

**CORRELATION EXAMPLE: TIME DELAY ESTIMATION**

**Given:** Noisy observations  $y[n]$  of known signal  $x[n]$  with unknown delay  $D$ .

**Goal:** Estimate unknown delay  $D$  from known  $y[n]$  in  $y[n]=x[n-D]+\text{noise}$ .

**Example:**  $x[n]=\text{radar signal}$ ;  $D=\text{two-way travel-time to target}=\frac{2 \cdot \text{DISTANCE}}{\text{LIGHTSPEED}}$ .

