To collect information from the external world into the computer we must convert it from analog into digital form. This conversion process is called sampling and because the output of the conversion is one digital number at one point in time, there must be a finite time in between conversions, Δt. If we use SysTick periodic interrupts, then this Δt is the time between SysTick interrupts. We define the sampling rate as

$$f_s = 1/\Delta t$$

If this information oscillates at frequency f, then according to the **Nyquist Theorem**, we must sample that signal at

$$f_s > 2f$$

Furthermore, the **Nyquist Theorem** states that if the signal is sampled with a frequency of f_s, then the digital samples only contain frequency components from 0 to $\frac{1}{2} f_s$. Conversely, if the analog signal does contain frequency components larger than $\frac{1}{2} f_s$, then there will be an aliasing error during the sampling process (performed with a frequency of f_s). **Aliasing** is when the digital signal appears to have a different frequency than the original analog signal.

For a demonstration of the Nyquist Theorem, please see the interactive available at the following link:

http://users.ece.utexas.edu/~valvano/Volume1/E-Book/C14_ADCdataAcquisition.htm#ITool14.2
(http://users.ece.utexas.edu/~valvano/Volume1/E-Book/C14_ADCdataAcquisition.htm#ITool14.2)