

# Focus on CSIR

## Services in Optronic Sensor Systems Ship Motion Simulator

Ship motion simulator  
for accurate maritime  
surveillance footage



The CSIR undertakes research and development to support the South African Navy and special operational forces with maritime surveillance using radar systems, sensor technology and rapid response mechanisms to monitor or defend the sovereignty of the country's oceanic terrain.

One specific area of interest is the use of optronics for improved surveillance at sea. The CSIR developed a novel camera-based surveillance system that provides a real-time, 360-degree video view of a ship's surrounds. It is able to detect and zoom in on small targets. To offer usable surveillance footage, the system must be able to provide a stable view, despite being mounted on board a constantly moving vessel.

To deal with this challenge, the CSIR's optronics team devised a motion simulator that emulates a ship's movement at sea based on pneumatics and a custom mechanical design. This means that continued development of the camera system could be done on land and future upgrades can be tested in a controlled

laboratory environment before being mounted on a vessel. The simulation system ensures the delivery of a surveillance platform offering effective visual outputs, despite the roll and pitch of the ship it is used on.

The ship motion simulator is a modified version of a six degrees of freedom Stewart platform (Hexapod). It operates on a roll and pitch axis at different frequencies and amplitudes using a combination of pneumatic actuators and position feedback into a custom control system. In this way, optronics experts could be sure that the camera system will be effective despite the challenges of shifting horizons, changing clouds and water swells obscuring objects.



The CSIR has made the simulator available to the University of Pretoria's Department of Mechanical Engineering to support postgraduate research on mathematical modelling and control systems studies. The ship motion simulator's control system was developed through this collaboration.

Using this same methodology, the team will also be looking at motion platforms to support systems on mobile land-based patrol or response vehicles.

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# CSIR

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