



ISRAEL AEROSPACE INDUSTRIES

RAMTA DIVISION

IAI RAMTA

Advanced Magnetics

Quantum Magnetometry



Unclassified / IAI Proprietary

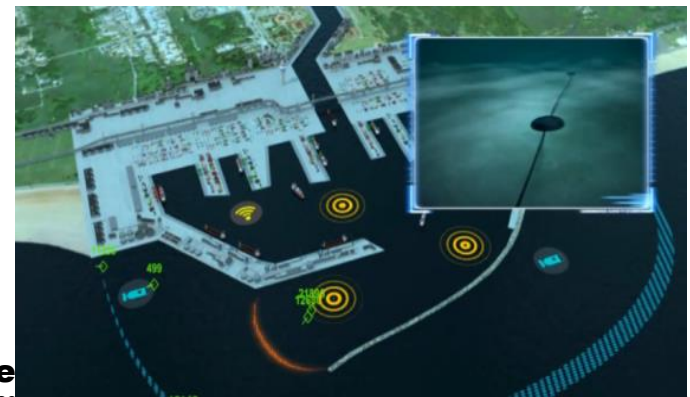
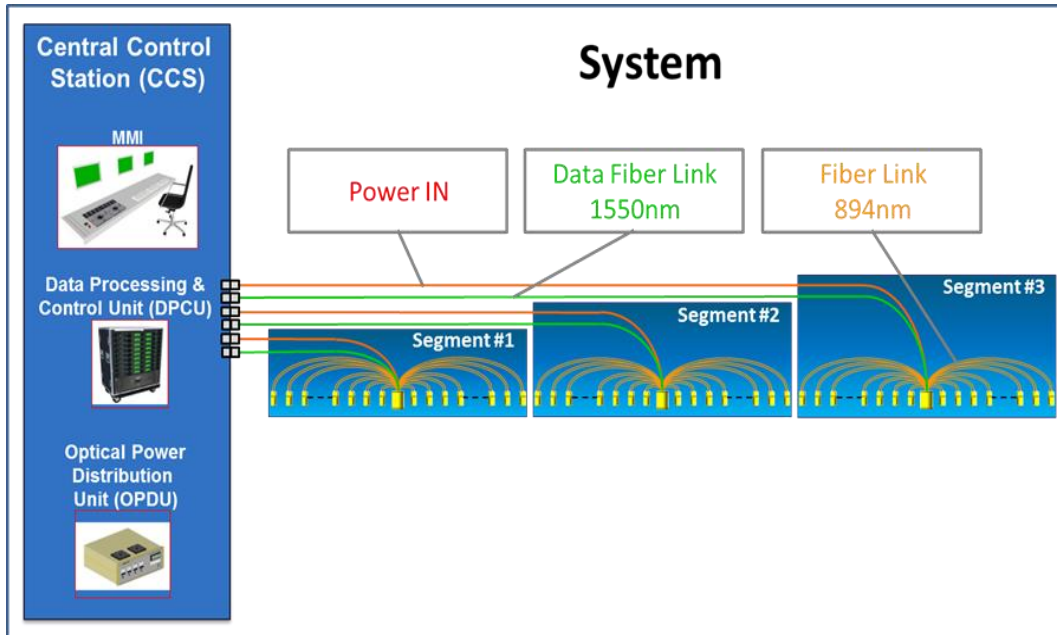
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Aerospace Industries Ltd

Project

● Goals:

- Develop quantum magnetometry as an *enabling technology*
- Develop *low-cost, simple, ultra-sensitive magnetometers*
- Integrate with IAI systems to provide all-optical solutions for HLS and defense needs



The Goal

- To develop and establish in Israel a scientific and technological infrastructure that will enable the design, development and production of magnetic field detectors that incorporate a very high sensitivity (sub-pico-tesla in the Earth field without shielding), all optical operation, will be oriented towards mass production at low cost to create multi-sensory-grid detection systems. Such a sensor does not exist today
- This infrastructure will be based on knowledge and experience that already exists in IAI RAMTA, on the basis of which a prototype of a high sensitivity sensor has been already developed.
- The highly sensitive detectors that will be developed in this project will have many uses both in the military field (identification of targets and securing of essential objects) and in the civilian field including Homeland Security (HLS), mineral exploration, geophysical surveys, medical devices, etc.

Innovation

- The new detecting platform will be based on a quantum interaction of light with alkaline atoms trapped in a vapor cell.
 - The significant part of the development program is the development of a simulation tool for the analysis and characterization of the quantum interaction, that will be optimized so that magnetic fields will be sensed with the required sensitivity.
 - Generic platform for simulation and emulation of magnetic sensors, taking into account the impact of Earth's magnetic field and environmental influences;
 - Highly sensitive magnetic field detectors (sub-pico-tesla in the Earth field without shielding), compact size; Low-cost operation with all optical operation, multiple threading capability for generating detection systems; Wide dynamic range; (G) No need to cool the sensor (cryogenic cooling)) Easy to operate; Totally passive sensor, etc.
 - To support the development of metrological infrastructure and procedures will be developed to characterize and verify results

RAMTA's Advanced Quantum Magnetometry: Stages of Development

Tech. Transfer
Quantum
Magnetic Sensor



Rb based BB
sensor



2011

2012

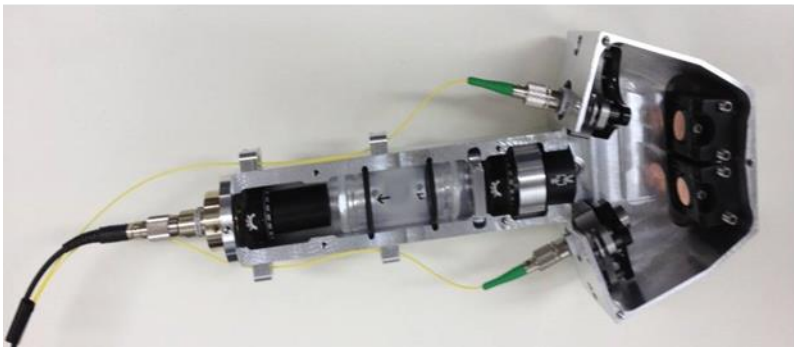
2013

2014

2015

2016

Rb based NMOR
sensor



Cs based BB
Sensor

Quantum (optical) magnetic sensing: an enabling technology

- IAI-RAMTA has gained accumulative knowledge and experience through:
 - Academia-to-Industry Technologies Transfer
 - Industry-Academia funded projects
 - R&D investments
- Key Achievements
 - Developed in-house capabilities
 - All components of the magnetic sensory systems
 - Demonstrated high-performance core technology
 - Prototype devices
 - Reached supreme performance (industrial level)
 - Quantum magnetometers
- Present Effort
 - Quantum Magnetometry
 - Multi-Sensory System level
- Searching partners for collaboration



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Thank You



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