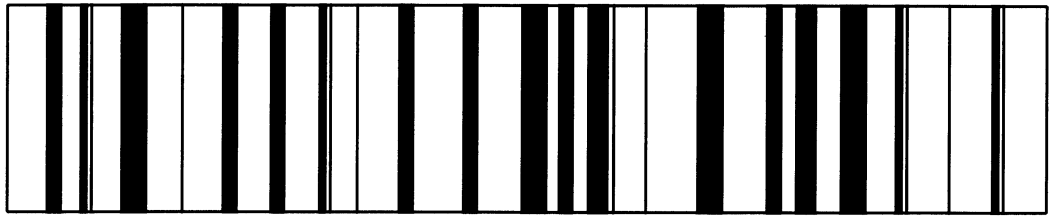
IFF with the SpEcBar

- Spectrally-Encoded Bar Code
- Cooperative, non-active scheme



- Idea: Put a bar code on all vehicles, soldiers, etc.

Hiding the Bar Code

- **Spectral encoding**
  - » **Consider** $f(x) = \sum c_i \varphi_i(x)$
  - » **Here, the** $\varphi_i(x)$ **are orthonormal basis functions**
- **The coefficients can be retrieved by computing inner products:**

$$\langle f, \varphi_i \rangle$$

Choice of basis functions

- **We can use sinusoids:**

$$\varphi_k(x) = \sin(kx)$$

- **Extract using wavelets**

$$\psi_k(x) = e^{-sx^2} \cdot \sin(kx)$$

Translated

A SpEcBar

- **Sum of sinusoids at specific frequencies**
  - » **E.g.,**

$$f(x) = \sin(x) + \sin(4x) + \sin(12x) + \sin(16x)$$

- **Clipped spatially**
  - » **It will look like a texture**
    - – **Not unlike camouflage**
  - » **It can be hidden through low amplitude modulation**
  - » **Placed on a placard**

Detection

- Extract with a wavelet transform
- At those locations where the SpEcBar is active, frequencies at the appropriate values will be strong
- Identify the SpEcBar from the ratio of the frequencies