LSTS vector scoring system – proof of concept test results

Firing trials March 2011, NSWC test range, Dahlgren VA

NDIA targets and ranges conference

Gary Kemp

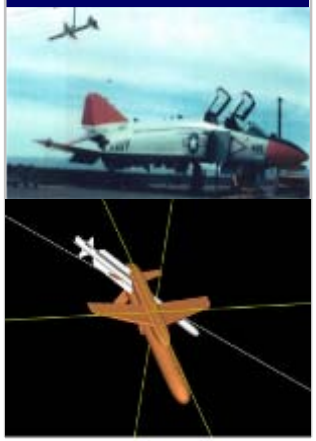
We are a leader in short range radar systems development and a supplier of specialist systems

- Over thirty years' experience in developing radar sensors
  - Missile test and evaluation systems – ARMS vector scoring system
  - 3D imaging radar systems – automotive, through-wall, infill
  - Holographic radar – real-time performance in heavy clutter for infill and scr

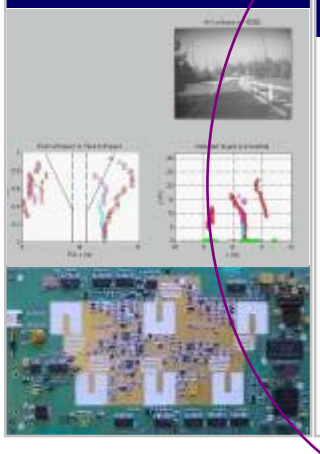
THE QUEEN'S AWARDS FOR ENTERPRISE: INNOVATION 2011

Arctic exploration

Military T&E

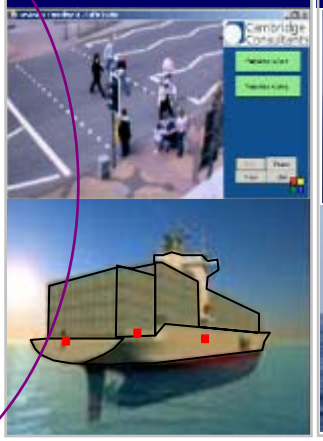


Automotive



PRISM 200
through-wall radar

Road & Marine



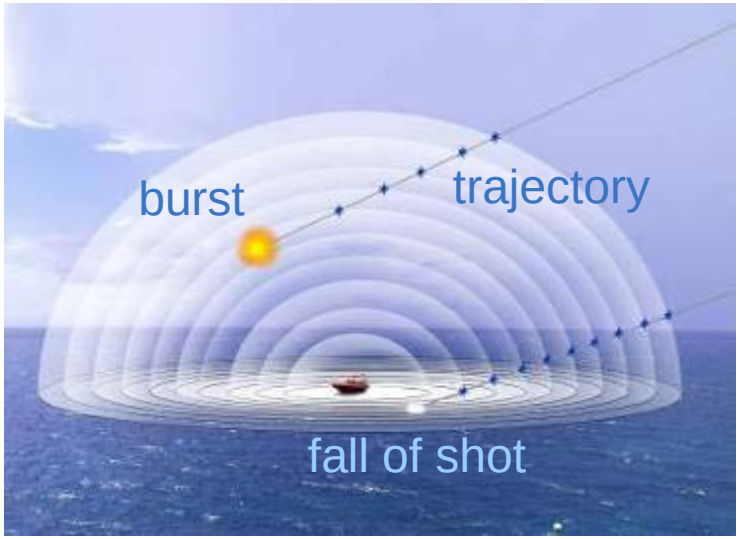
Holographic radar

1980 ⟶ 2011

Land and Surface Target Scorer (LSTS)

- The Land and Surface Target Scorer is a real-time vector scoring system for highly mobile targets operating in very cluttered environments.
- The LSTS proof of concept development was funded by the OSD Target Management Initiative program, sponsored and managed by NAWC-WD, Point Mugu, Target Systems Division, 5.3.1

HSMST



1000ft scoring volume

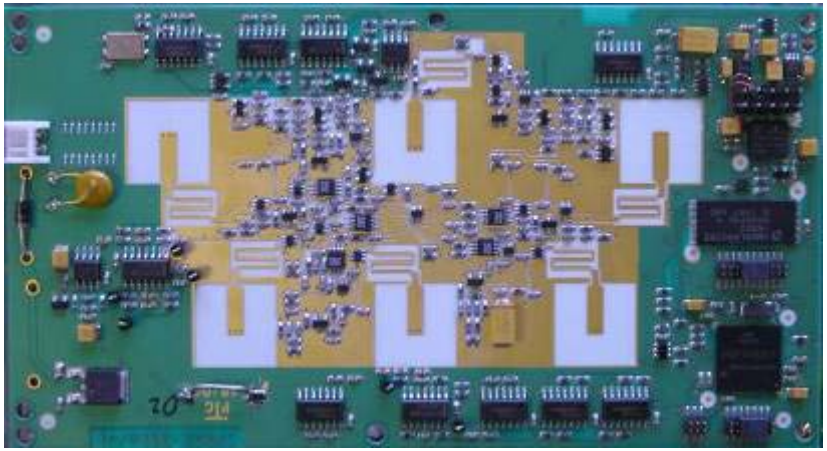
Key functionality of the LSTS system

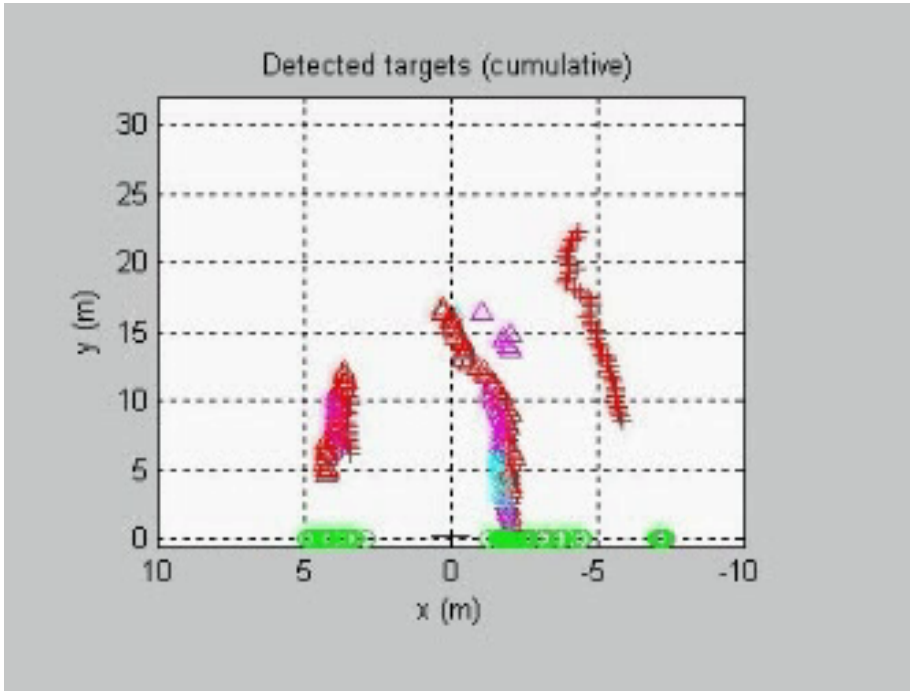
Parameter	Final system	PoC system
Coverage	Hemispherical	Quadrant
Range (5” shell)	1000 feet	330 feet
Range (.50 calibre)	300 feet	100 feet
Firing rate	20 rounds per minute	40 seconds continuous capture
Projectile closing velocity	2500ft/sec	2500ft/sec
Simultaneous operation	up to 4 targets with not less than 1000 ft separation	1 radar operating required
Reporting	Real-time	15 minutes

Land and Surface Target Scorer (LSTS)

- We had already developed a small, single card holographic radar system that tracks multiple targets in real time, for the automotive market.
- We had tested a variant of this system in longer range and in marine applications.

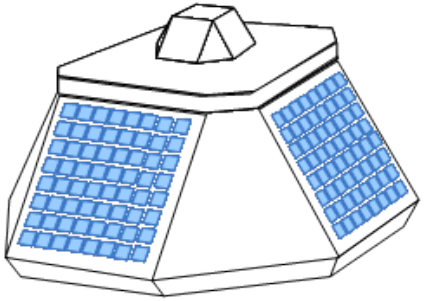
‘SPOT’ radar 6” x 3.1”





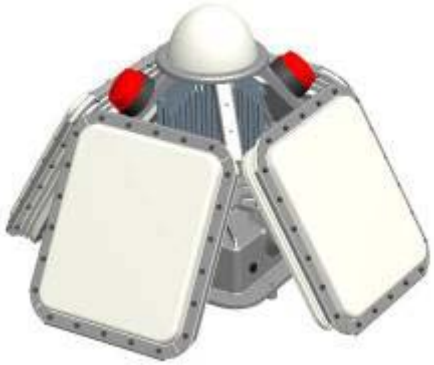
Land and Surface Target Scorer (LSTS) Proof of Concept system

- The system was developed from start to TRL6 in 15 months.
- The proof-of-concept equipment has been engineered to a form that is close to that of the final system.



Concept

Jan 2010



CAD design

June 2010

Build

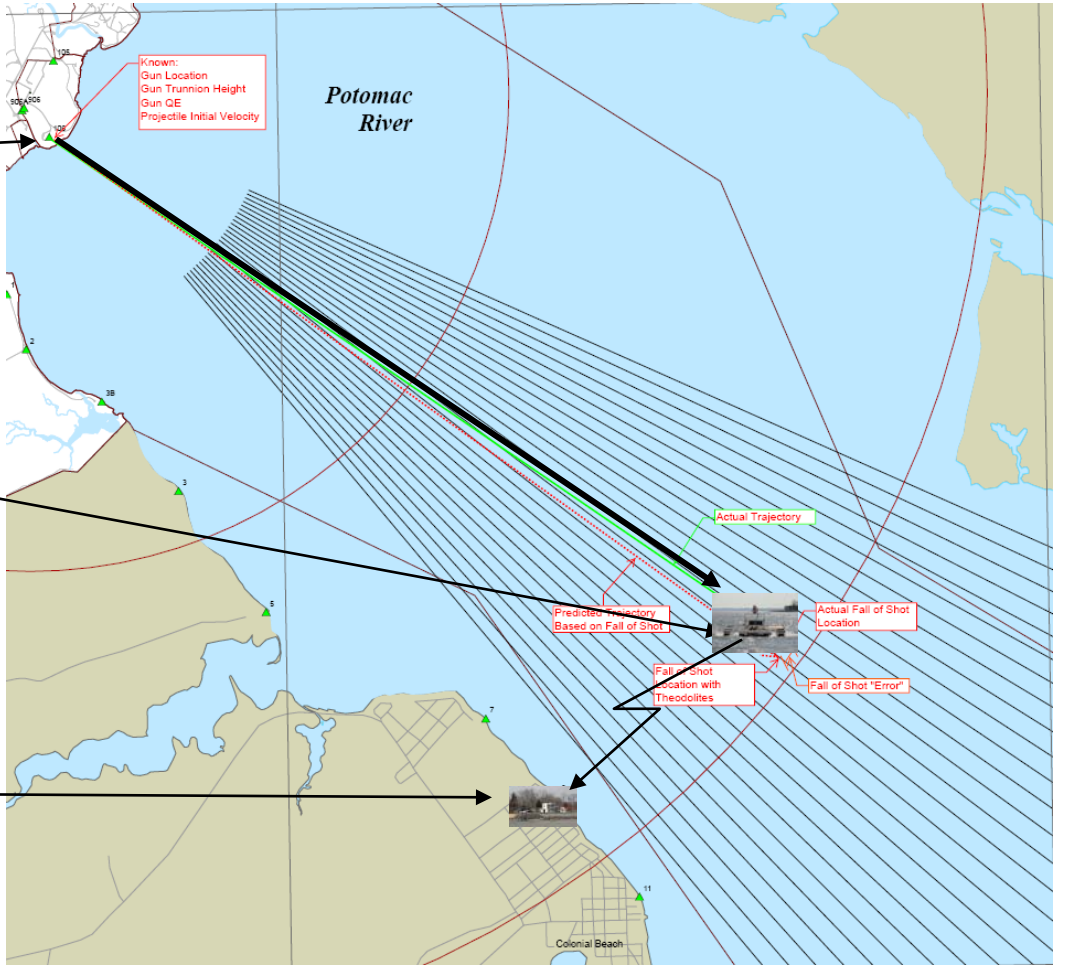
Nov 2010

Sea trials

Mar 2011

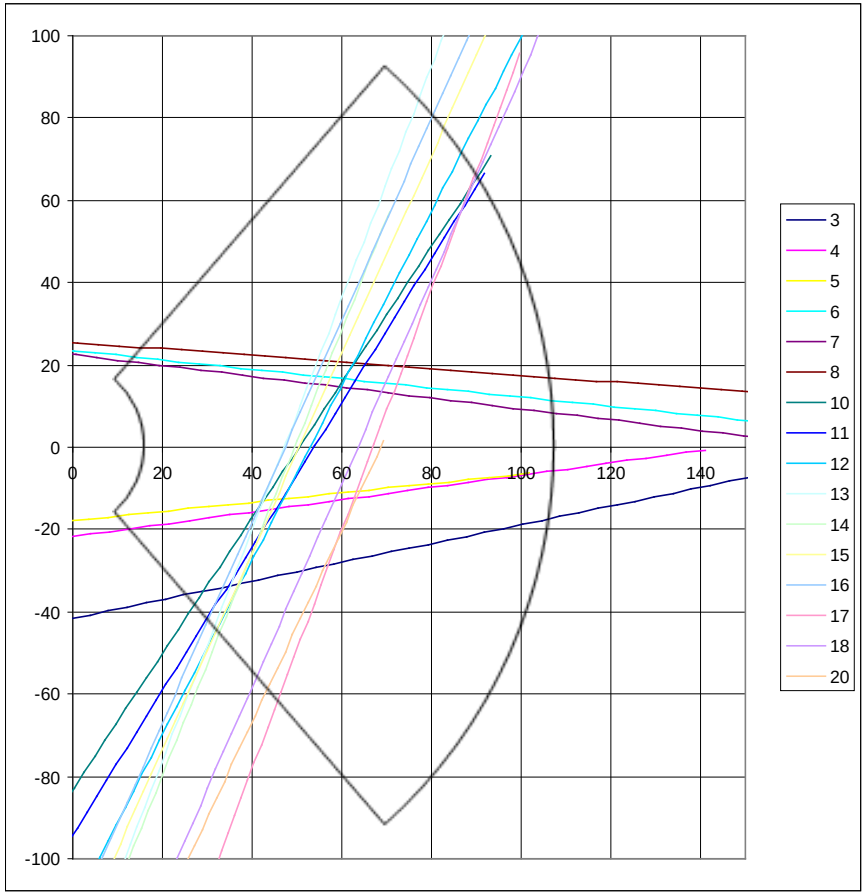
PoC system – Sensor Head, Radar Data Processor and Battery

Sensor pontoon 9000 yards down range



PoC Demonstration Results

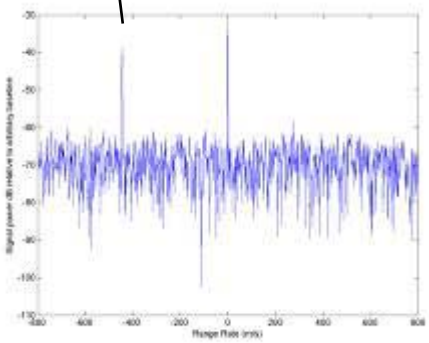
- 16 x 5” shell shots scored:
  - mixture of BL&P and HE
  - Mixture of up-range, down-range and broadside trajectories
  - One 4-shot burst (3 second intervals)
- Results confirmed predicted performance:
  - good detection rate
  - good discrimination from clutter
  - good signal-to-noise at longest range
  - low noise on individual position estimates
- Ability to detect distinctive splash point and blast point returns



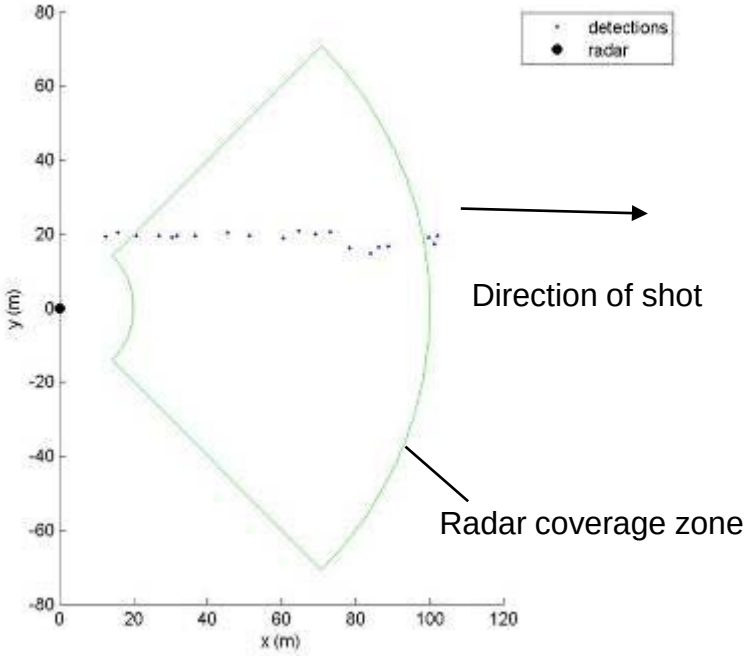
A tracked trajectory of a 5” shell fired from 6 miles range over the top of our radar with a muzzle velocity of 800m/s

Sea Clutter

Shell at 100m



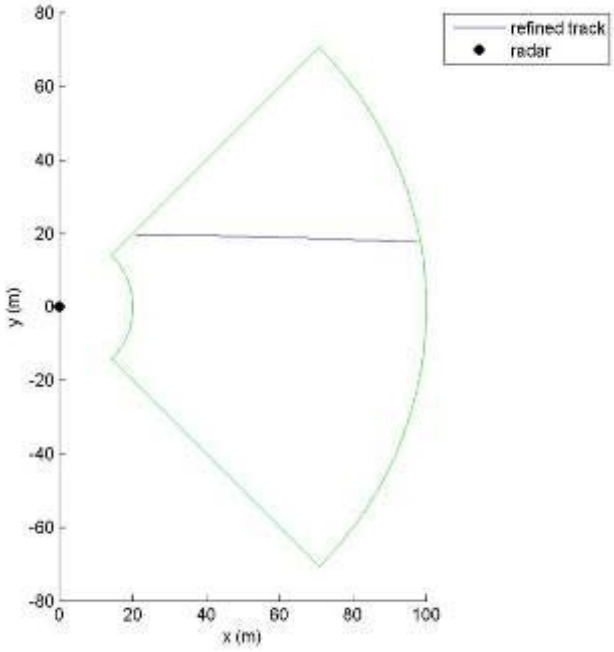
Raw detections



Direction of shot

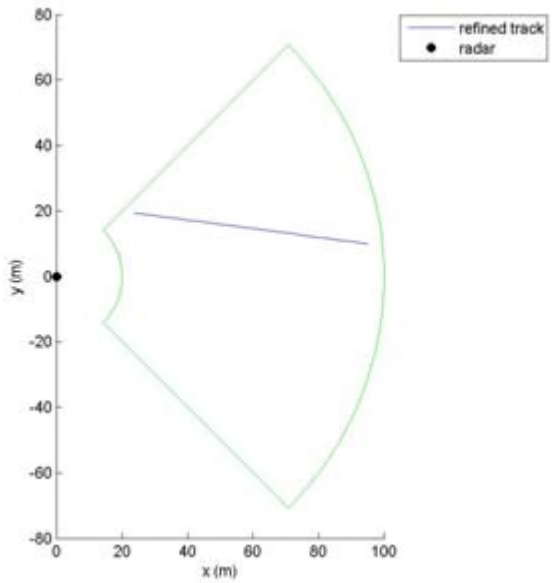
Radar coverage zone

Refined trajectory

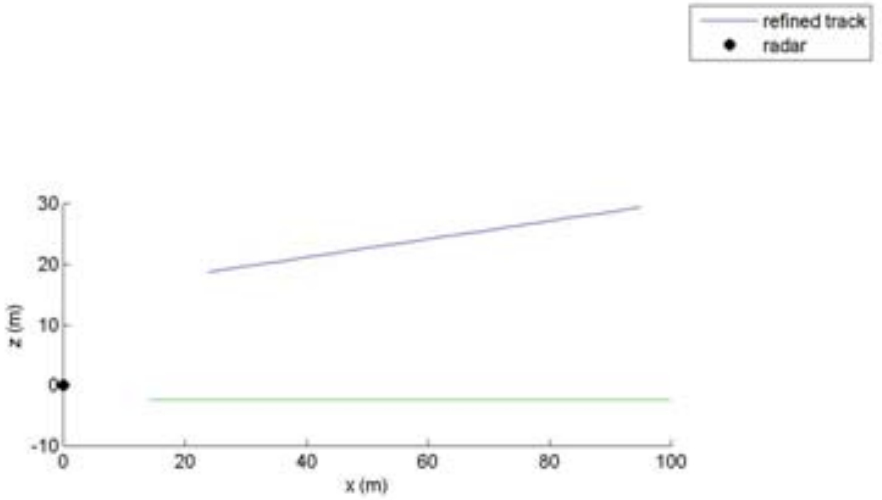


Up-range shot

Plan view

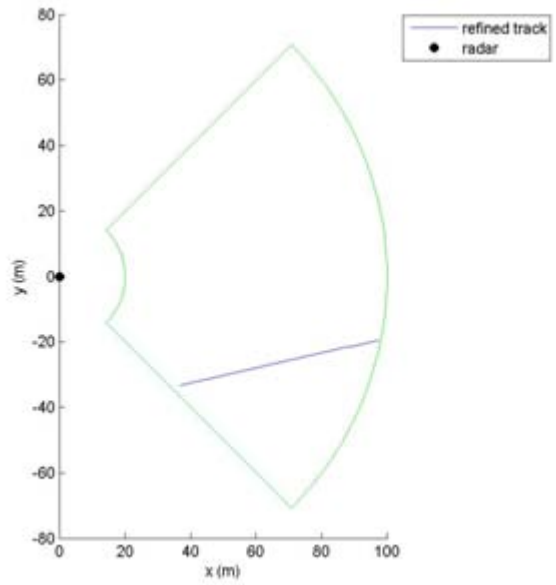


Elevation view

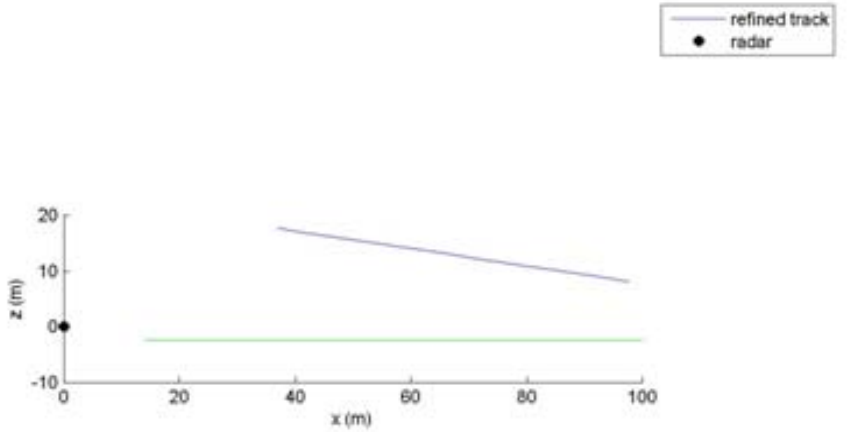


Down-range shot

Plan view

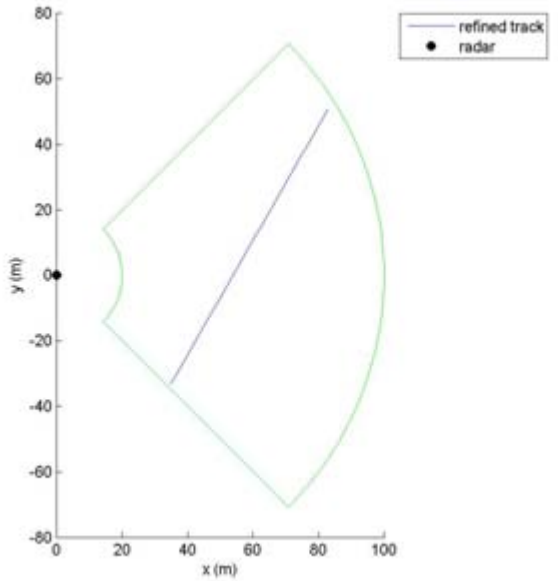


Elevation view

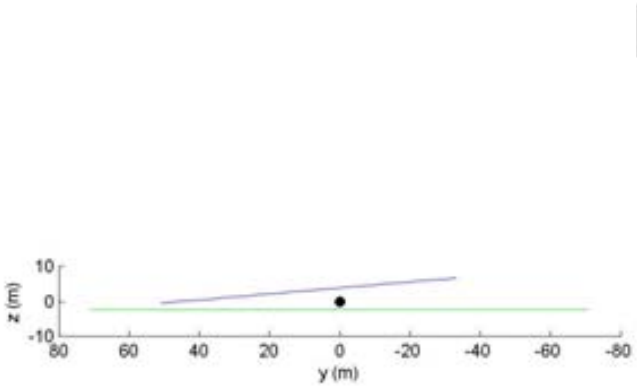


Cross-track shot

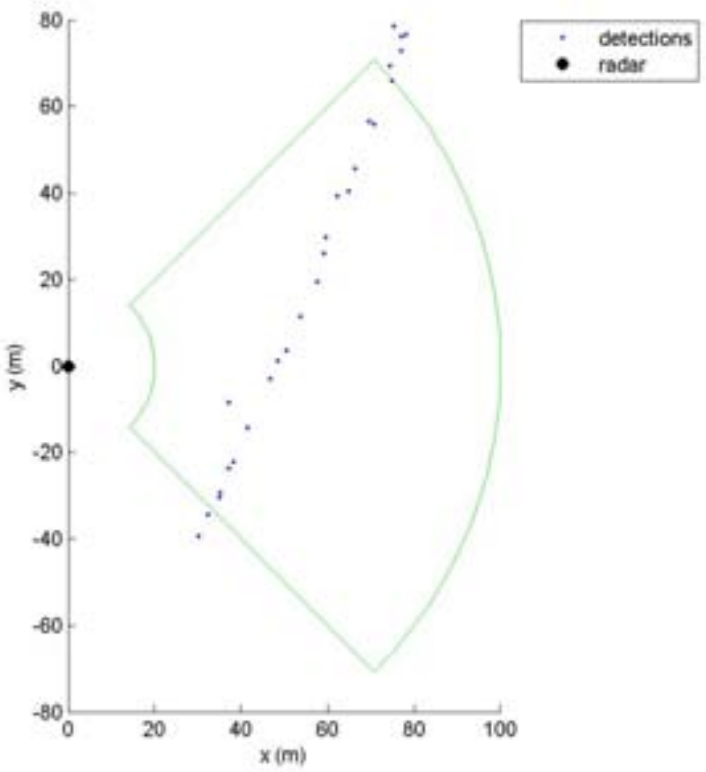
Plan view



Elevation view



4 shot burst

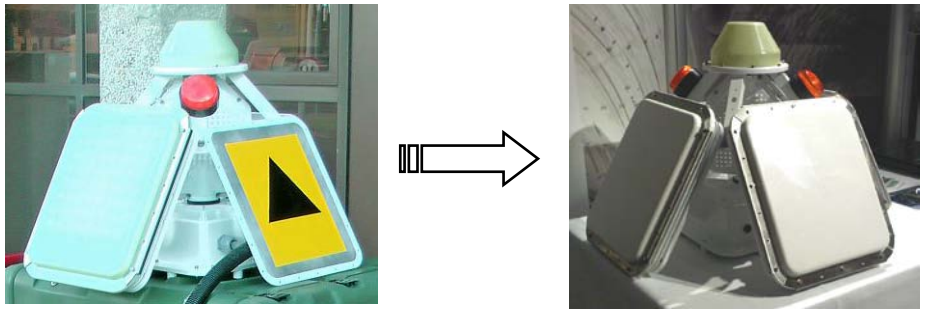


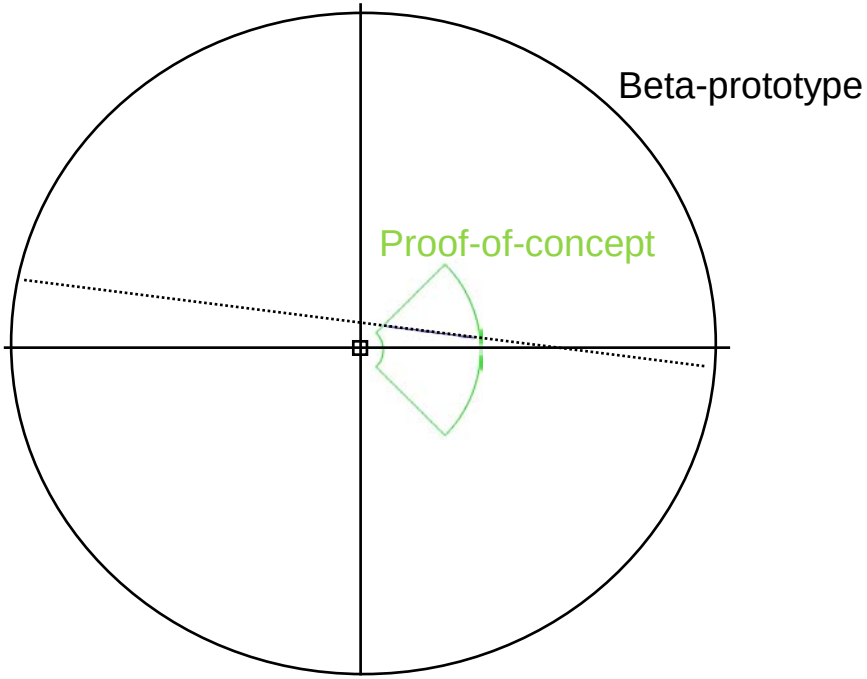
HE shot

Land and Surface Target Scorer Beta-prototype build

Beta prototype phase to include:

- Scale up to 1000’ range
- Full hemispherical coverage
- Real-time processing
- Trials on fixed and mobile platforms
- Trial against 50 cal





Questions?

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