

ADC

Wednesday, September 03, 2014 5:32 AM

ADC - analog to digital conversion



Digital
HIGH = 5V
LOW = 0V

$$2^{10} = 1024 \quad \begin{array}{l} 1 - 1024 \\ 0 - 1023 \end{array}$$

$$\begin{array}{ccc} 0 & \dots & 1023 \\ \parallel & \uparrow & \parallel \\ 0V & \dots & 5V \\ & 2.5V & \end{array}$$

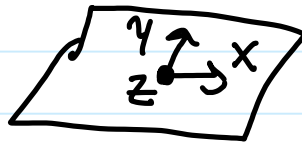
$$\frac{\text{raw ADC}}{\text{max \# of states}} = \frac{\text{voltage}}{\text{reference voltage}}$$


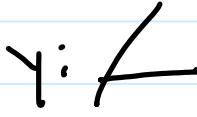
$$\frac{x}{1024} = \frac{2.5V}{5V}$$
$$(1024)(2.5V) = (5V)x$$
$$x = 511$$

$$1.25 = 256$$

Accelerometer

- produces a voltage
- Arduino reads ADC
- returns an ADC value (corresponds to voltage)
- voltage = acceleration



x:  y:  z: 505

$$\frac{505}{1024} \times \frac{5}{5}$$

$$x = \frac{2.45V}{1g} \rightarrow \text{acceleration}$$

Arduino ADC = 180 ~ 170

$$\rightarrow \frac{170}{1024} \times \frac{5}{5}$$

$$x = 0.85V$$