

# Anti-aliasing Prefilter (6B)

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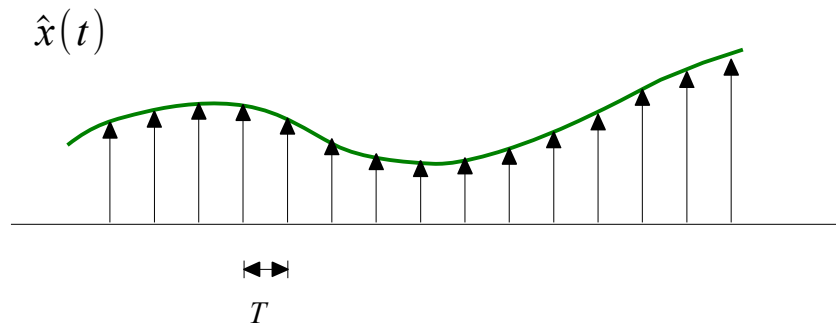
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# Sampler

## Ideal Sampling

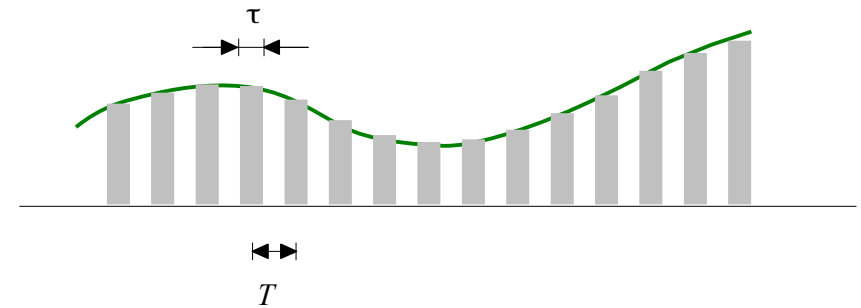


$$\hat{x}(t) = \sum_{n=-\infty}^{+\infty} x(nT) \delta(t-nT)$$

↓ CTFT

$$\hat{X}(f) = \int_{-\infty}^{+\infty} \hat{x}(t) e^{-j2\pi ft} dt$$

## Practical Sampling

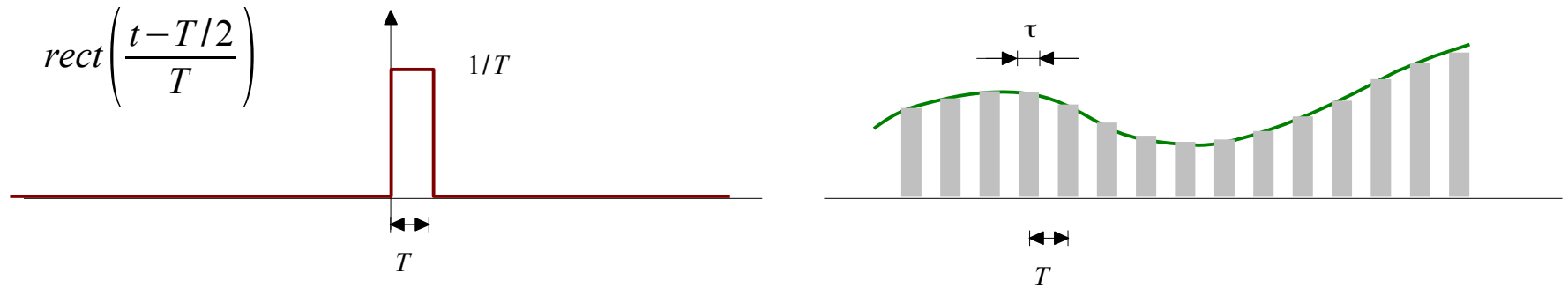


$$\hat{x}(t) \approx \sum_{n=-\infty}^{+\infty} x(nT) p(t-nT)$$

↓ CTFT

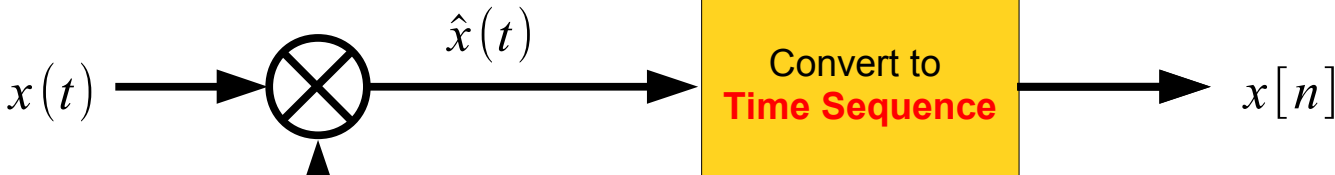
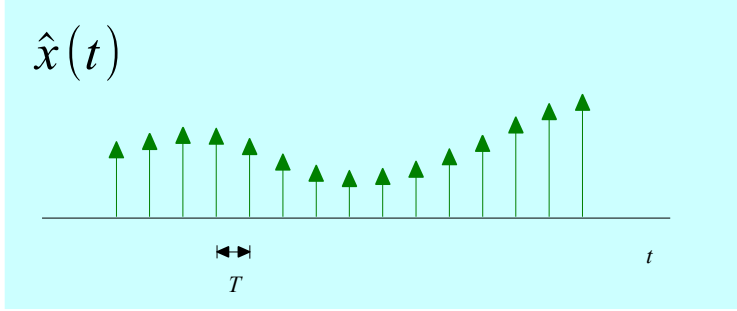
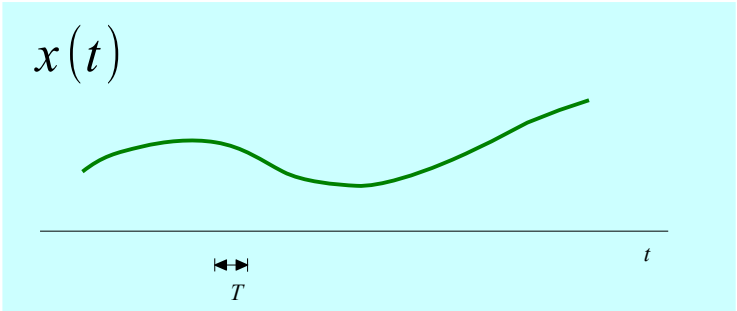
$$?$$

# Zero Order Hold (ZOH)



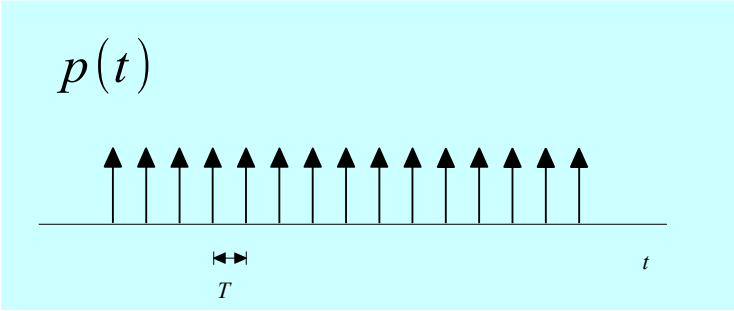
$$x_{ZOH}(t) = \sum_{n=-\infty}^{+\infty} x[n] \cdot rect\left(\frac{t-T/2-nT}{T}\right)$$

# Time Sequence

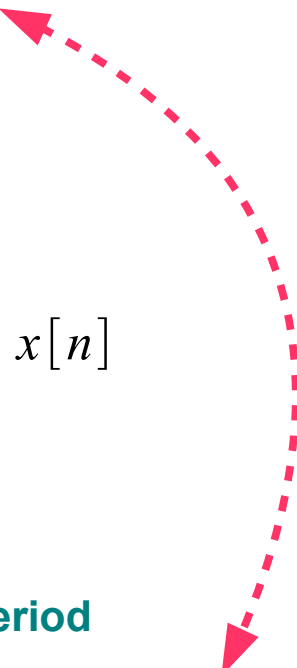
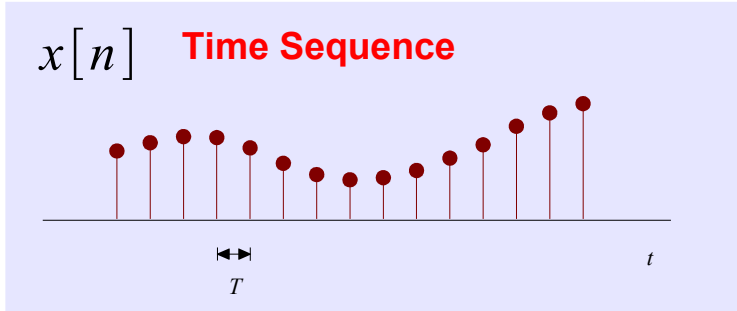


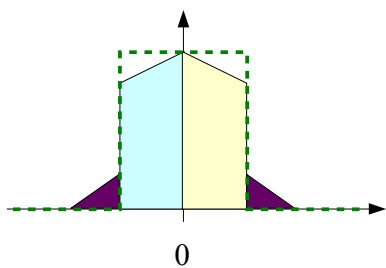
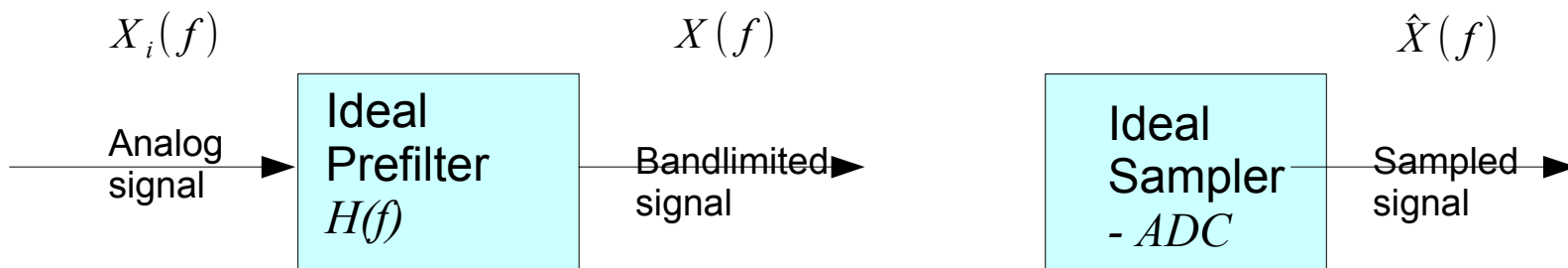
**Ideal Sampling**

$$p(t) = \sum_{n=-\infty}^{+\infty} \delta(t - nT)$$

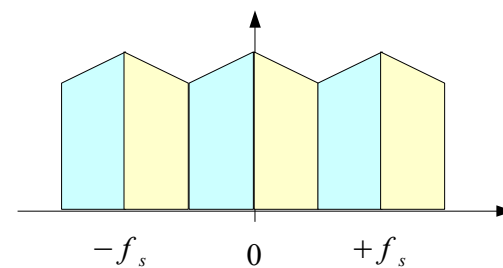
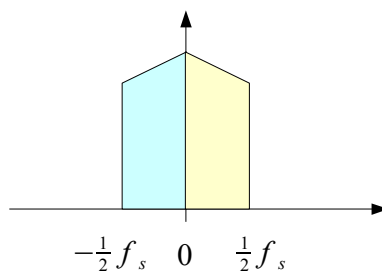


$T$  Sampling Period





$\frac{2}{4}f_s$      $\frac{3}{4}f_s$      $f_s$









## References

- [1] <http://en.wikipedia.org/>
- [2] J.H. McClellan, et al., Signal Processing First, Pearson Prentice Hall, 2003
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- [4] R. G. Lyons, Understanding Digital Signal Processing, 1997
- [5] AVR121: Enhancing ADC resolution by oversampling
- [6] S.J. Orfanidis, Introduction to Signal Processing  
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