$x_a(t)$ $x_s(t)$ $c(n)$

SAMPLE &
HOLD $x(n)$ QUANTIZER $\hat{x}(n)$ ENCODE

$S_a(t)$

$S_a(t)$ $\uparrow$ $\uparrow$ $\uparrow$ $\uparrow$ $S_a(j\Omega)$ $\uparrow$ $\uparrow$ $\uparrow$ $\uparrow$
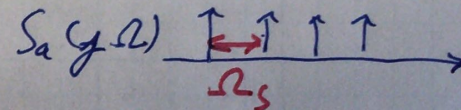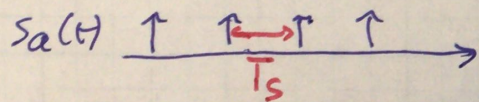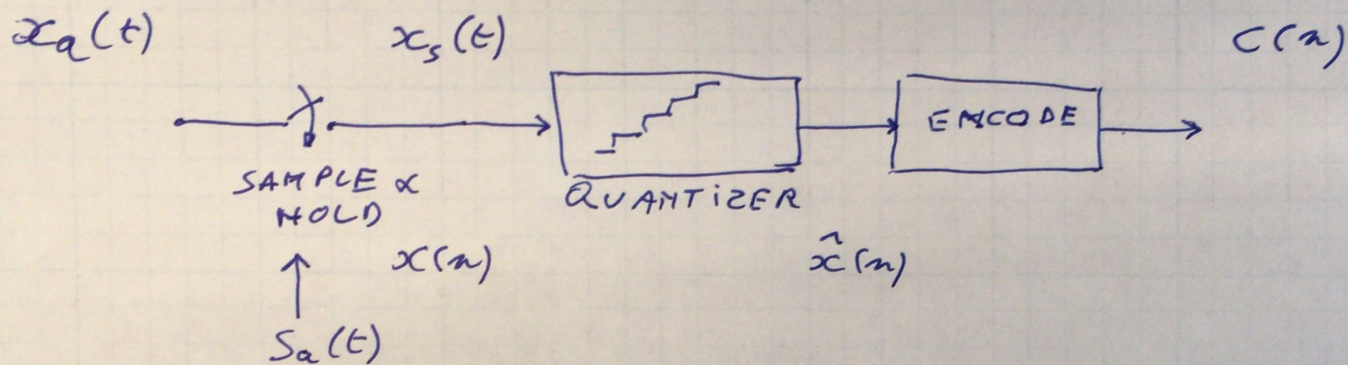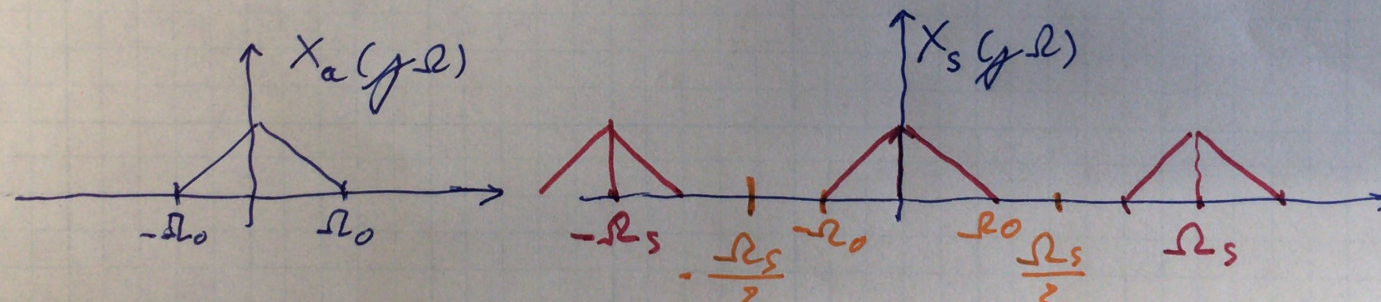 T_s Ω_s

$$S_a(t) = \sum_{n} \delta(t - n T_s) \iff S_a(j\Omega) = \sum_{k} \delta(\Omega - k\Omega_s) \cdot \frac{2\pi}{T_s}$$

$$x_s(t) = x_a(t) \cdot S_a(t)$$

$X_a(j\Omega)$ $X_s(j\Omega)$

$-\Omega_0$ Ω_0 $-\Omega_s$ $-\frac{\Omega_s}{2}$ $-\Omega_0$ Ω_0 $\frac{\Omega_s}{2}$ Ω_s

$\leftarrow$ NYQUIST $\uparrow$
THEOREM

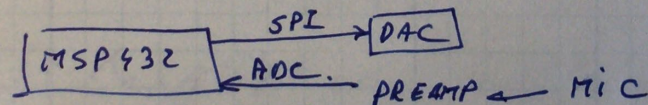$$\Omega_0 < \frac{\Omega_s}{2} \quad \text{FOR RECONSTRUCTION}$$

DSP APPLICATION
YOUR C CODE

DSP APPLICATION
LIBRARY
MSP432_BOOSTXL

HARDWARE ABSTRACTION
LAYER   = SW LIBRARY
GPIO_SETHI( );

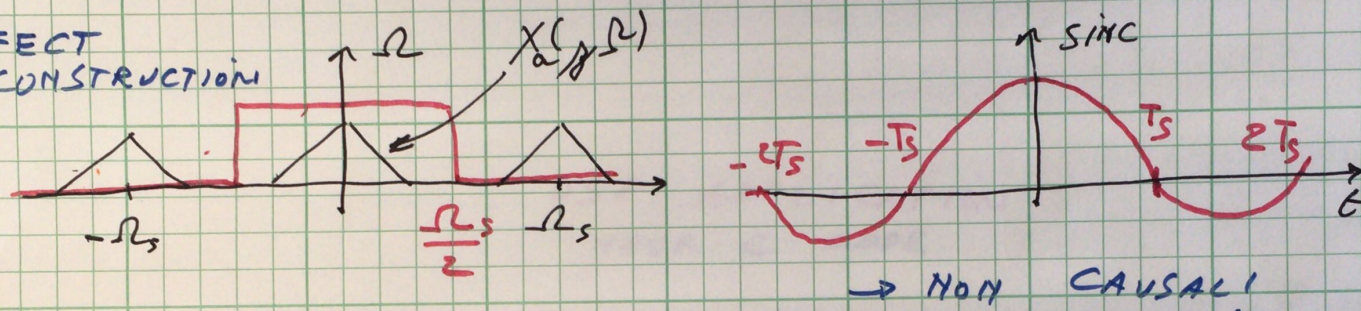HARDWARE DETAILS

MSP432 ──── SPI ──→ DAC
        ←── ADC.
              PREAMP ← MIC

HARDWARE SCHEMATICS

PERFECT
RECONSTRUCTION

Ω $X(j\Omega)$

$-\Omega_s$

$\frac{\Omega_s}{2}$ Ω_s

SINC

$-2T_s$ $-T_s$ T_s $2T_s$ t

→ NON CAUSAL!

PRACTICAL
RECONSTRUCTION

ZERO-ORDER HOLD.

IMPULSE RESPONSE

$z(t)$

T_s

T_s t

T_s $2T_s$ $3T_s$ t

$-2\Omega_s$ $-\Omega_s$ Ω_s Ω