



PROTECTING HELICOPTERS USED IN SECURITY, POLICING AND MILITARY OPERATIONS FROM SMALL ARMS FIRE

A radar system to alert helicopters to small-arms attacks

Addressing a problem and fulfilling a market demand

Helicopter vulnerability to enemy fire

Helicopters are particularly vulnerable to small arms fire as they are often used close to the ground, in the range of hidden snipers, during peace support missions, counter poaching and policing. The number of such incidences has been increasing, and along with it, the need to protect these assets and the crews involved.

A CSIR-developed hostile fire indication sensor provides awareness to helicopter pilots and crew that they are being fired on, and indicates where the shooter is located – allowing the initiation of immediate evasive or reactive tactics.

The technology on offer

Radar-based system spots shots and shooters

Radar technology is well suited to solutions such as those to protect helicopters. The CSIR was approached by SAAB Grintek Defence, a leading supplier of aircraft self-protection suites, to collaboratively develop a radar-based hostile fire indicator sensor to add to its existing platform protection system for helicopters.

The radar solution developed has been proven through flight trials of a concept demonstrator which detects bullets passing within a 50 m radius of the helicopter, providing a warning 'bubble' around the aircraft. The system alerts the pilot and crew that they are being fired on and indicates where the shooter is located, allowing the immediate initiation of evasive or reactive tactics.

The radar-based hostile fire indicator system consists of four radar sensors, positioned around the helicopter, each covering a 90° sector of the surrounds. The radar sensors transmit radio frequency energy and sense the echo returns from objects in the environment. The system can discard returns from other objects by measuring several key parameters such as range and velocity to discern the distinctive signature of a bullet.

A central computer receives the data from each sensor and processes it to detect the presence of a bullet. Threat information is provided to the pilot on a cockpit display in real time.

Value proposition and competitive advantage

System uses full benefits of unique radar sensor detection capability

Other options for protection, based on, for example, ultra-violet, infrared and acoustic technologies have been proposed for bullet detection but do not compare well to the benefits of using radar-based sensors instead. Acoustic systems are challenged by the noise generated by the helicopter as well as the scene and are not effective where shots are silenced or shooters are firing from thickets and foliage.

A key market requirement is to avoid false alarms. The radar detects the bullet itself – rather than related elements in the scene. It can measure important characteristics and the profile of a bullet, resulting in fewer false alarm signals compared to other technologies.

Market opportunity

Industrial partnership with leading player with a track record in the sector

The industry partnership between the CSIR and SAAB Grintek Defence is synergistic and favourably positions the project for success. The CSIR benefits from the partnership with an established global player in the intended marketplace in that the company brings a trusted and ready delivery channel into a sector that is heavily influenced by proven track record.

As a systems house, SAAB Grintek Defence also brings extensive experience in taking new technology to the market, including maturing technology through both industrialisation and commercialisation. The company produces the Integrated Defence Aids Suite (IDAS), which is a proven self-protection suite for aircraft, containing various missile warning receivers and countermeasures. Through Saab International (Sweden), this system has become one of the leading self-protection suites in the world.

Market opportunity

Small, effective shot detection for multiple platforms

The primary opportunity lies in joining a proven and robust technology development partnership and – together with the CSIR and SAAB – taking the hostile fire indicator system to the helicopter and military markets. The product is appropriate for new helicopters and can also be retrofitted to existing assets. The existing SAAB footprint of users of the IDAS system is a ready interface to the aircraft platform market.



Bullet detection proven through live firings with system installed on helicopter.

Such a small radar that detects high-speed small projectiles has numerous other applications and can be adapted for the protection of vehicles and military bases, extracting more value from the technology.

Business opportunity

From demonstrator to prototype – and beyond

Having proven the technology with a sensor size valid for market uptake, funding is required for taking the concept demonstrator to prototype stage, followed by industrialisation, flight certification and scaled-up production.

An investment of R30 million will fund a two-year development phase. Year one will focus on product concept update and refinement based on updated market insights, sensor hardware design refinement (miniaturisation, ensuring environmental conformance, etc.) and real-time implementation of the proven detection processor. Year two will be dedicated to prototype integration and validation through field testing, and the final design update and implementation into product prototype. The development phase will be followed by an industrialisation, flight certification and scale-up phase.

Nearly eight decades of CSIR expertise in radar to support the system

The CSIR team comprises electronic engineers backed by many decades of organisational capability building. The team has worked with clients globally on the development of cutting-edge radar systems. Working with electronic experts ensures that systems undergo rigorous testing through collegial outsmarting. The team is further bolstered by access to sophisticated software and simulation suites, and world-class facilities and laboratories.

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