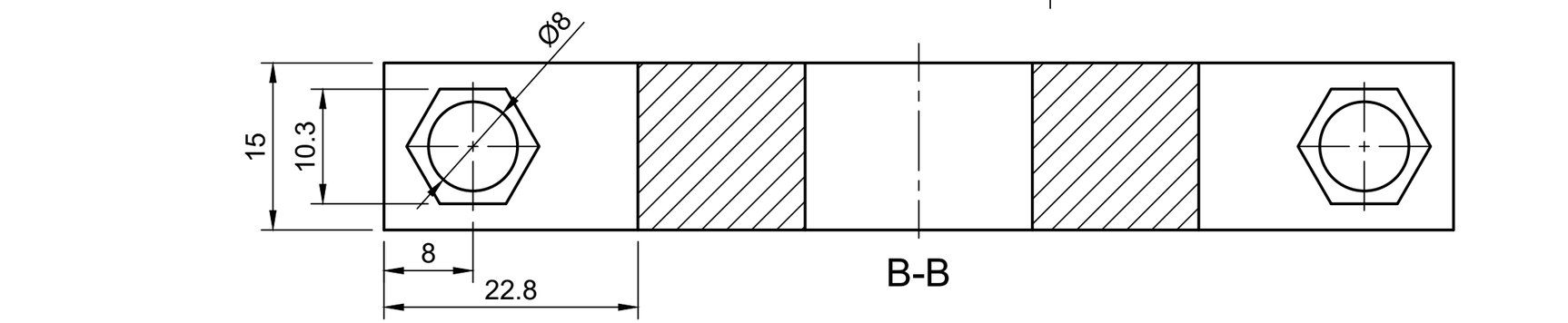
(d) Front view



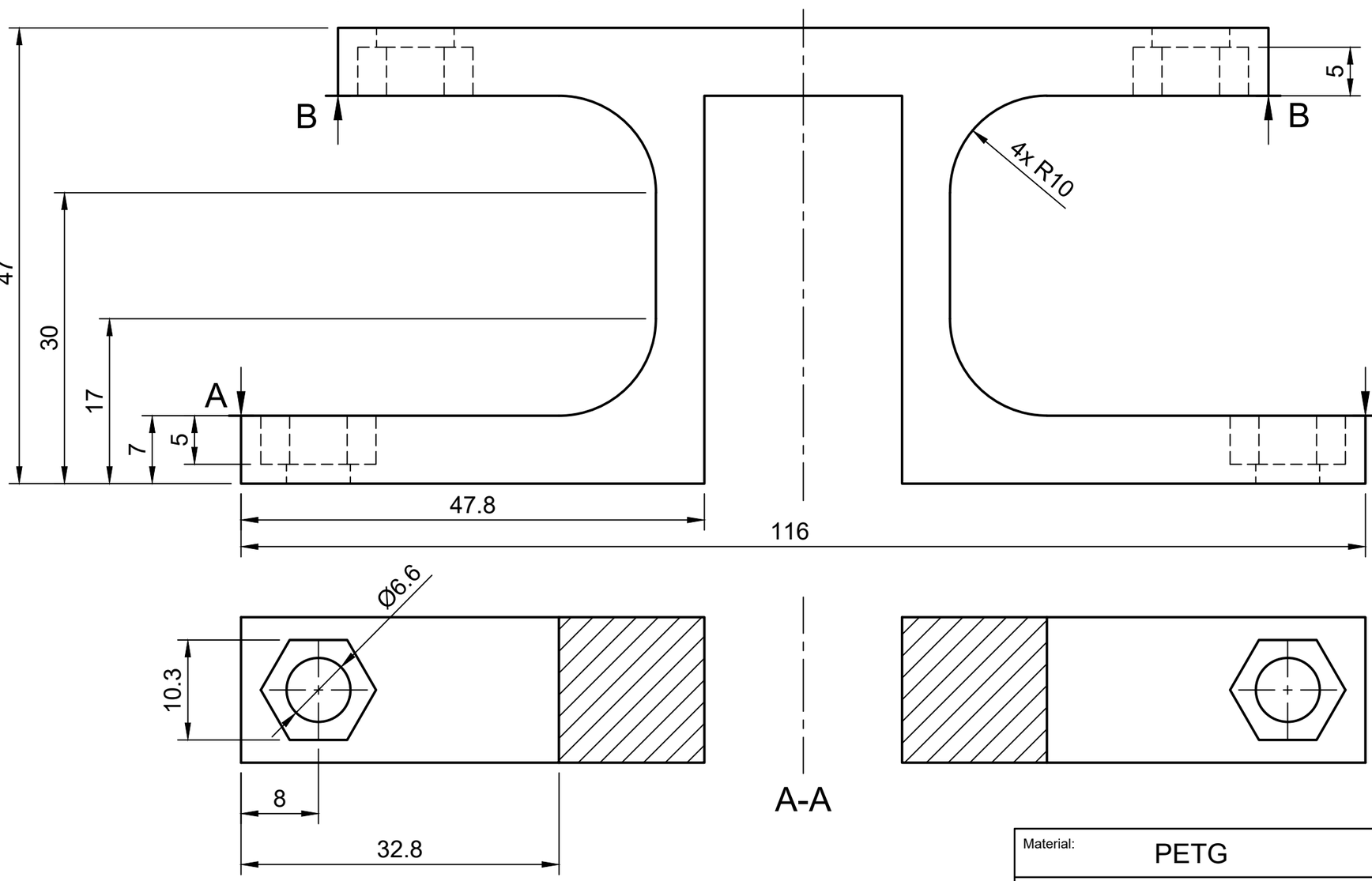


Isometric view scale: 1:2

Material: MDF		Part name: **I-slider**
Scale: 1:1		
EPFL	**ME-320**	**Product development and engineering design** Group 8

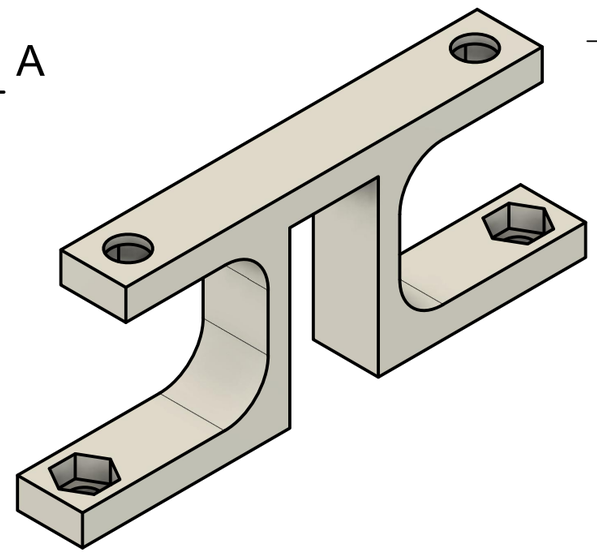


B-B



A-A

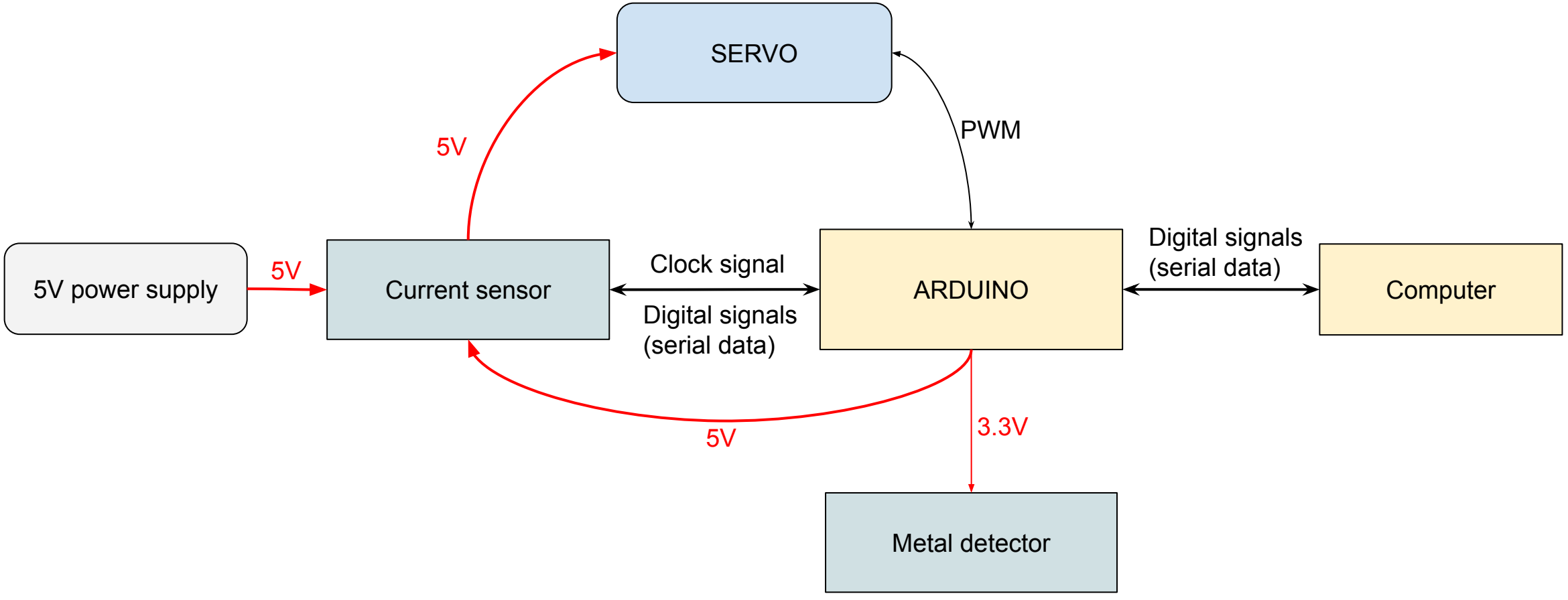
Isometric view scale: 1:1

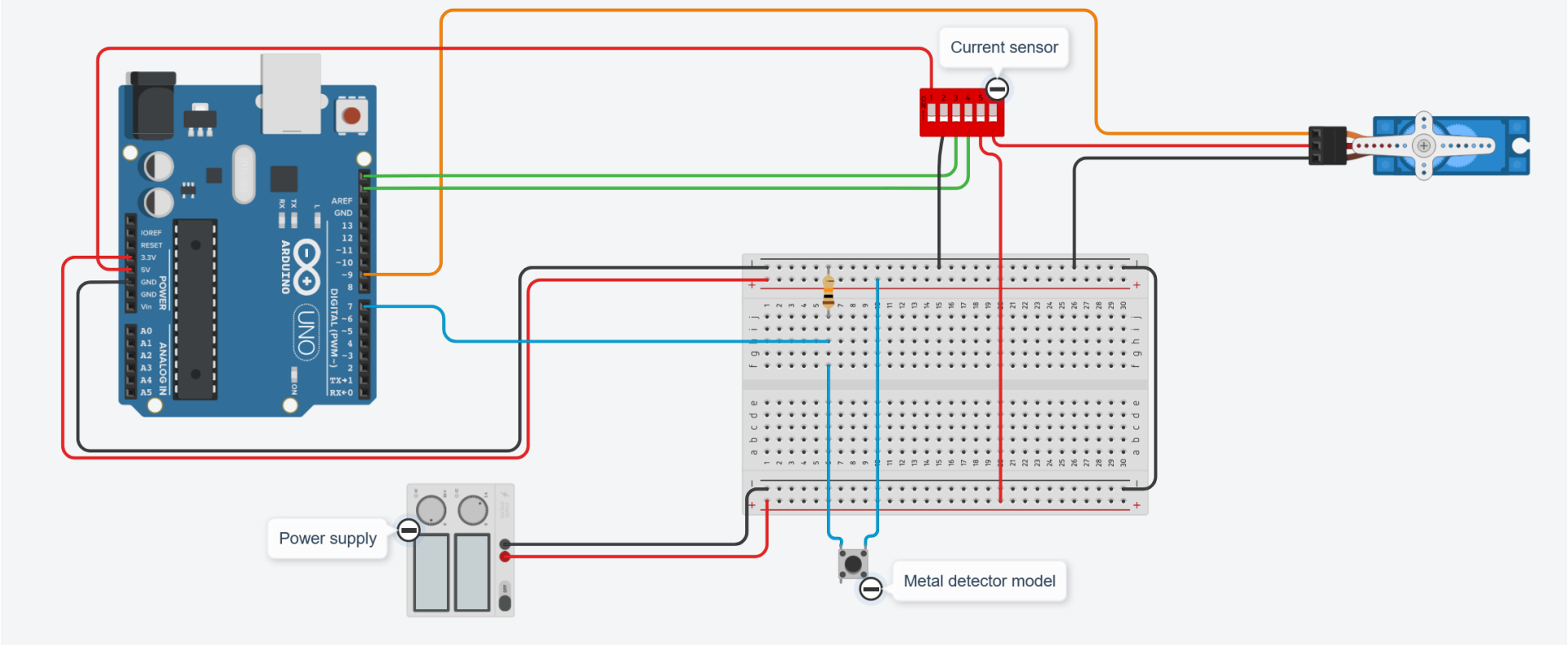


Material: PETG		Part name: **Mounting plate connector**	
Scale: 2:1			
EPFL	**ME-320**	**Product development and engineering design**	**Group 8**

Table 1: Bill of materials

Part	Material	Quantity	Category
Rod	Brass	2	Structure
Inclined plane	PETG	1	Structure
Brush	PETG	1	Structure
Bearing	PETG	8	Structure
Connecting plate	MDF	1	Structure
Arduino	-	1	Electronics
Servomotor	-	1	Electronics
Breadbord	-	1	Electronics
Power Supply	-	1	Electronics
Current Sensor	-	1	Electronics
T-slider	MDF	1	Structure
I-slider	MDF	1	Structure
Servomotor bar	PETG	1	Structure
Slider bar	PETG	2	Structure
Mounting plate connector	PETG	2	Structure
Guidewire	PETG	1	Structure
Platform	MDF	1	Structure
Platform sides (small)	MDF	2	Structure
Platform sides (large)	MDF	2	Structure
Screw ISO 4762 - M4 x 16	Steel 4.6	6	Screws/Nuts
Nut ISO 4032 - M4	Steel 6	6	Screws/Nuts
Screw ISO 4762 - M6 x 16	Steel 4.6	8	Screws/Nuts
Nut ISO 4032 - M6	Steel 6	8	Screws/Nuts
Screw ISO 4762 - M3 x 12	Steel 4.6	4	Screws/Nuts
Nut ISO 4032 - M3	Steel 6	4	Screws/Nuts
Screw ISO 4762 - M2 x 12	Steel 4.6	2	Screws/Nuts
Screw ISO 4762 - M2 x 10	Steel 4.6	2	Screws/Nuts
Nut ISO 4032 - M2	Steel 6	2	Screws/Nuts
Wires	-	10	Electronics
Resistor (10 kOhm)	-	1	Electronics
ME-320 plate	MDF	1	Aesthetic
Group 8 plate	MDF	1	Aesthetic


SERVO
5V
PWM
5V power supply
5V
Current sensor
Clock signal
Digital signals
(serial data)
ARDUINO
Digital signals
(serial data)
Computer
5V
3.3V
Metal detector


Current sensor
Power supply
Metal detector model

Algorithm 1: Pseudo-code of the gripper program

```
Declaration of all pins, objects, threshold values used in the program;
Connection to the current sensor;
Initialize the position of the servo;

while Arduino is on do
    if Metal is detected then
        Display "Metal is detected" via the Serial monitor
    end

    Choose : 1. Close, 2. Open, 3. Initialization;

    if 1. Close then
        for i ← 0 to Max servo position do
            Position of servo ← i;
            Read the current;
            if Current > Defined threshold then
                Closed;
                Stop the execution of the closing loop;
            end
        end
    end

    if 2. Open then
        for i ← servo position to 0 do
            Position of servo ← i ;                /* Decreasing i until 0 */
        end
    end

    if 3. Initialize then
        Servo position ← 0
    end

end
```