임베디드컴퓨팅
Embedded Computing
(0009488)
Magnetic Switch

2022년 2학기

정보기술대학 정보통신공학과
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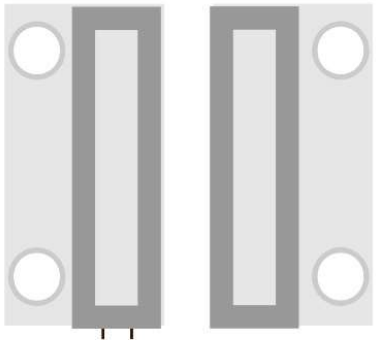
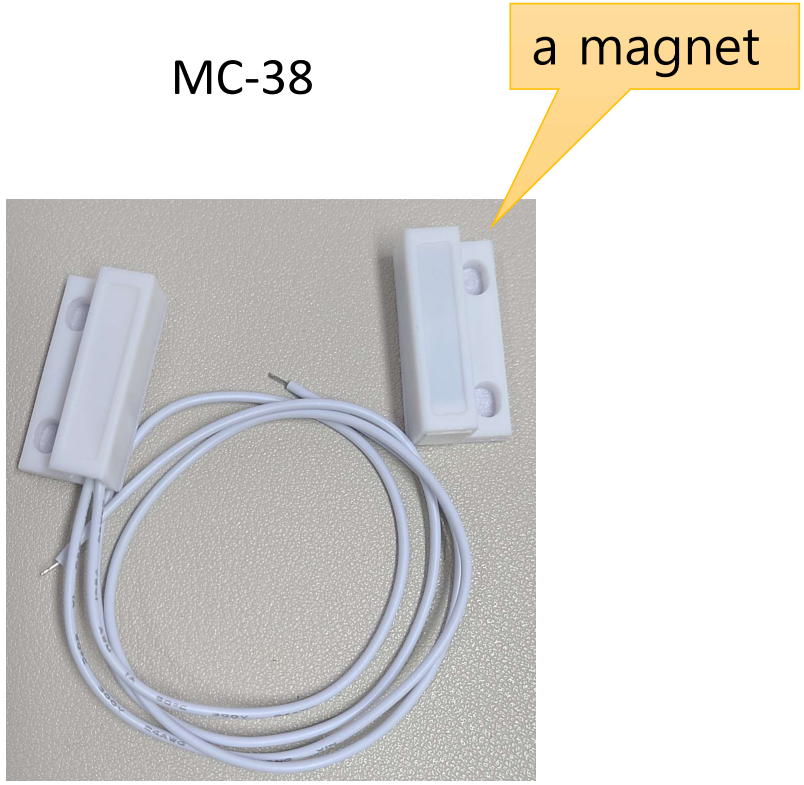
Magnetic switch

- A magnetic switch (or, magnetic contactor)?
  - a device that acts like a switch using the properties of a magnet.
- On/Off condition
  - Depending on the proximity of the magnet to the switch
- Usage
  - Door, gate, windows open/close sensor
  - W/ LED: a sensor for toilet occupancy
  - W/ buzzer: a sensor for notification on visitor

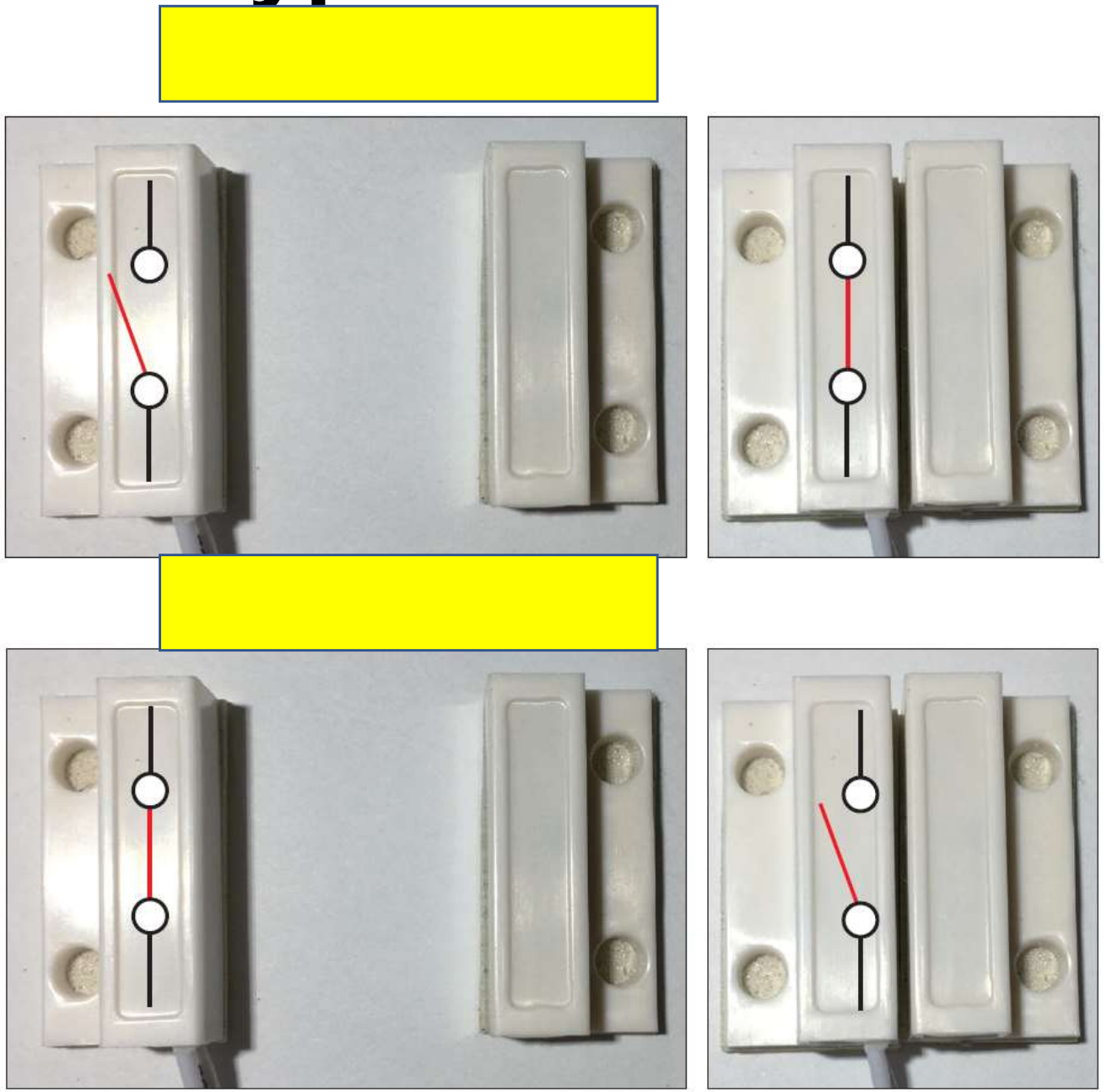


MC-38



Magnetic switch types

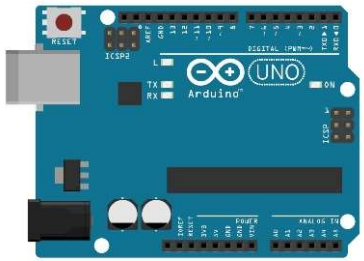
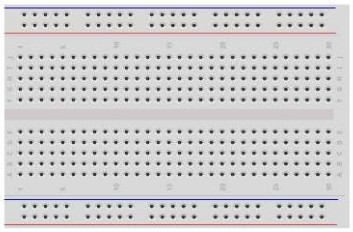
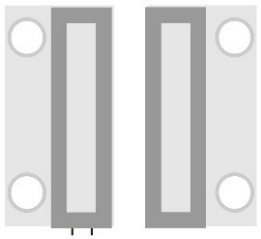
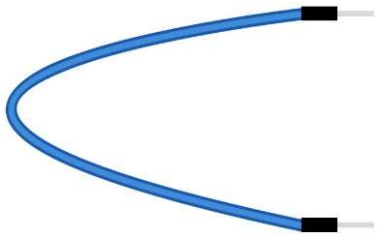
- Normally Open (NO) switch
  - **Open**: when there is no magnet near the switch
  - Close: when there is a magnet nearby.
- Normally Close (NC) switch
  - **Close**: when there is no magnet near the switch
  - Open: when there is a magnet nearby.



Lab: Types of our magnetic switch

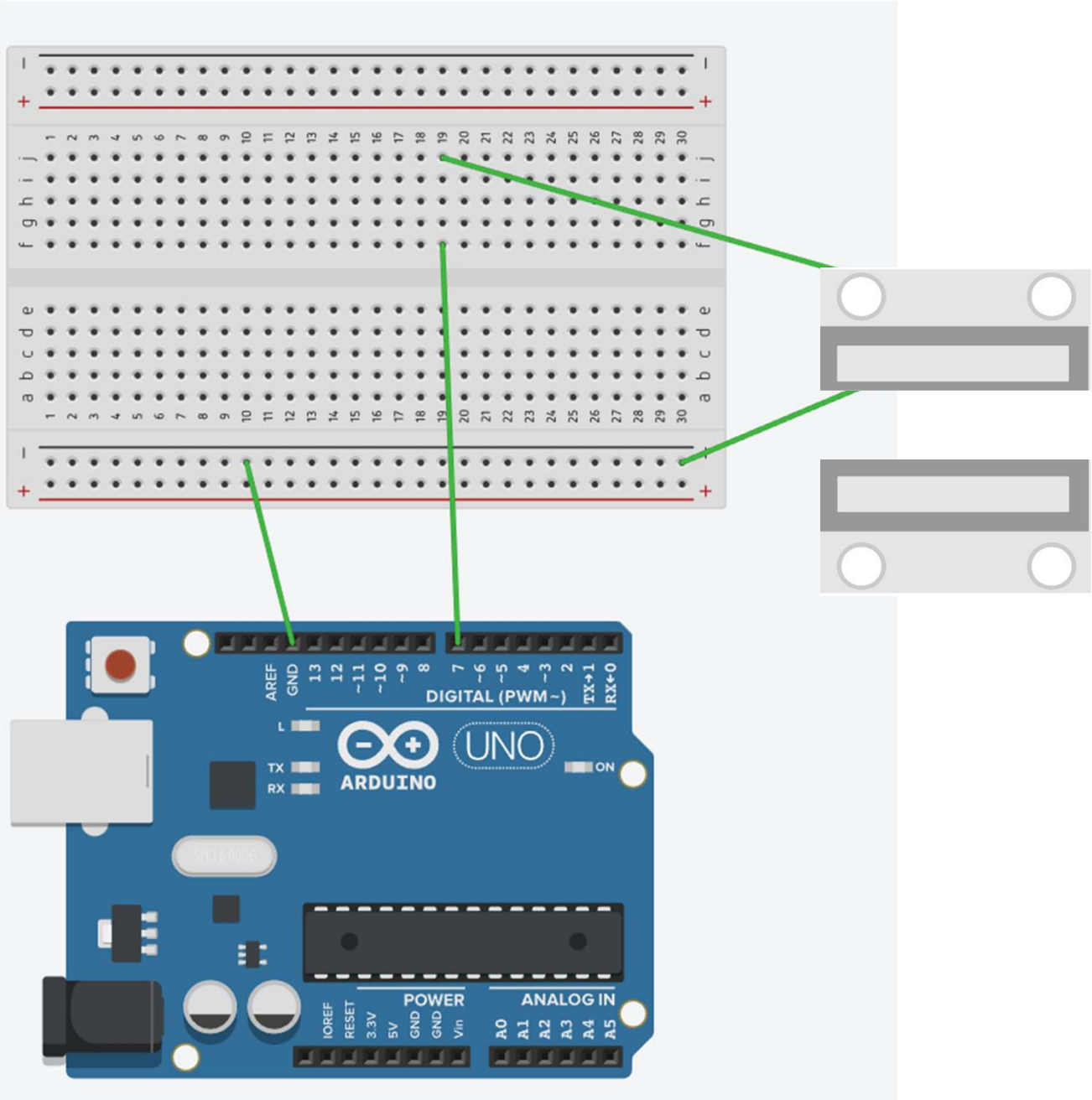
- Let's write a sketch program to display the state of magnetic switch via serial communication

- Required H/W components

Arduino Uno board	Breadboard	Magnetic Switch (MC-38)	Jumper cable (Male-Male)
			
x 1	x 1	x 1	x 2

Circuit wiring setup

MC-38 (wired switch)	Arduino board
Wire 1	digital 7
Wire 2	GND



A sketch code

```
#define MAG_PIN     7

void setup() {
    pinMode(MAG_PIN,                    );
    Serial.begin(9600);
}

void loop() {
  int value = digitalRead(MAG_PIN);
  Serial.println(value);
  delay(1000);
}
```

Connect to
Digital pin No. 7

Read the state of magnetic switch.

Check results

- When there is no magnet nearby
  -
- When there is a magnet nearby
  -

NO?
NC?

Lab: Measure door open time

- There is a door with a sensor based on a magnetic switch.
- We want to write a sketch program to measure how long the door is open.
- Requirements
  - Check Door state every 1s.
  - Measure the time the door is open.
  - Display the open time via serial communication if it lasts more than 10s.
  - Time display format is <hour> h <min> m <seconds> s
    - e.g. Open time 0 h 1m 23 s
  - When the door is closed, display “Closed”, and initialize the open time.

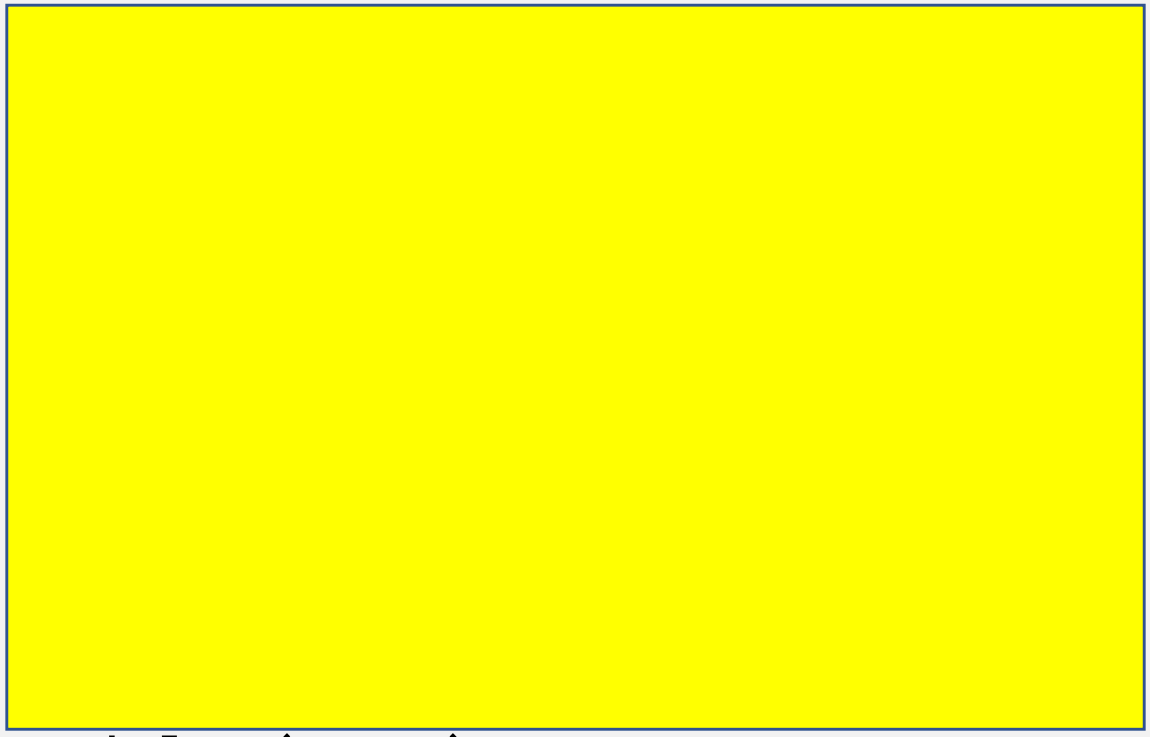
A sketch code for basic setup

```
#define MAG_PIN     7
#define
#define


unsigned long opentime;
void setup() {
    pinMode(MAG_PIN,                );
    Serial.begin(9600);
    
}
```

A sketch code for loop

```
void loop() {
  int value =
digitalRead(MAG_PIN);
```



```
  delay(1000);
}
```

A sketch code for loop

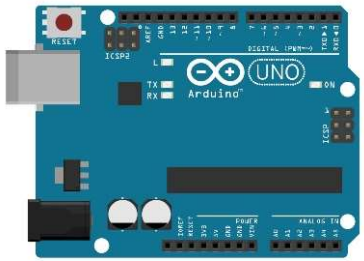
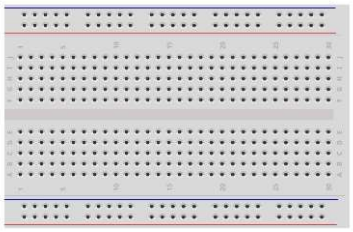
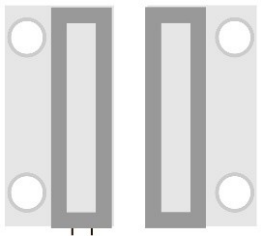
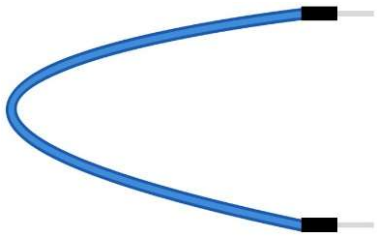
```
String getTimeMsg(unsigned long
otime) {

}
```

Lab: Measure door open time

- Let's write a sketch program to measure and display the time to be a door open using magnetic switch via serial communication

- Required H/W components

Arduino Uno board	Breadboard	Magnetic Switch (MC-38)	Jumper cable (Male-Male)
			
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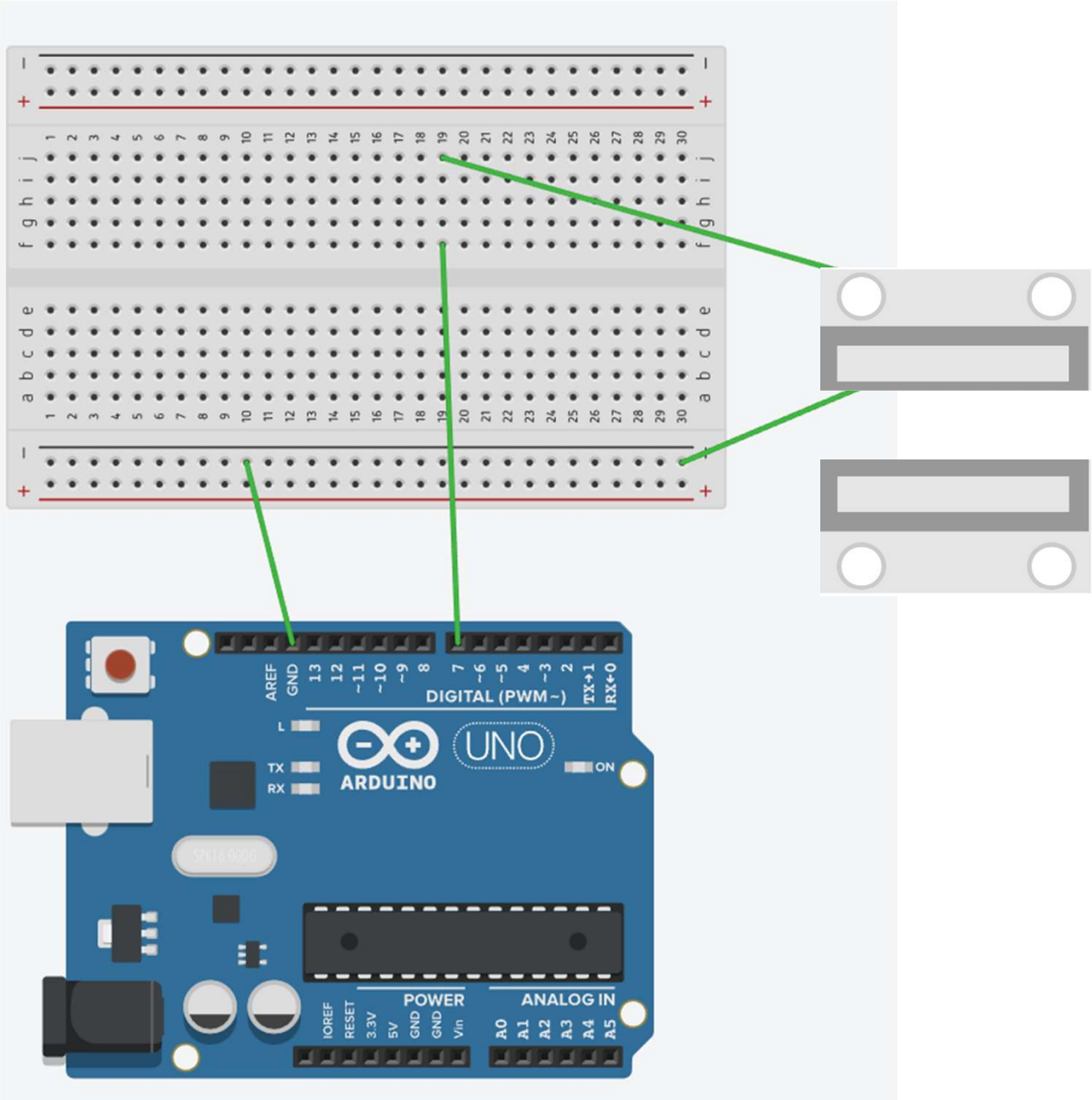

Assignment: Semi-Smart Door

- There is a door with a sensor based on a magnetic switch. A client request to change it more intelligent one using Arduino.
- Available parts
  - a Red LED, a Pizeo Speaker
- Based on the "Measure open time" lab, write a sketch program by adding the following requirements.
  - Simplify the time message by hiding 0 time values.
    - e.g. 240s = 4 m, 123s = 2 m 3 s, 3823s = 1 h 3 m 43 s
  - Blinking a red LED every 1s if it lasts more than 20s.
  - Alert a sound using tone() if it lasts more than 30s.
  - Stop all output and initialize the open time if the door is closed.
  - A block-type comments in the top of source code w/ "your student no., your name, writing date, etc."
- Results
  - (a source code file) sketch source code (***"sketchfilename.ino"***)
  - (a Arduino board capture file) a photo capture showing how you setup your circuit (max. 1GB file).

cf) tone(pin, frequency, duration):

- 6271Hz freq sound during 0.15s
- delay 0.2s
- 4186Hz freq. sound during 0.15s
- delay 0.2s