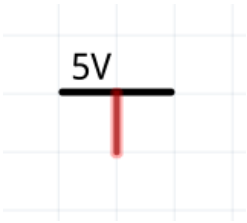
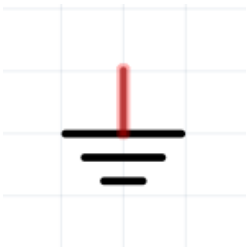
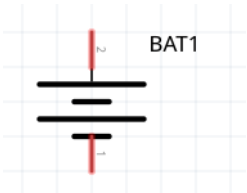
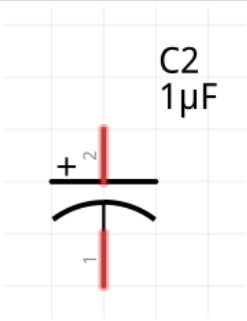
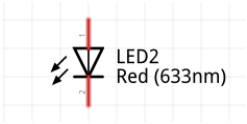
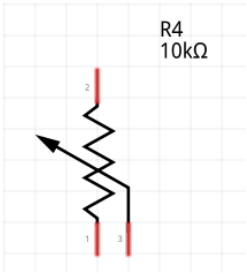
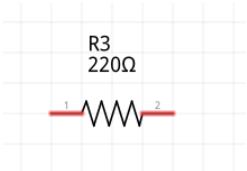
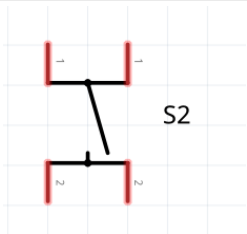
ArduinoGirls

Beginner analog and digital electronics tutorials.

Schematic Symbols

Symbol	Name	What it Does	Units	Notes
	Power source ; also known as Vcc	Provides energy (+)	Volts (V)	
	Ground ; also known as Gnd	Provides energy (-)	Volts (V)	
	Power source (+ and – terminals)	Provides energy	Volts (V)	The “longer” end of the symbol is positive, the “shorter” negative.
	Capacitor	Stores energy temporarily	Farads (F)	Some capacitors (electrolytic, metallic) are polarized (direction matters!) and are marked as such. Ceramic capacitors are not direction sensitive.

Symbol	Name	What it Does	Units	Notes
	Light Emitting Diode (LED)	Shines light		Direction matters – the “longer” leg (the “base” of the triangular symbol) is positive
	Potentiometer	Allows to regulate resistance by turning a knob	Ohms (Ω)	The “center” terminal is what changes “value”. Direction does not matter.
	Resistor	Resists current flow	Ohms (Ω)	Direction does not matter. Resistor value is color-coded on it with colored stripes.
	(Push) Button	Switches things on and off		Can be sticky (press and it stays on) or not. Direction does not matter.

Units and Stuff

Name	Unit	What it Is
Voltage	Volt (V)	
Current	Ampere (A)	
Resistance	Ohm (Ω)	
Capacitance	Farad (F)	How much energy is can fit into a capacitor

Code Reference

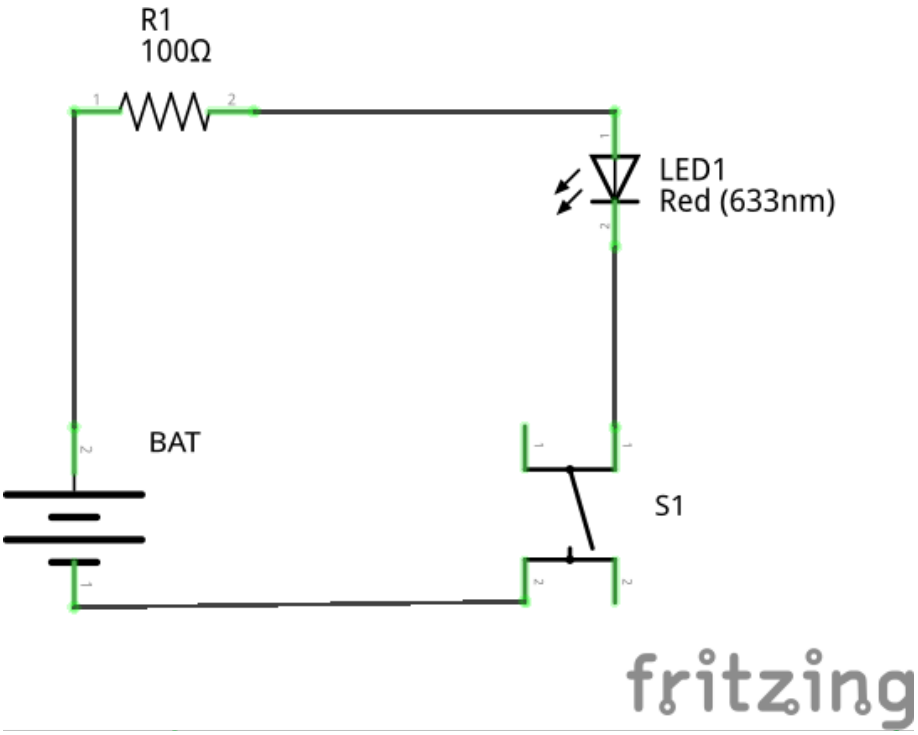
https://www.arduino.cc/reference/en/

https://starbeamrainbowlabs.com/blog/images/20160925-Arduino-Cheat-Sheet.png

Function	What it Means	Example
digitalRead(pin);	What is the status of that pin? HIGH or LOW?	digitalRead(A0);
digitalWrite(pin, value);	Set pin to value	digitalWrite(A0, HIGH);
pinMode(pin, mode);	Configure pin to either be INPUT or OUTPUT	pinMode(A0, INPUT);
delay(time);	Wait for X milliseconds	delay(1000);

LED With A Switch

Shiny!

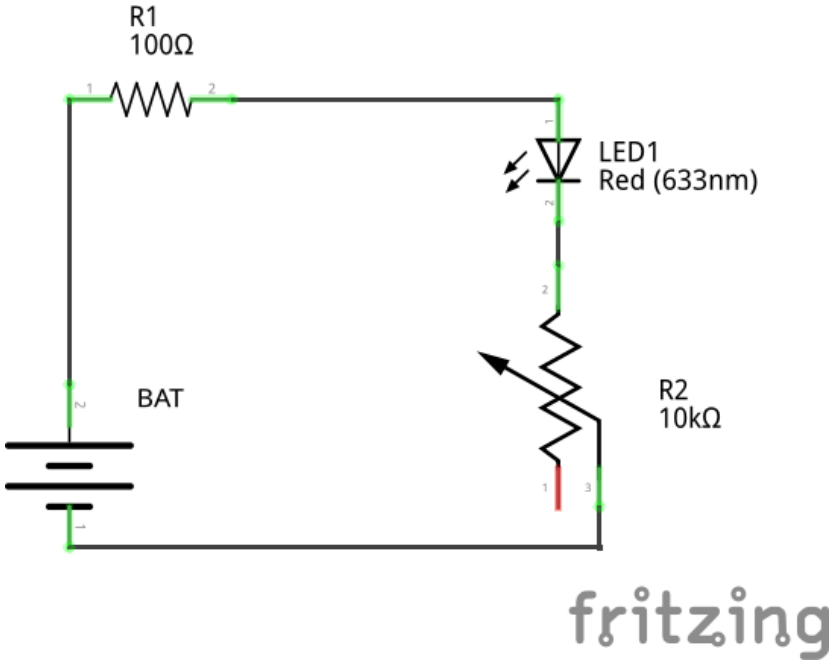


Materials

ID	Storage Ref	Notes
R1		Anywhere from 50 ... 300 Ω is fine
LED1	CAT 050 or CAT 056 or CAT 044	Any color
BAT	CAT 039	3V CR2450 coin cell
S1	CAT 009 or CAT 010	Any switch

- Why is the resistor needed?
- What happens when we increase or decrease the resistor's value?
- What happens if the LED is inserted in the wrong direction?

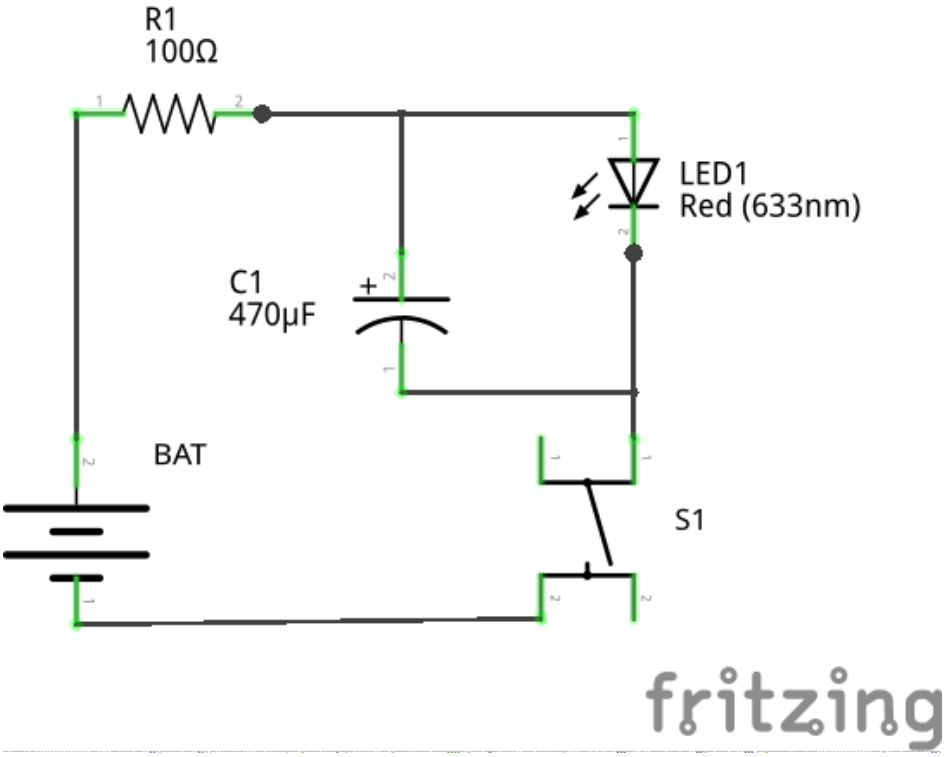
LED With a Potentiometer



Materials

ID	Storage Ref	Notes
R1		Anywhere from 50 ... 300 Ω is fine
LED1	CAT 050 or CAT 056 or CAT 044	Any color
BAT	CAT 039	3V CR2450 coin cell
R2	CAT 045 + CAT 049	

LED with a Capacitor

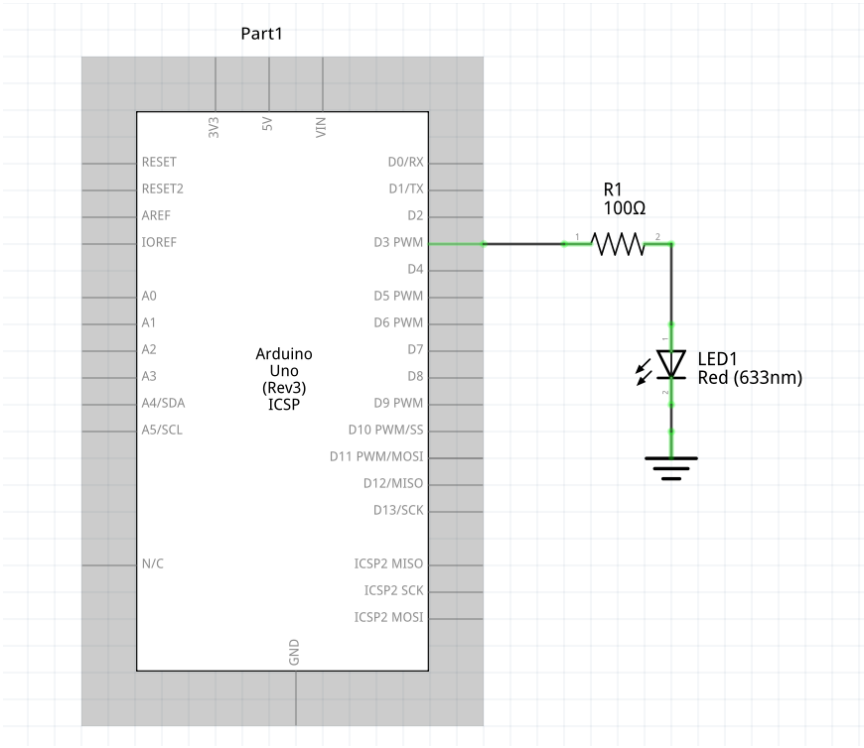


Materials

ID	Storage Ref	Notes
R1		Anywhere from 50 ... 300 Ω is fine
LED1	CAT 050 or CAT 056 or CAT 044	Any color
BAT	CAT 039	3V CR2450 coin cell
S1	CAT 009 or CAT 010	Any switch
C1		Polarization (direction) matters!

What happens when we use a larger capacitor?

Blinking LED (aka Hello World)



Materials

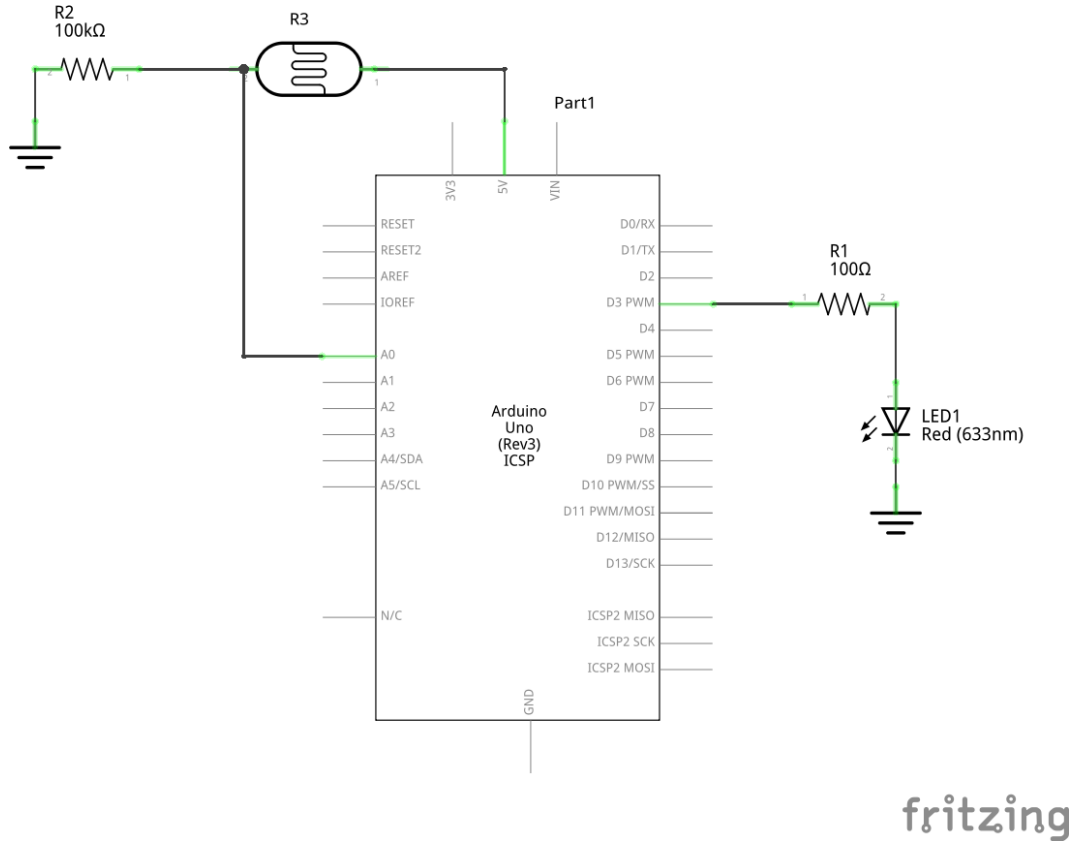
ID	Storage Ref	Notes
R1		Anywhere from 50 … 300 Ω is fine
LED1	CAT 050 or CAT 056 or CAT 044	Any color

Spec

Program the Arduino such that it would blink a LED connected to one of the Digital pins (see: blink.ino)

Experiment with with different timings. Write a SOS blinker (see: sos.ino)

Darkness Warning



Materials

ID	Storage Ref	Notes
R1		Anywhere from 50 … 300 Ω is fine
LED1	CAT 050 or CAT 056 or CAT 044	Any color
R2		
R3	CAT 033	LDR, polarity does not matter

Spec

Connect a light sensor and a LED with the Arduino. Program the Arduino to warn (by lighting the LED) when it’s getting darker.

Door Sensor

Customer's Business Problem

"The outer door to our office premises has a "auto-close" lever, but it isn't strong enough and doesn't work properly. Sometimes, when employees pass through the door and the door isn't released with enough force, the door does not close all the way and stays unlocked. This enables anyone to just walk in and is a security risk."

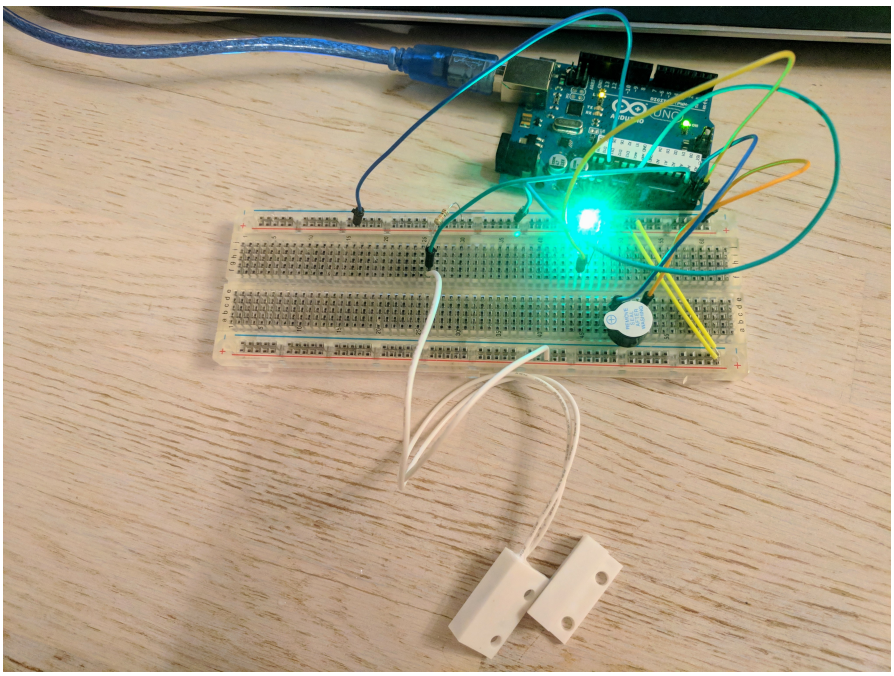
The building manager does not believe the problem exists, so the door won't be "fixed". Solve this with technology.

Solution

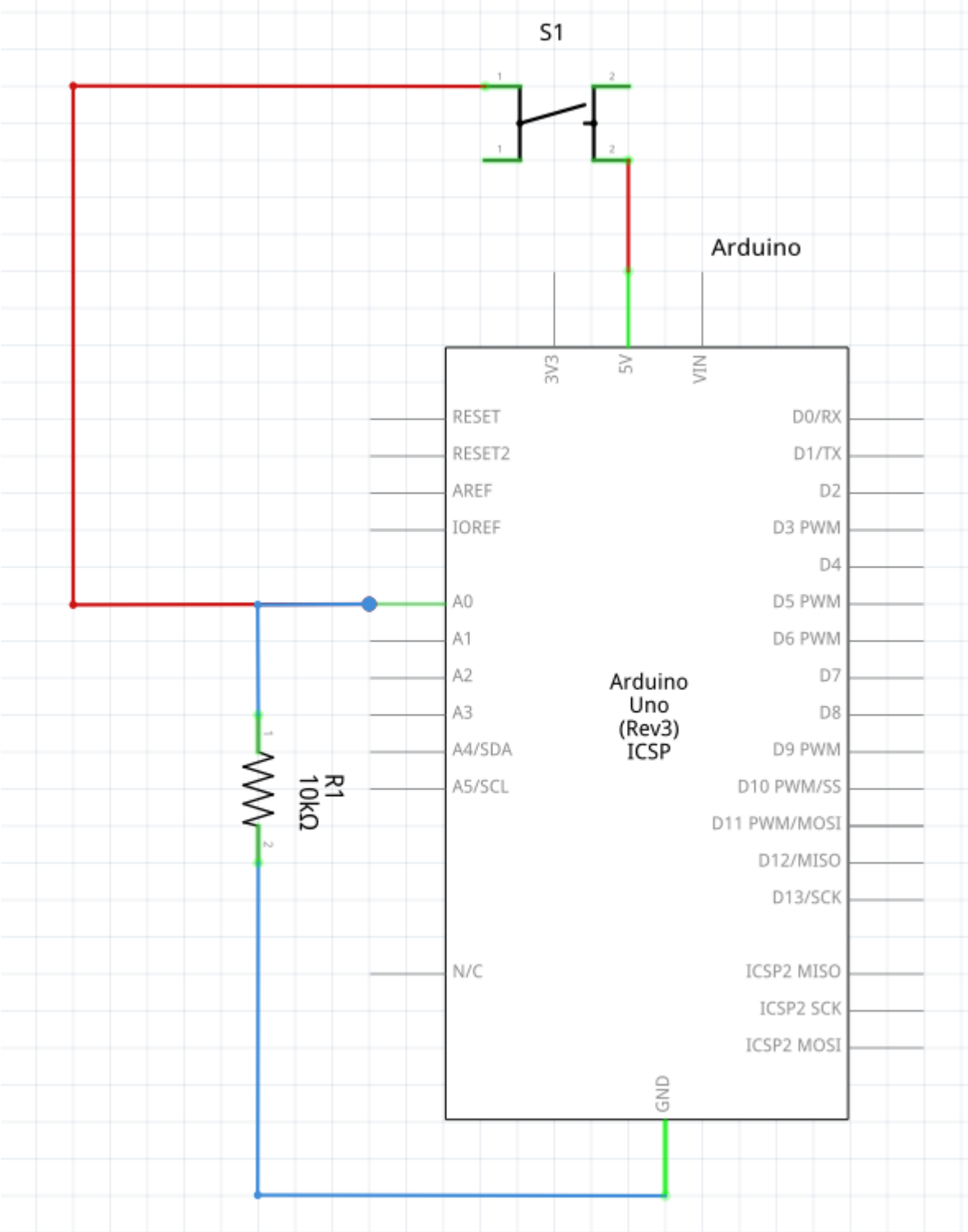
Build a door sensor that could be installed on the door – when the door stays open for longer than is reasonable, the sensor detects this and will start beeping, alerting employees in the office that the door is actually open; so that they could come and close it.

Tech Spec

- Arduino as "brain"
- Door sensor will periodically check the door status
- If the door is open, a warning / status LED will be lit
- If the door has been open for 30 seconds or more, a buzzer will start periodically beeping (5 sec intervals)
- When the door is closed, the sensor "resets" (LED off, beeping off, start checking the status of the door again)

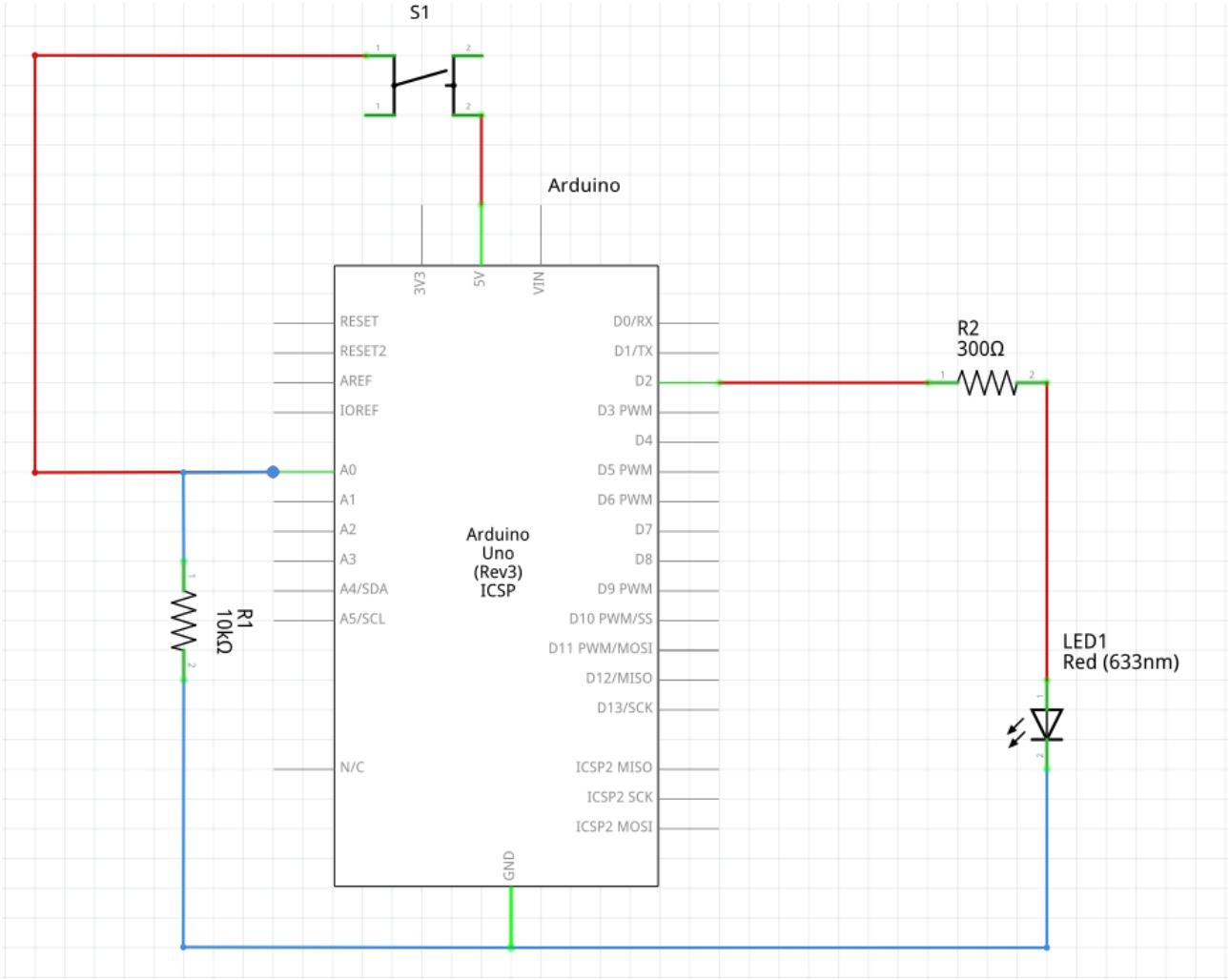


Reading A Switch (The Door Sensor)



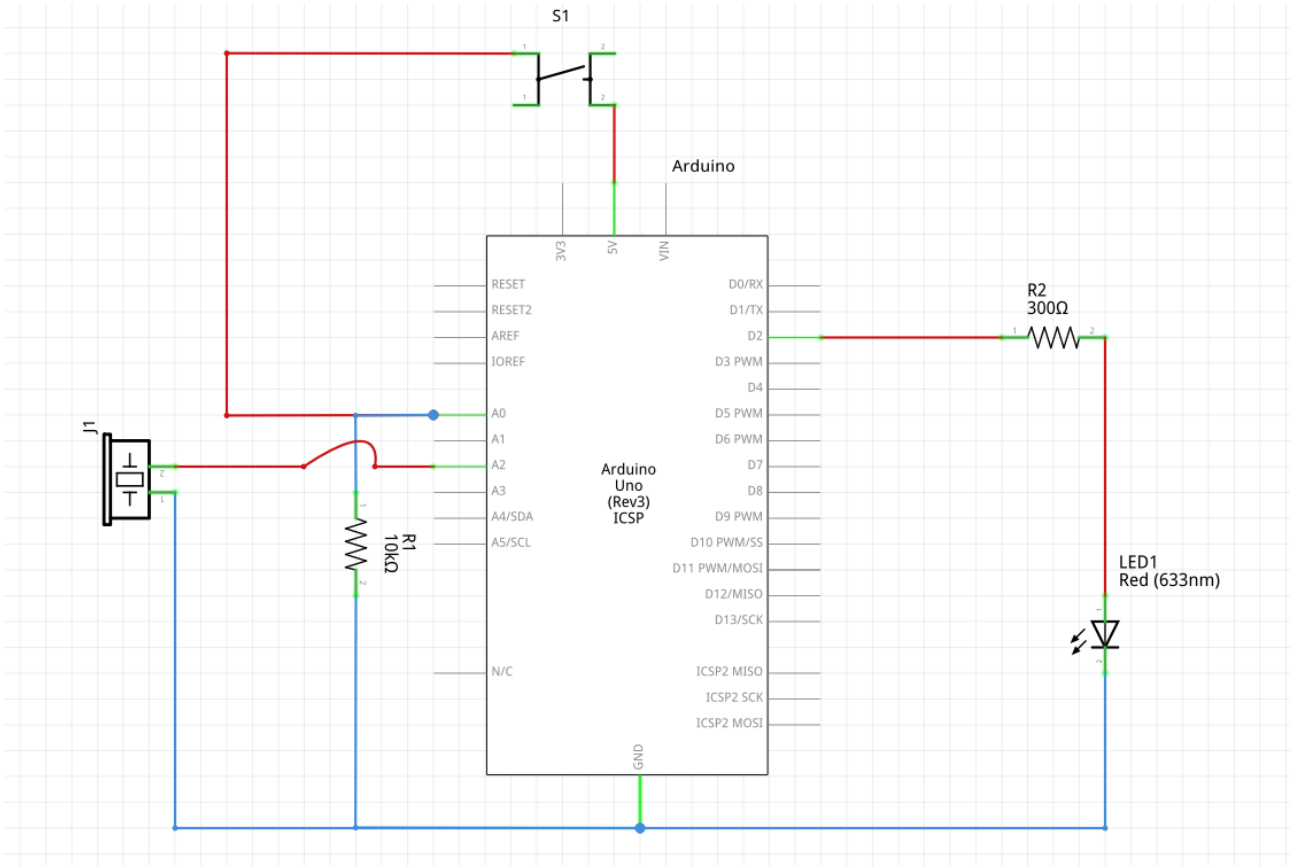
Symbol	Storage Ref
R1	
S1	ID 0214 ; CAT 053

Turning a LED On and Off



Symbol	Storage Ref
LED1	CAT 050 or CAT 056
R2	

Controlling a Buzzer



Symbol	Storage Ref
J1	CAT 014; ID 160