

Focus on CSIR research in Optronic Sensor Systems

CSIR Defence, Peace,
Safety & Security

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Main focus

The Optronic Sensor Systems group is one of the competence areas in the CSIR Defence, Peace, Safety and Security operating unit. The group supplies advanced opto-mechatronic solutions to the aerospace community, through research, development and integration of the underlying science and engineering disciplines.

The scope of activities in the Optronics Sensor Systems group covers five complementary research areas. Multi-skilled personnel integrate the diverse research areas into a coherent whole.

Focused research groups

Infrared (IR)

Electronic Warfare (EW)

Platform protection against IR-guided surface-to-air missiles is key to self-defence.

Our capabilities (skills, tools and processes) are applied to find solutions for platform protection against a variety of optronic threats.

The scope of R&D covers:

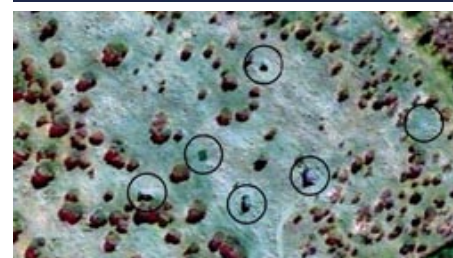
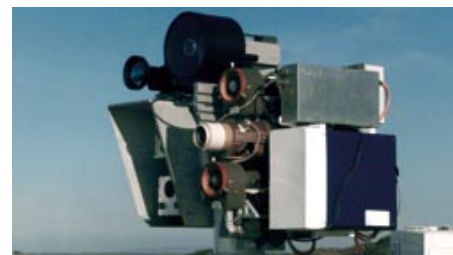
- Characterising and modelling of threats, platforms and counter-measures

- Threat missile analysis and understanding (exploitation)
- Countermeasure measurements and evaluation
- Platform signature measurement and evaluation
- Countermeasure specifications and advanced electronic countermeasure development
- Missile instrumentation and evaluation

Facilities required to achieve this scope, are a combination of purchased tools, self-developed tools and software as well as processes and skills in the supporting activities.

Capabilities

- IR measurement and radiometry
- IR thermal imagers – MWIR/SWIR/LWIR
- Single pixel radiometers
- Spectral radiometry and data analysis
- FTIR spectral radiometry
- Software simulators with interacting models
- Hardware-in-the-loop (HWIL) simulators



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Electro-Optical Observation Systems

The major focus of activities in this area is the design optimisation's prototyping of surveillance systems. These capabilities can be extended to other optical sensor configurations.

Capabilities

- Long-range day and night zoom sensor systems
- IR sensor systems
- Night observation systems
- Image processing
- Opto-mechatronic systems
- Optical surveillance systems performance and effectiveness analysis and prediction
- Space optical instruments



Test and Evaluation

The scope of activities for testing and evaluation is closely linked to the higher level support provided in EW and surveillance. The activities of the Test and Evaluation group make it both a support and R&D area.

Test Facilities

- IR signature measurement
- IR measurement of phenomena
- IR and visual spectral measurements
- Optics and optical sensor system testing
- Camouflage testing
- Countermeasure measurements

Remote Sensing

The scope of activities within this group is to understand the complexities of military image interpretation and to develop image processing algorithms and techniques to enable better strategic decisions.

This work is done for the South African National Defence Force (SANDF), the South African Police Services (SAPS) and other government organisations.

Camouflage

The scope of the Camouflage group is to develop appropriate and robust camouflage patterns and colours for the SANDF.

A vast amount of measurements is performed to characterise the environment in the visual and IR and to use this information to improve development of camouflage products. New techniques for evaluation, design and optimisation are being investigated, such as the introduction of modelling techniques and the use of multi-spectral and hyperspectral processing.

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