



Green Radar Technologies for Maritime Surveillance

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About us



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The main sensor for surveillance applications is a RADAR. What is it?

The RADAR (Radio Detection and Ranging) is an electronic system to detect objects by exploiting the e.m. reflection of the transmitted microwave signal.

Main drawbacks



1) High transmitted power (up to MW)

- a) Complexity
- b) Cost
- c) Human being safety (exposure to e.m. radiations)

2) Need of frequency band allocation

Passive radar

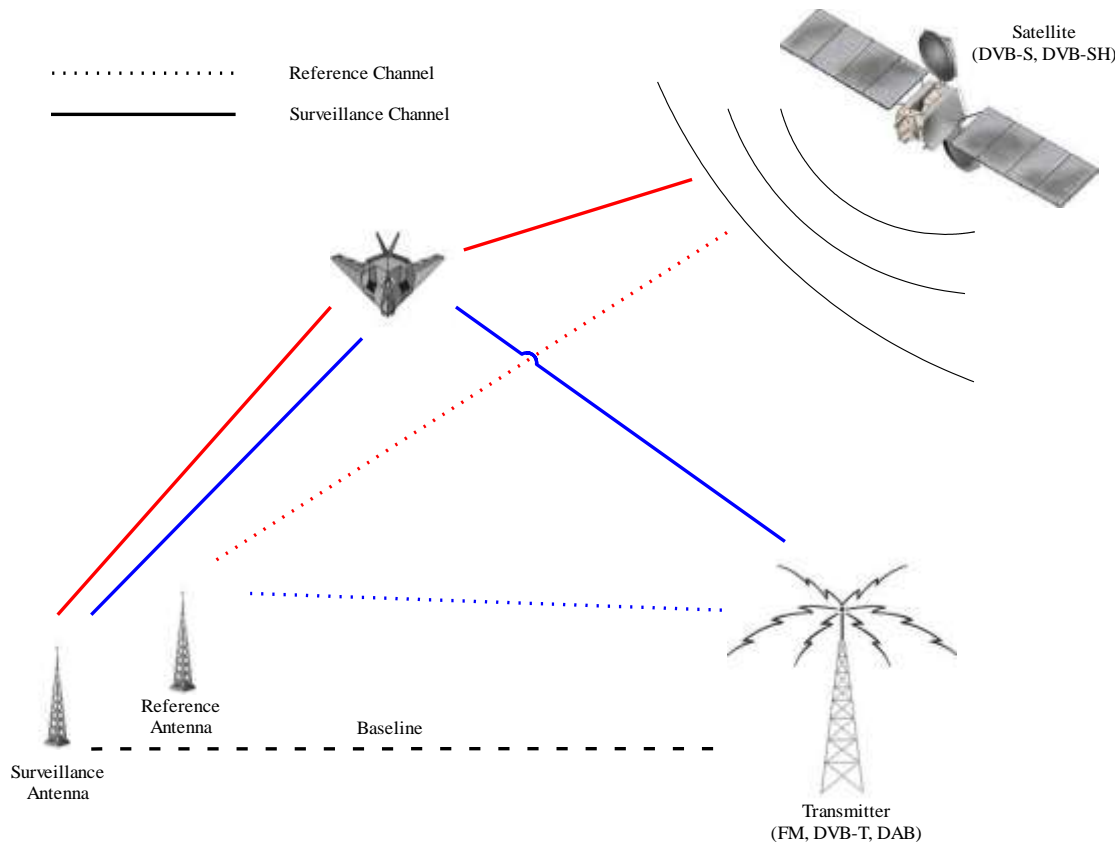
Passive radar or Passive Coherent Location (PCL) makes the radar functionality by exploiting the e.m. pollution produced by the broadcast signals (DVB-T, UMTS, GPS, etc).



Passive radar is a **GREEN technology** for surveillance applications



Passive radar concept



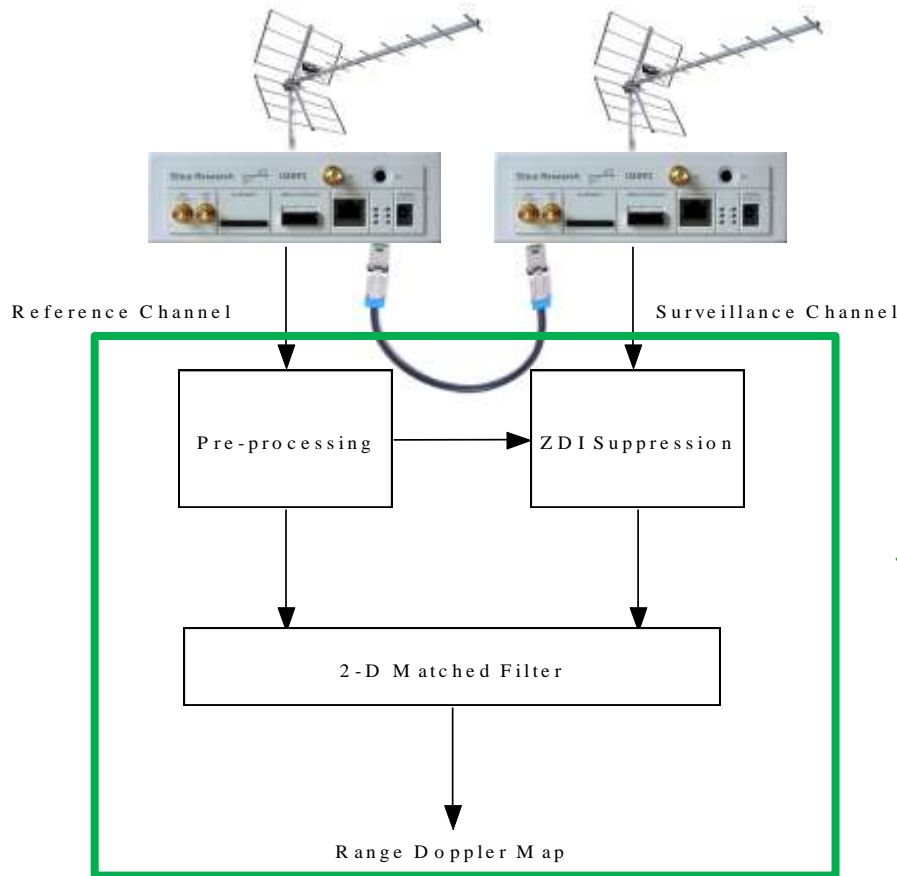
Advantages

- **No electromagnetic radiation**
- **No frequency band allocation**
- **Small size system**
- **Low cost architecture**
- **Low energy requirements**

Applications

- **Maritime Surveillance and harbor protection**
- **Aerial Surveillance**
- **Car Traffic Control**

Passive Bistatic Radar Demonstrator Equipment



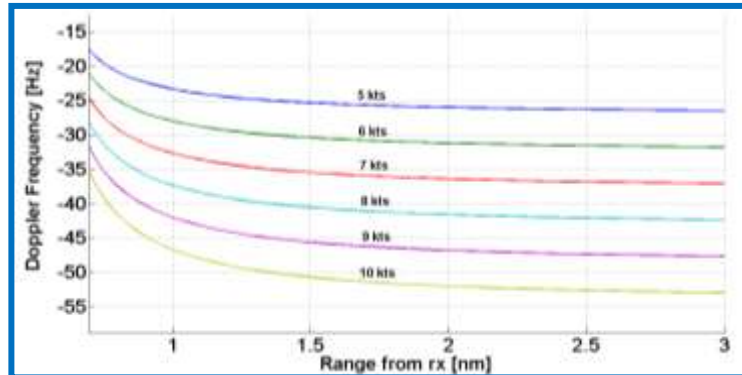
Software

- ✓ Octave
- ✓ Python
- ✓ C++

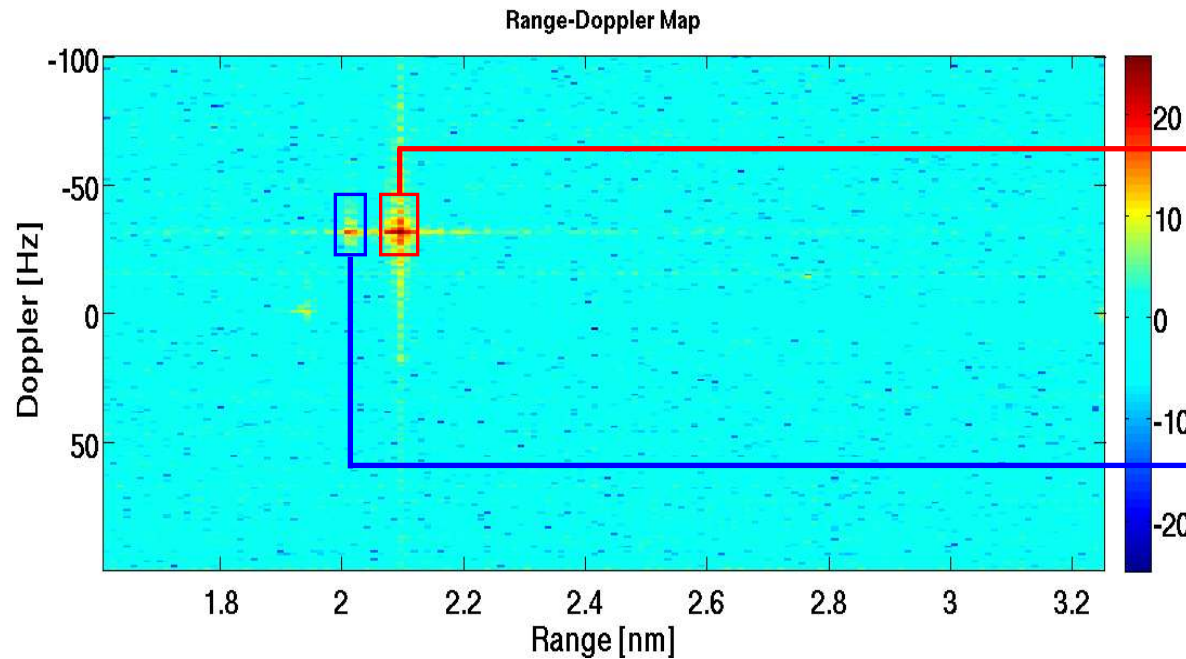
Passive Radar Experiment



DVB-T Maritime Target Detection



Experimental results: Detection



*Range = 2.096 nm
 $f_D = -32.42$ Hz
(about 6.5 kts)*

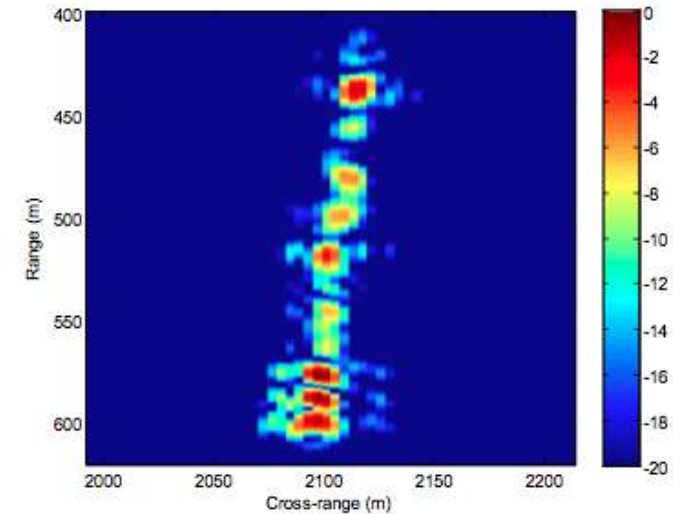
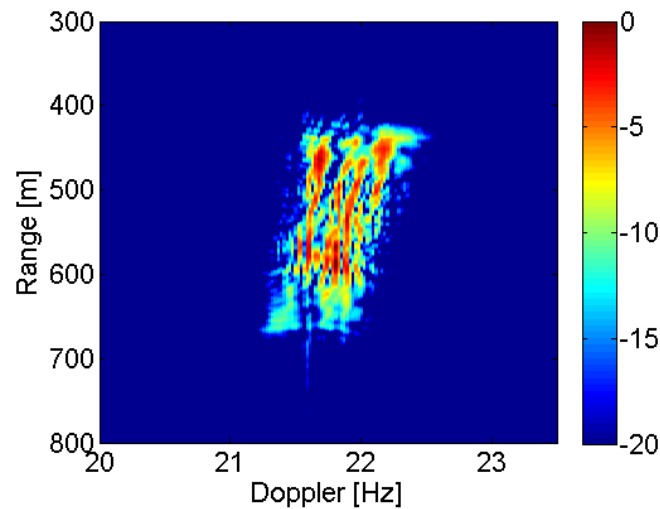
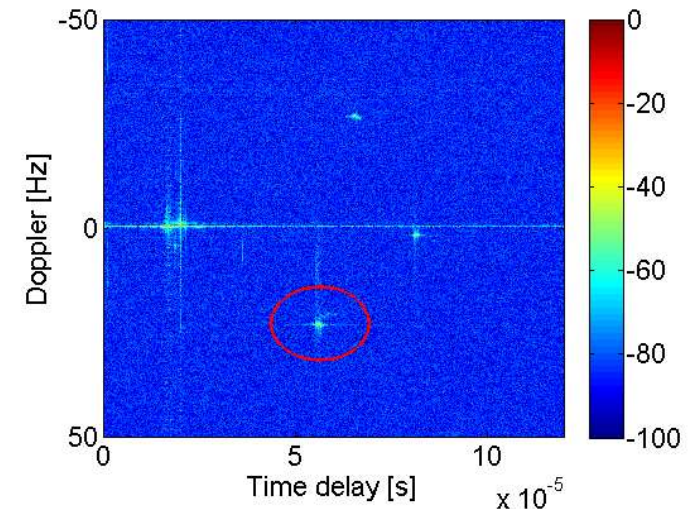
*Range = 2.009 nm
 $f_D = -32.42$ Hz
(about 6.5 kts)*



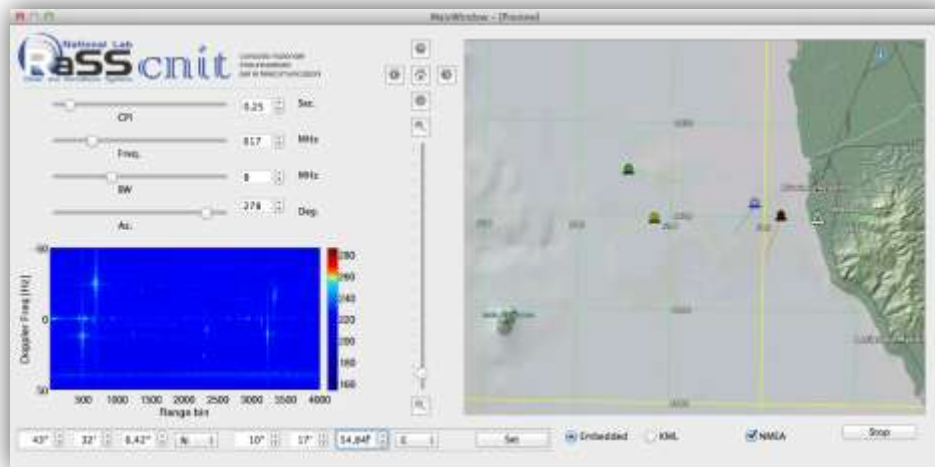
$$D = 2.096 - 2.009 = 0.087 \text{ nm} \approx 161 \text{ m}$$



Experimental results: P-ISAR

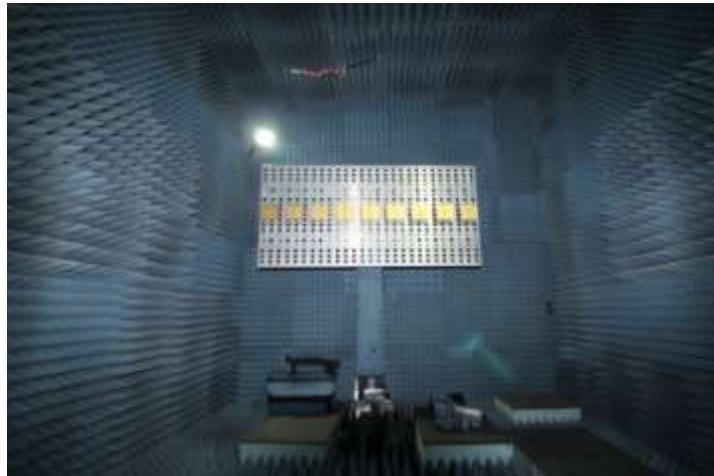


Future Developments



**Server Blade
(multi-core)**

NVIDIA GPU Cluster



- To implement the processing algorithms on NVIDIA Graphic card with CUDA technology
- Graphical User Interface (GUI)
- Moving towards Antenna Array