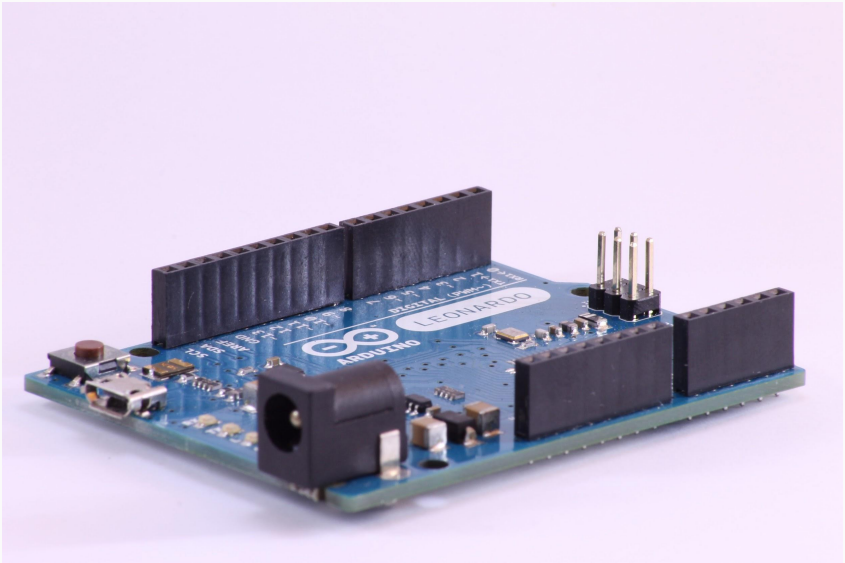
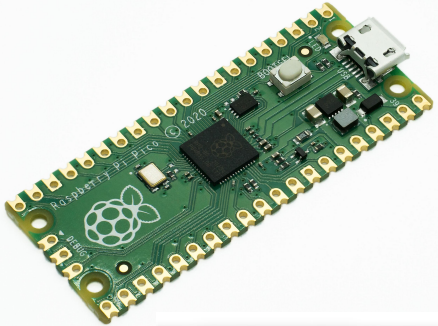
Arduino Workshop

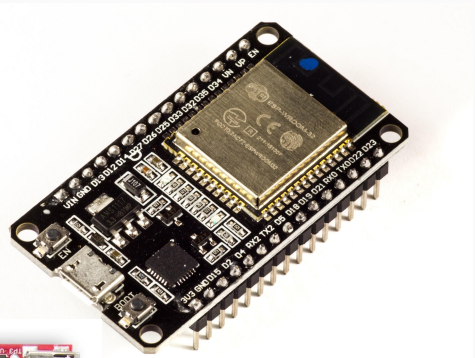
By students at TI-CEPD, NSUT under Prof. Dhananjay V. Gadre

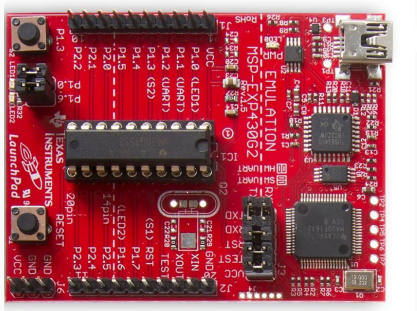
Microprocessor vs Microcontroller



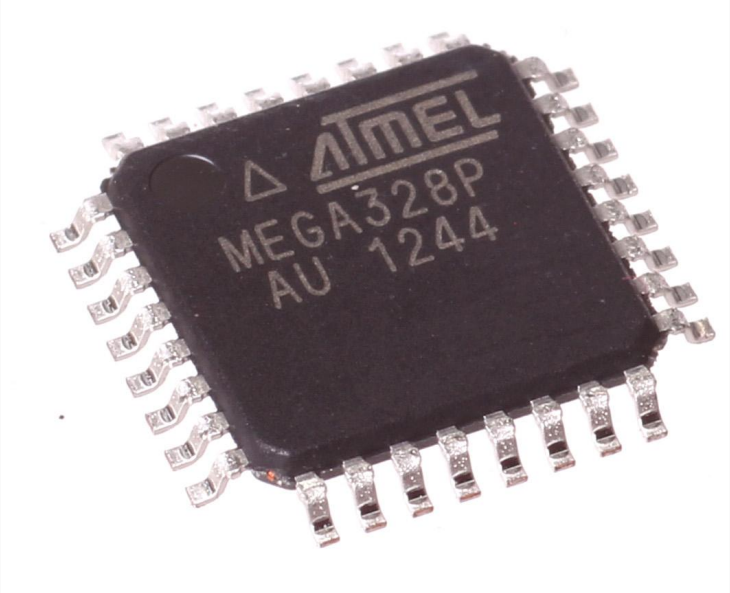
Arduino, the most famous MC







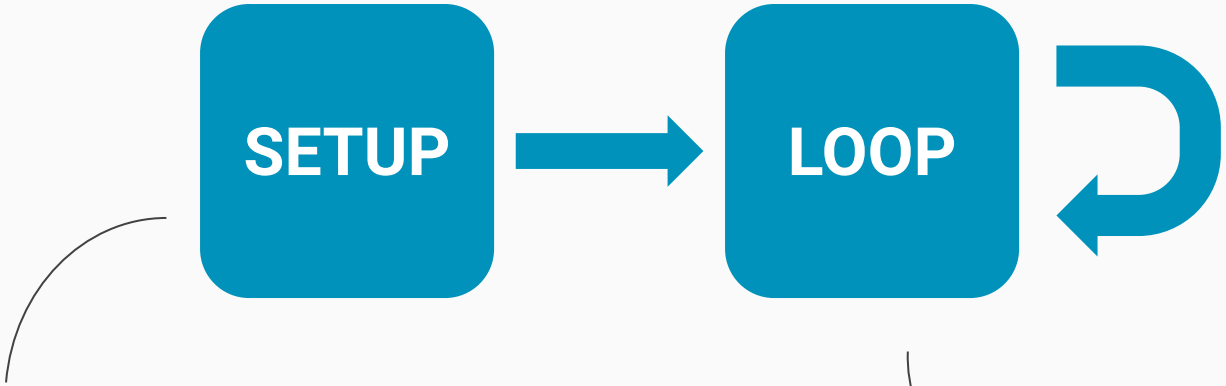
Arduino’s microprocessor



Arduino IDE

People at Arduino studied the datasheet for Atmel MEGA328P and reduced and simplified its operations for use in the Arduino IDE

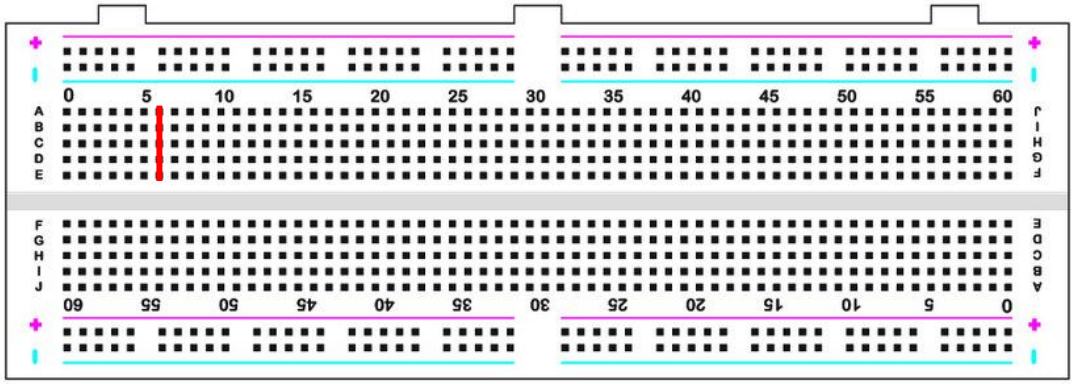
setup and loop

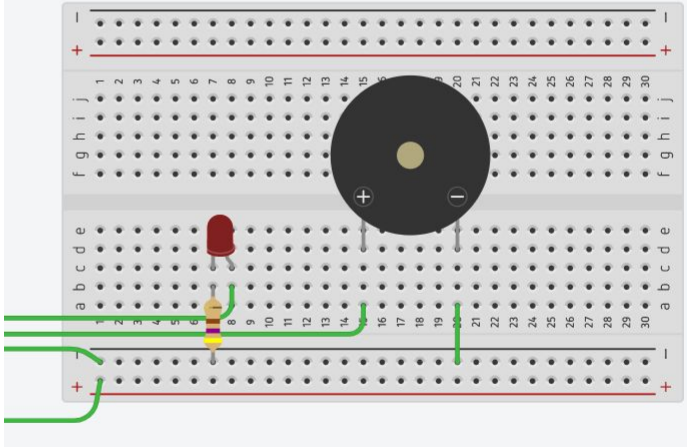


Is only run once in an Arduino program and is used to initialize variables, set pins as input or output etc

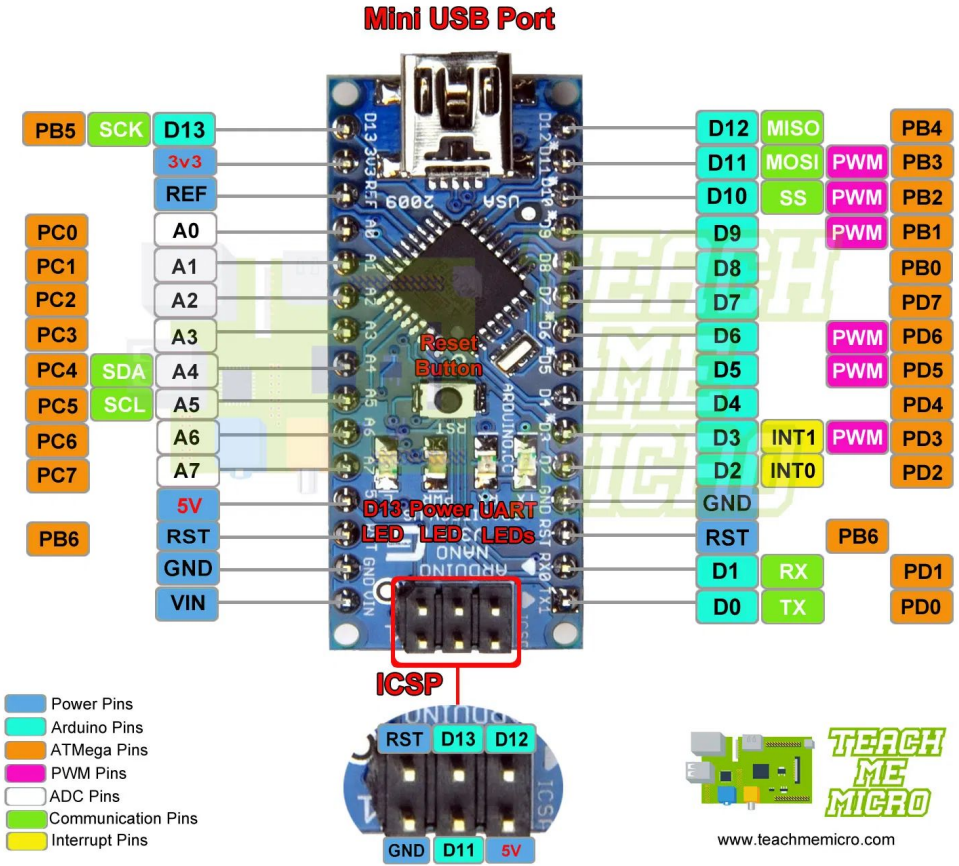
Runs continuously non-stop until the program is terminated

Solderless Breadboards





ARDUINO NANO PINOUT

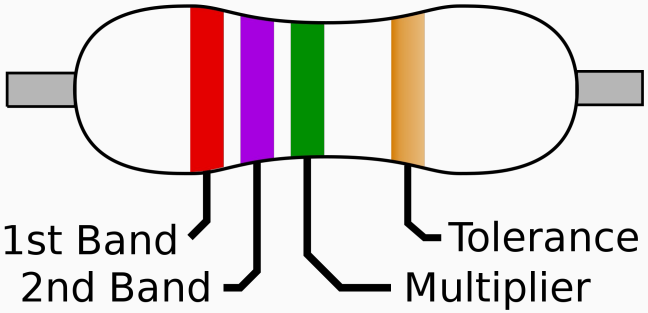


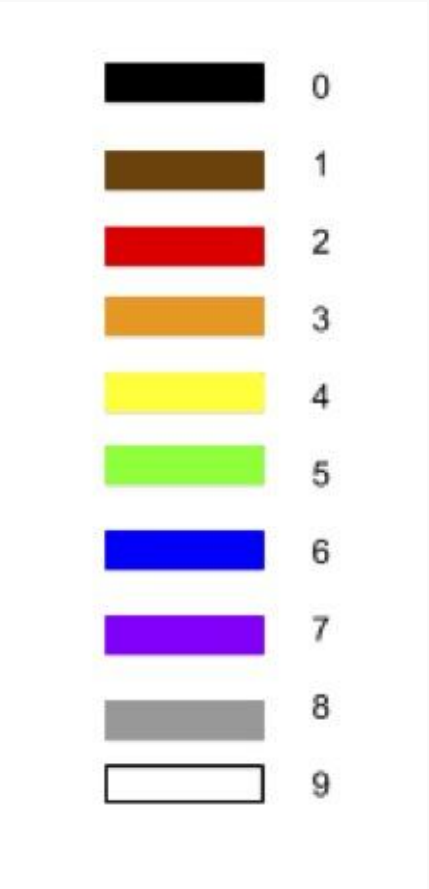
First Circuit!!!

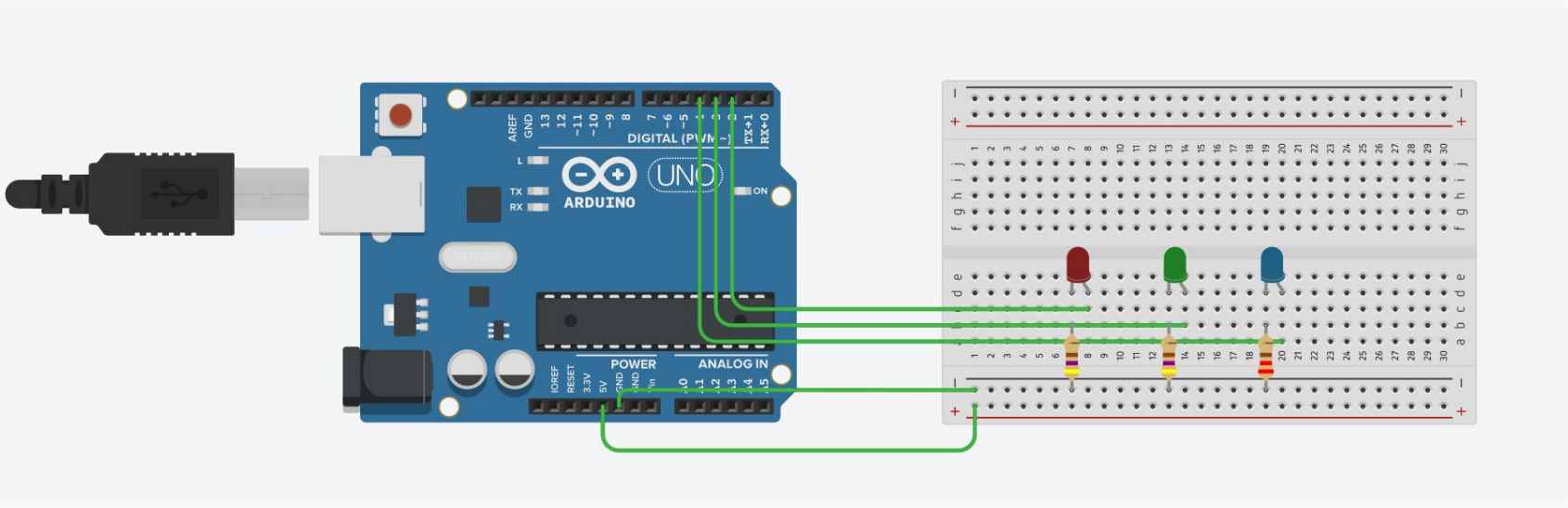
Change the LED_BUILTIN used in the program to any other I/O pin you see on the Arduino Nano

Use any of the 3 color LEDs in your kits and attach the positive end of that LED to the pin you selected in the program and negative end to GND (same as 0V)

But we need a Resistor in series with the LED to limit the current through it!!





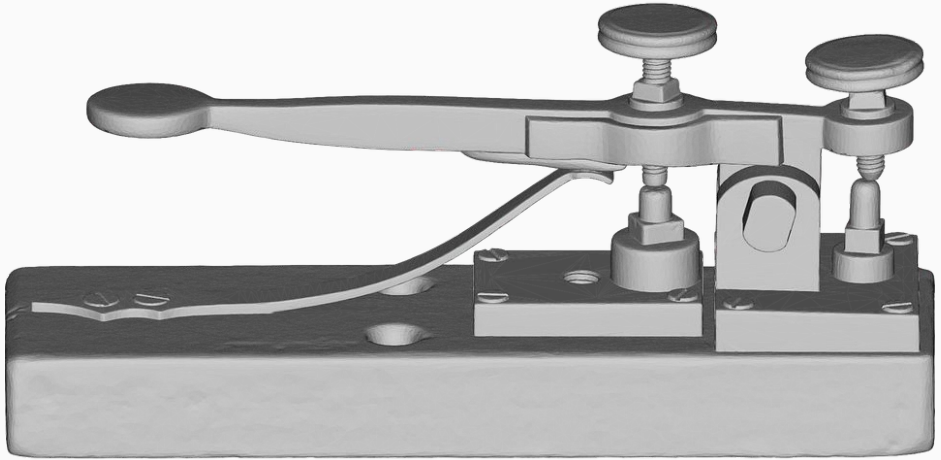

DIGITAL (PWM~)
UNO
ARDUINO
POWER
ANALOG IN

New Project - Morse Code!!

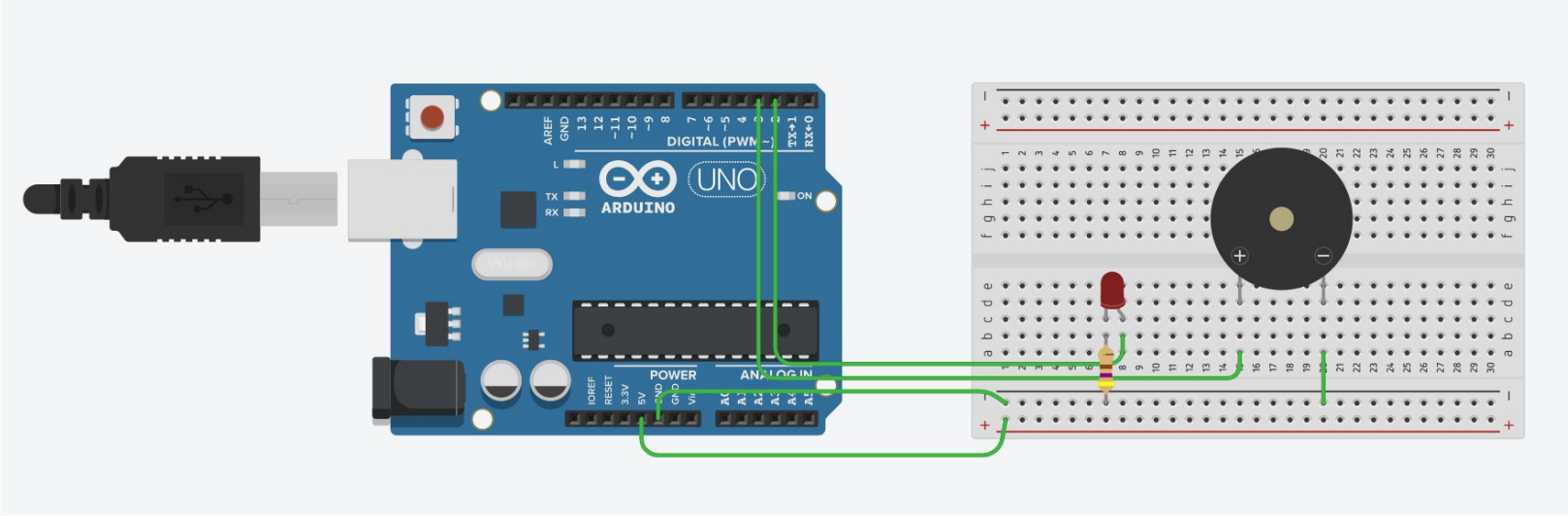
International Morse Code

1. A dash is equal to three dots.
2. The space between parts of the same letter is equal to one dot.
3. The space between two letters is equal to three dots.
4. The space between two words is equal to seven dots.

A	● ▬	U	● ● ▬
B	▬ ● ● ●	V	● ● ● ▬
C	▬ ● ▬ ●	W	● ▬ ▬
D	▬ ● ●	X	▬ ● ● ▬
E	●	Y	▬ ● ▬ ▬
F	● ● ▬ ●	Z	▬ ▬ ● ●
G	▬ ▬ ●		
H	● ● ● ●		
I	● ●		
J	● ▬ ▬ ▬		
K	▬ ● ▬	1	● ▬ ▬ ▬ ▬
L	● ▬ ● ●	2	● ● ▬ ▬ ▬
M	▬ ▬	3	● ● ● ▬ ▬
N	▬ ●	4	● ● ● ● ▬
O	▬ ▬ ▬	5	● ● ● ● ●
P	● ▬ ▬ ●	6	▬ ● ● ● ●
Q	▬ ▬ ● ▬	7	▬ ▬ ● ● ●
R	● ▬ ●	8	▬ ▬ ▬ ● ●
S	● ● ●	9	▬ ▬ ▬ ▬ ●
T	▬	0	▬ ▬ ▬ ▬ ▬



“Hello” 



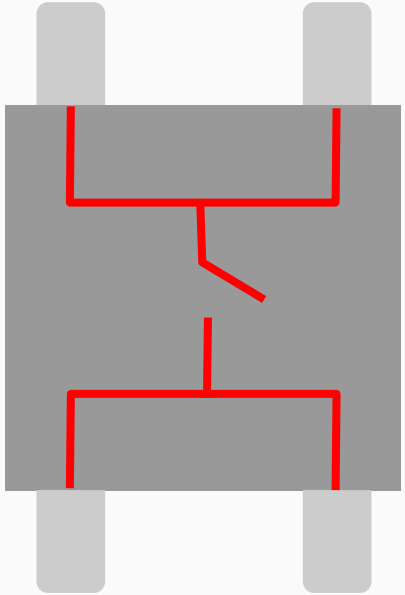
What if we want to take an input?

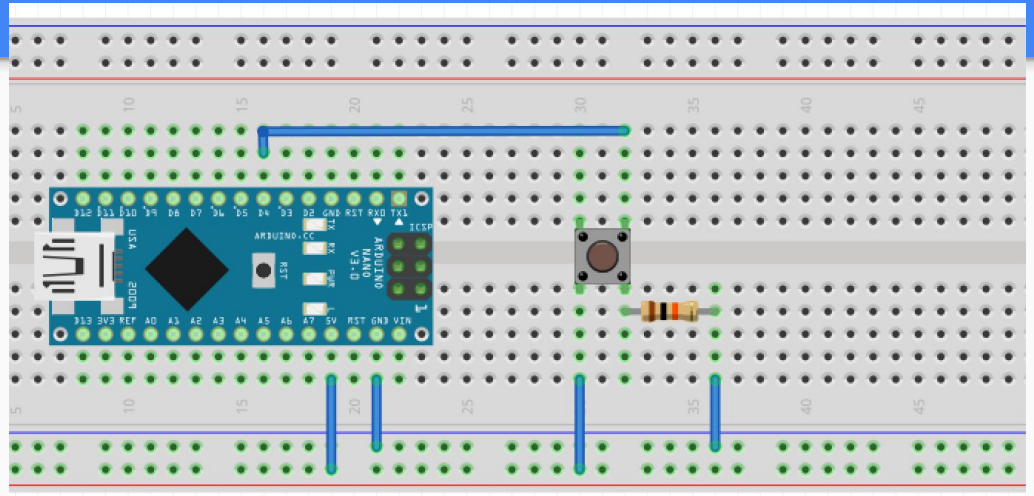
For taking input we use the **digitalRead()** function, this function just checks if the voltage at the pin specified is HIGH (5v) or LOW (0v) and we can use the result in our programs

But a button can only make or break a circuit, how do we provide HIGH and LOW logic to pins?

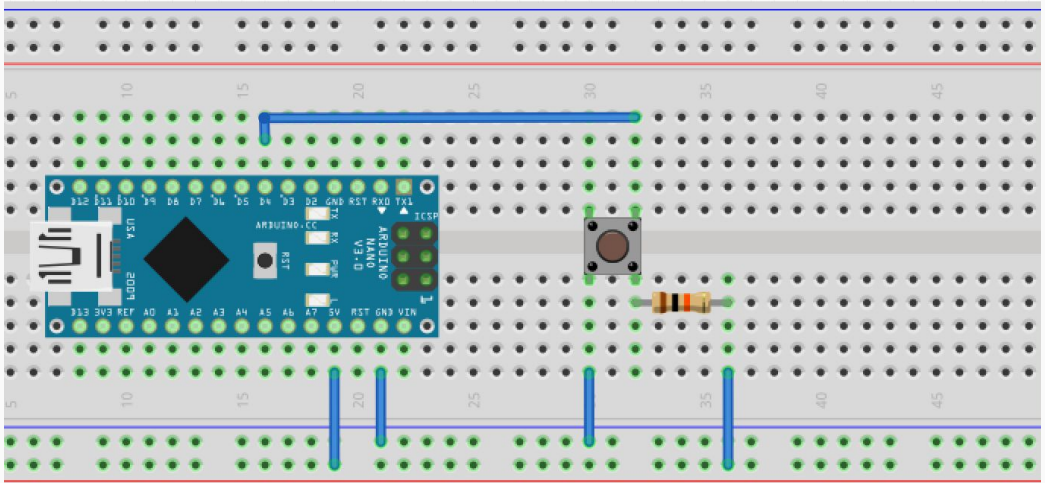
digitalWrite() and digitalRead()

Omron Switch





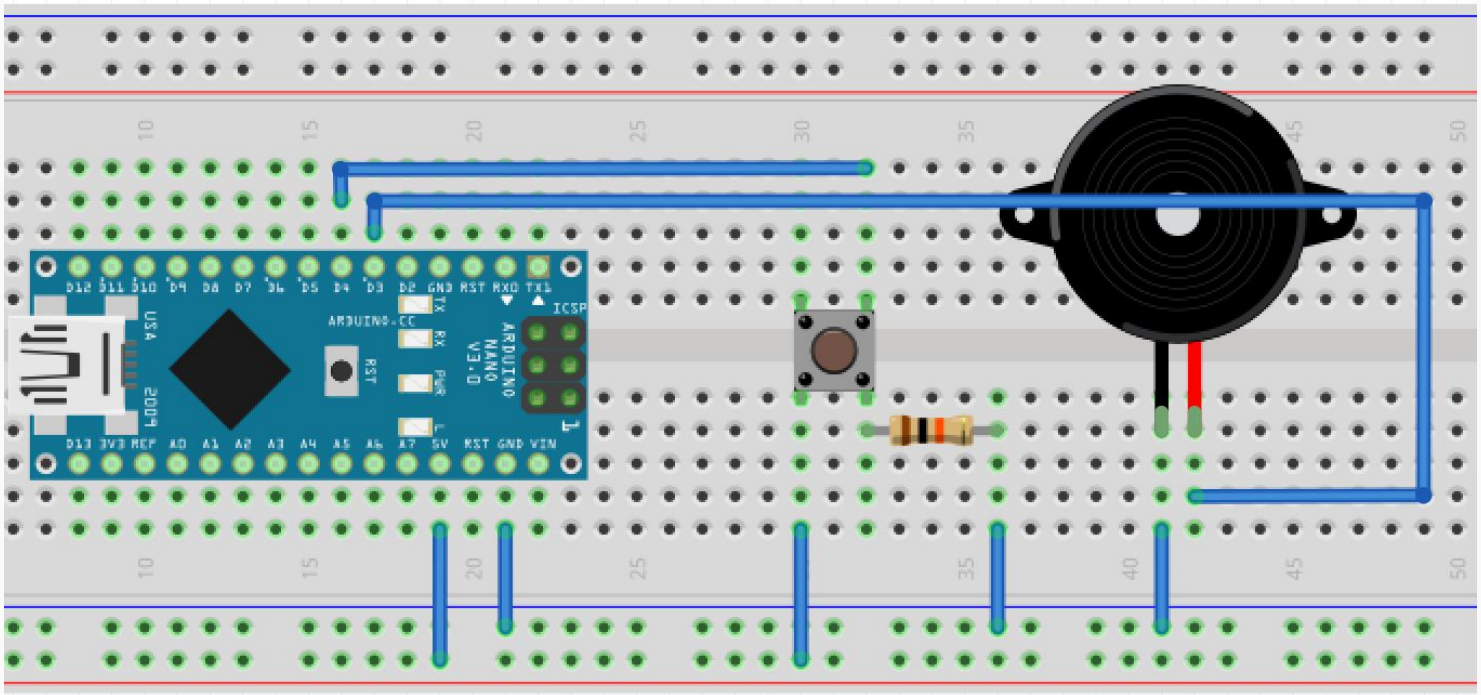
Normally pulled LOW



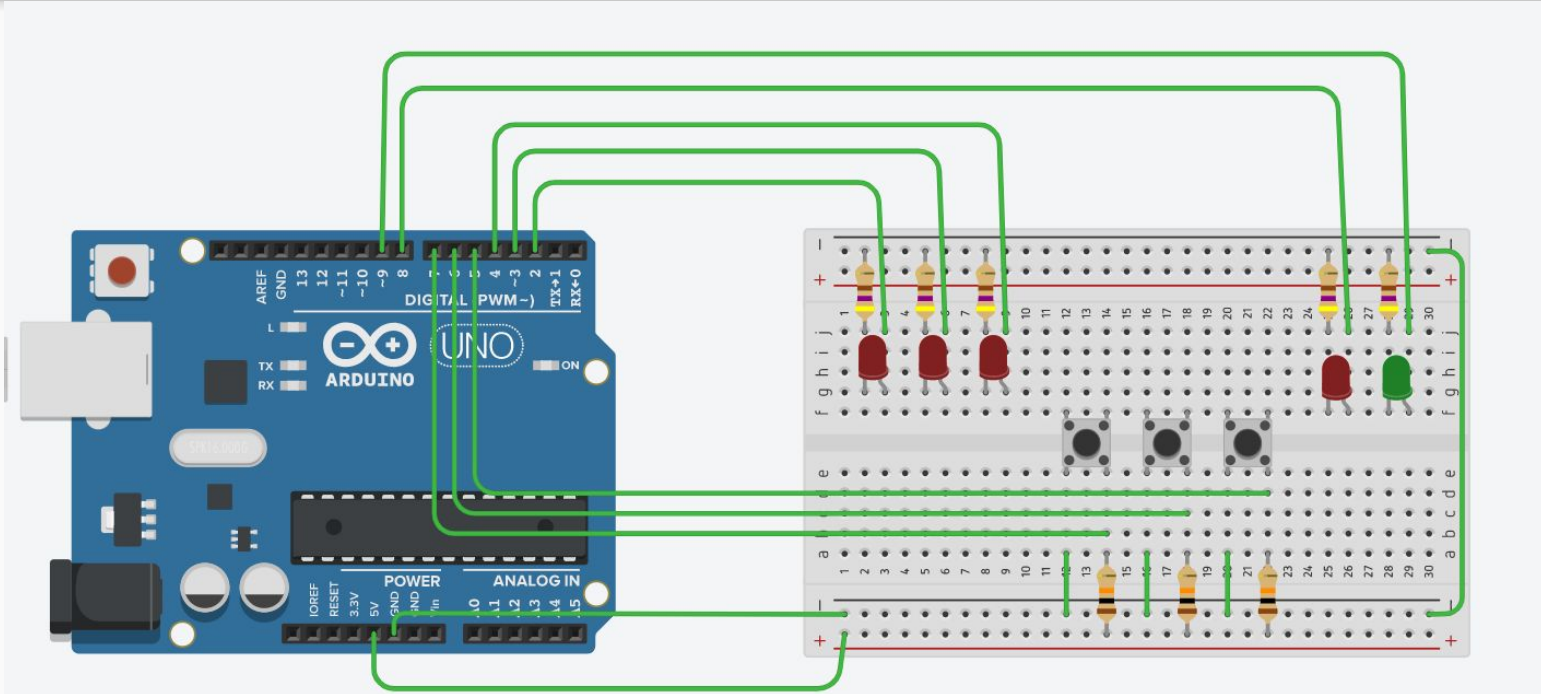
Normally pulled HIGH

digitalRead()!!

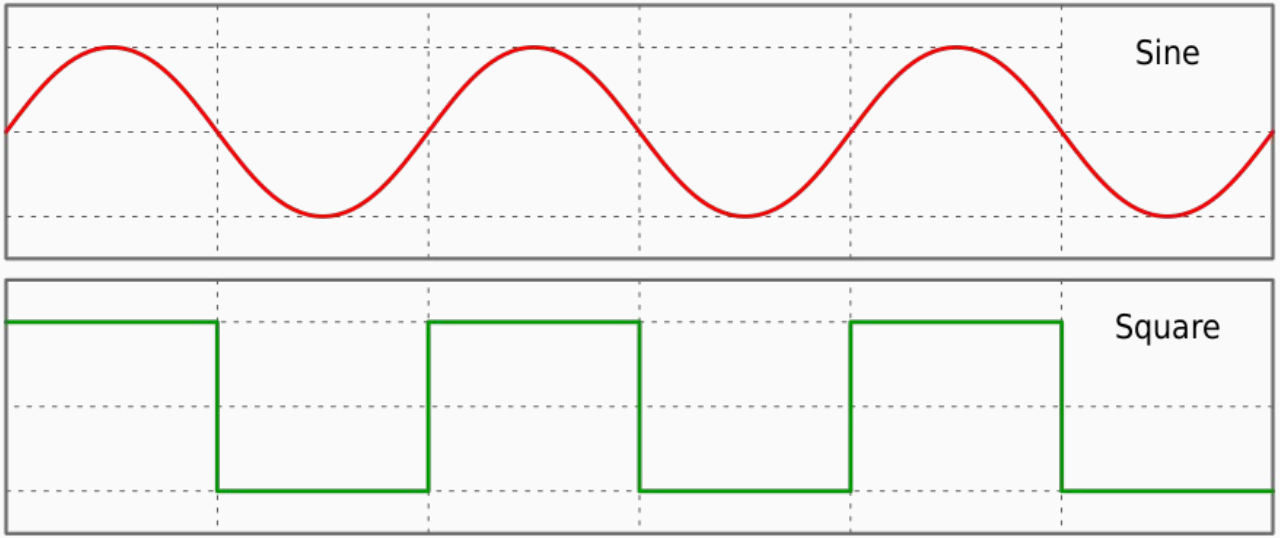
Objective: Press button to make noise



LED Memory Game!!!

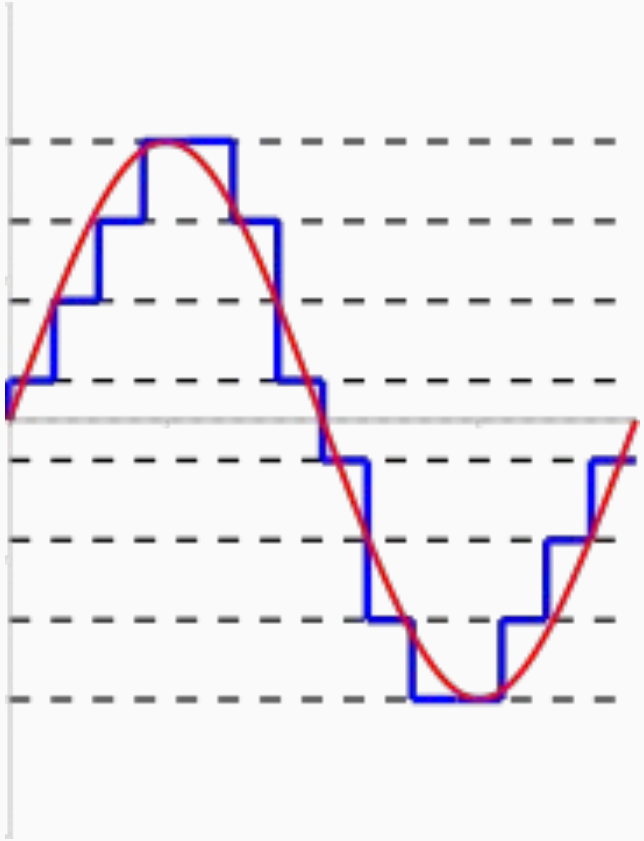


Working with Analog signals



We need an ADC (Analog to Digital Converter)

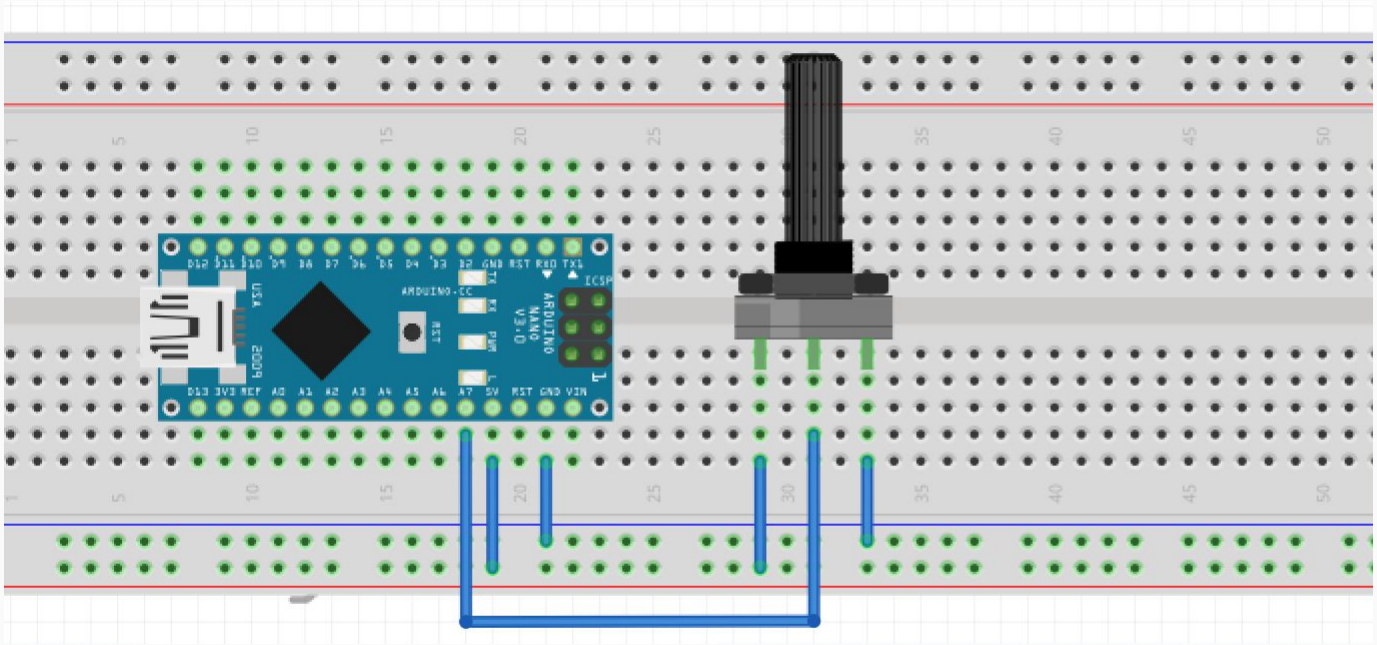
Arduino ADC



Arduino has a 10 bit ADC
Which means the number of levels an analog signal is divided
Into in 2^10 = 1024 levels

Thus reading an analog voltage gives us a number in the range of 0 to 1024

ADC Test

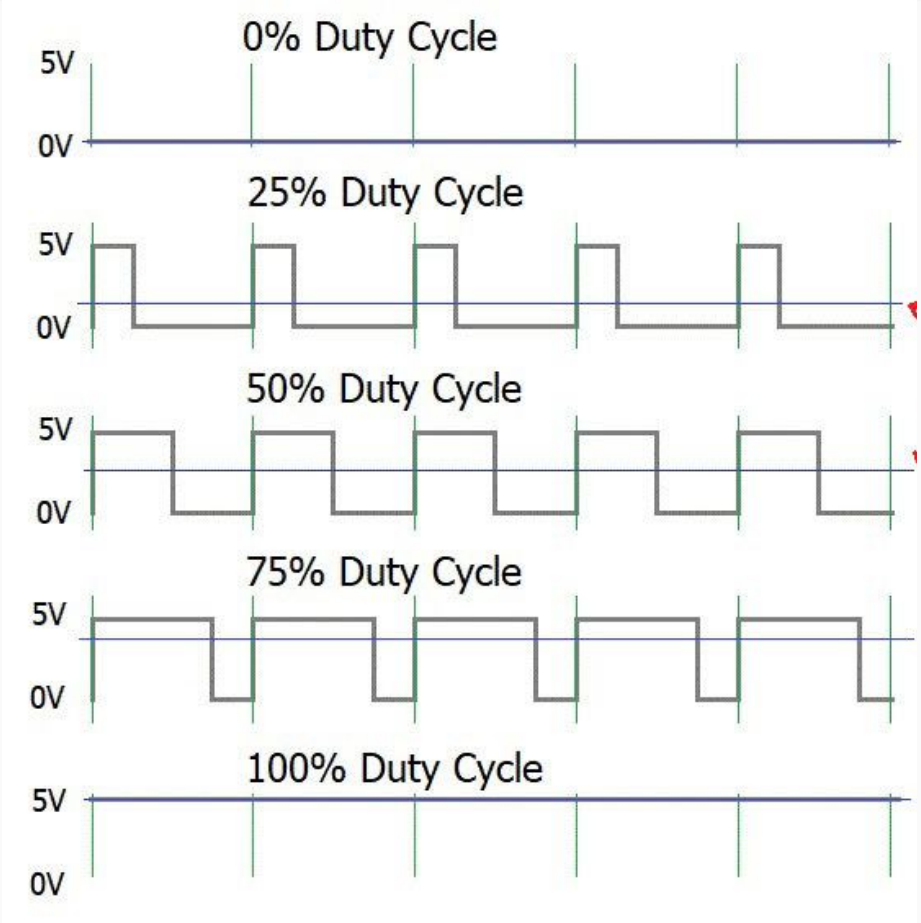


We will use **Serial** to see the value of analogRead()

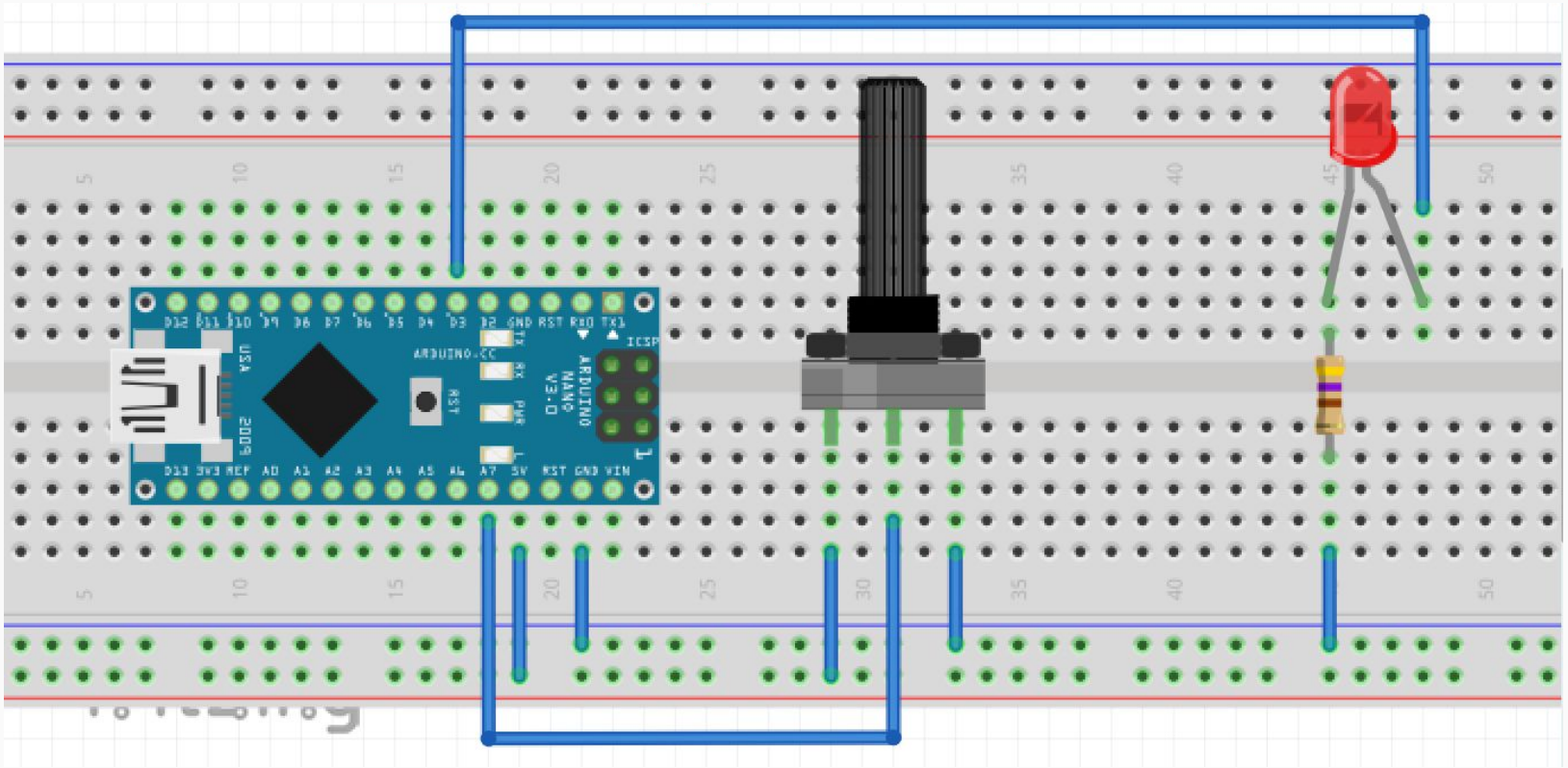
analogWrite() with PWM

PWM -> Pulse Width Modulation

analogWrite() does not work the same way as analogRead()



Using our analogRead() value from Potentiometer!!



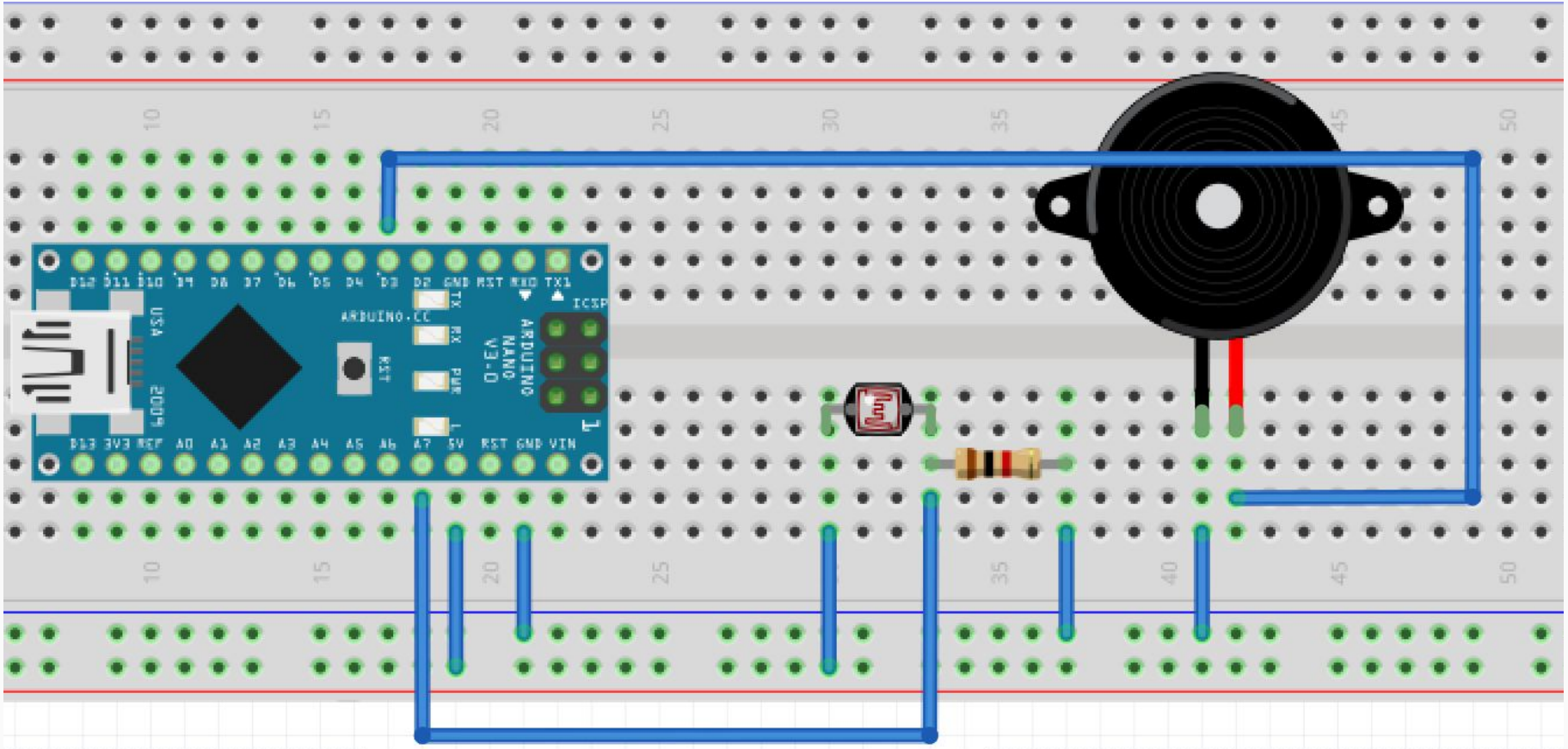
Light to Sound

We will make something similar to the light probe for visually impaired students

For that we need an **LDR (Light Dependant Resistor)**

LDR is a variable resistor whose value varies as per the amount of light falling on it

So we need to convert this variable resistance to something we can read using analogRead()


D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 GND RST RXD TX1
ARDUINO.CC
TX
RX
PWR
L
RST
ICSP
ARDUINO NANO V3.0
USA
2004
D13 3V3 REF A0 A1 A2 A3 A4 A5 A6 A7 5V RST GND VIN

Thank You!!!

There is a lot we couldn't cover…

We have only scratched the surface in terms of what one can do with an arduino, there is so much more to explore and test.

For eg. we can control LCD displays with arduino + Speakers with arduino, we can use 1000s of different kinds of sensors for monitoring experiments, taking observations, etc.

Refer to arduino.cc or any just google “How to do _____ on arduino”

Also feel free to reach out to us on Whatsapp or our Linkedin

Mudit Aggarwal, Rohan Deswal and Reshul Jindal at NSUT