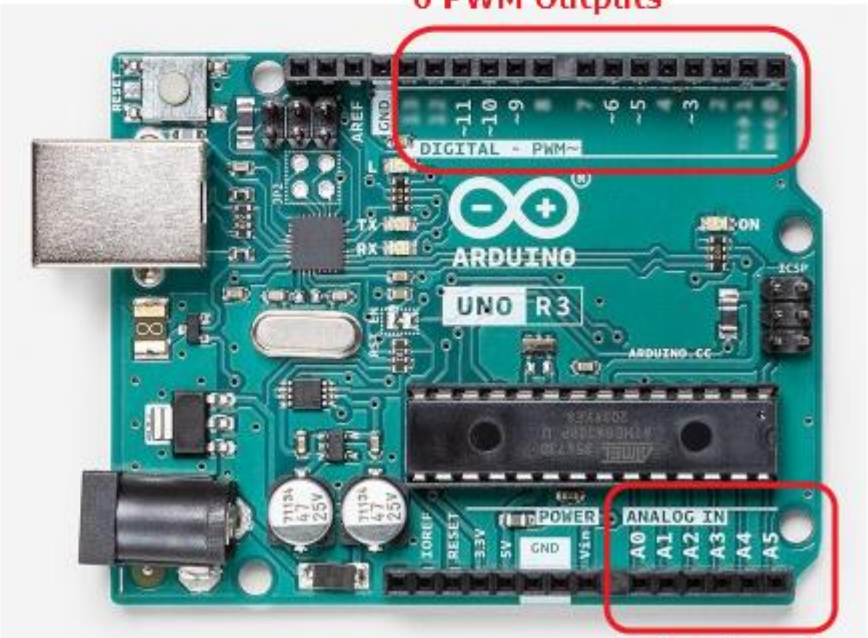
EP1000

Analog I/O

Analog I/O

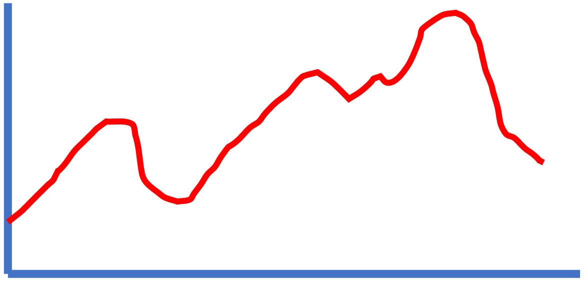
6 PWM Outputs

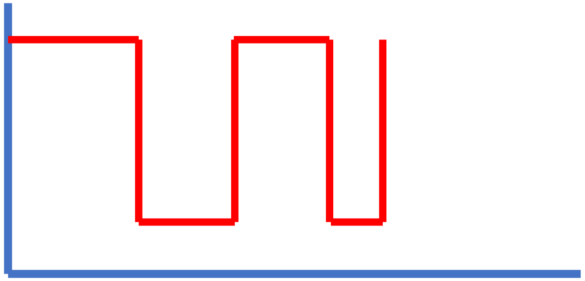


Analog Inputs
10-bit ADC

- The Uno uses the ATMega328 processor, which has 6 analog input pins.
- Each analog input has a 10-bit analog-to-digital converter that can produce an equivalent binary value for an analog voltage between 0 and Vref.
- Analog output is done using Pulse Width Modulation which can be used to control LEDs and Motors.
- Pins that can perform PWM are denoted with a ~
  (Pins 3, 5, 6, 9 , 10, 11)

Analog vs Digital





- Analog signals are continuous.
- Analog signals require conversion (ADC) before processing
- Analog signals are real world.

- Digital values are discrete e.g. 0, Vcc
- Digital values are easy to process.
- Digital signals need to be converted to appear to be real world signals.

Reading Analog Signals

- Analog signals need to be converted to digital values before they can be processed.
- Analog-to-Digital Conversion required
  - Sampling (at least 2X input signal frequency)
  - Vref
  - Timing

References:

YouTube:

- All About Electronics: Introduction to ADC and DAC
- Great Scott: Electronic Basics #27: ADC (Analog to Digital)

- Embedds: ATMega328 ADC – Raw Mode

Simplified ADC with Arduino System

- Assumes that input signals are stable and does not change quickly.
- Uses a default Vref = 5V
- Resolution = $5/2^{10}$ = 4.9mV
- Max Read speed = 100 mS
  = 0.001s
- Result is between 0 ~ 1023

Analog I/O

analogRead(pin)

where
pin = A0..A5

EP1000

Analog I/O

End