PASSIVE RADAR TECHNOLOGY FOR AIR TRAFFIC SITUATIONAL AWARENESS

Passive radar, also known as Passive Coherent Location, is a sensor that uses third-party illuminators – such as public frequency modulation (FM) broadcast – to illuminate a target of interest. It locates and tracks the target by processing the reflected signals of the target. This is a more cost-effective radar solution that requires minimal equipment and offers reduced maintenance costs, because it does not need a dedicated transmitter section. Less equipment also means greater mobility. Because of the passive nature, these systems are free from spectrum licensing issues. These benefits make it ideal for applications such as gap filling to active radar networks, or as a replacement for primary surveillance radars. There are also various military advantages.

Uses

Over the past eight years, the CSIR has been undertaking research and development on passive radar applications. This includes investigating the performance of FM band passive radar for air traffic control purposes in the controlled airspace at South Africa's Oliver Tambo International Airport. The radar exploits several transmitters in the region and consists of numerous receiver nodes, connected to a central node at the CSIR, where the fused air picture is generated. These connections are secured Virtual Private Network Connections. Each receiver node consists of a receiver and a personal computer in which the radar processing is performed to output target plots. These plots are then transformed into target tracks at the central node by using a target tracking filter. For displaying the target plots and tracks, a web-based server is used to access the radar display through a secured socket layer.

The CSIR's electronic warfare team has also investigated an application for drone detection and surface target surveillance, using passive radar to detect drones in perimeters around high-value sites and is seeing increasing interest.

Opportunities for impact

Users of passive radar include air traffic navigation services, small aerodrome authorities and others in the rapidly growing aviation sector where safety is critical; as well as armed forces and agencies involved in border management for both the detection and tracking of land-based, maritime and air targets. Passive radar is still seen as an emerging technology in the global market, but certain large radar players have products in the market.

The CSIR aims its solutions at developing countries, where the cost efficiency of this type of sensor is a strong advantage.

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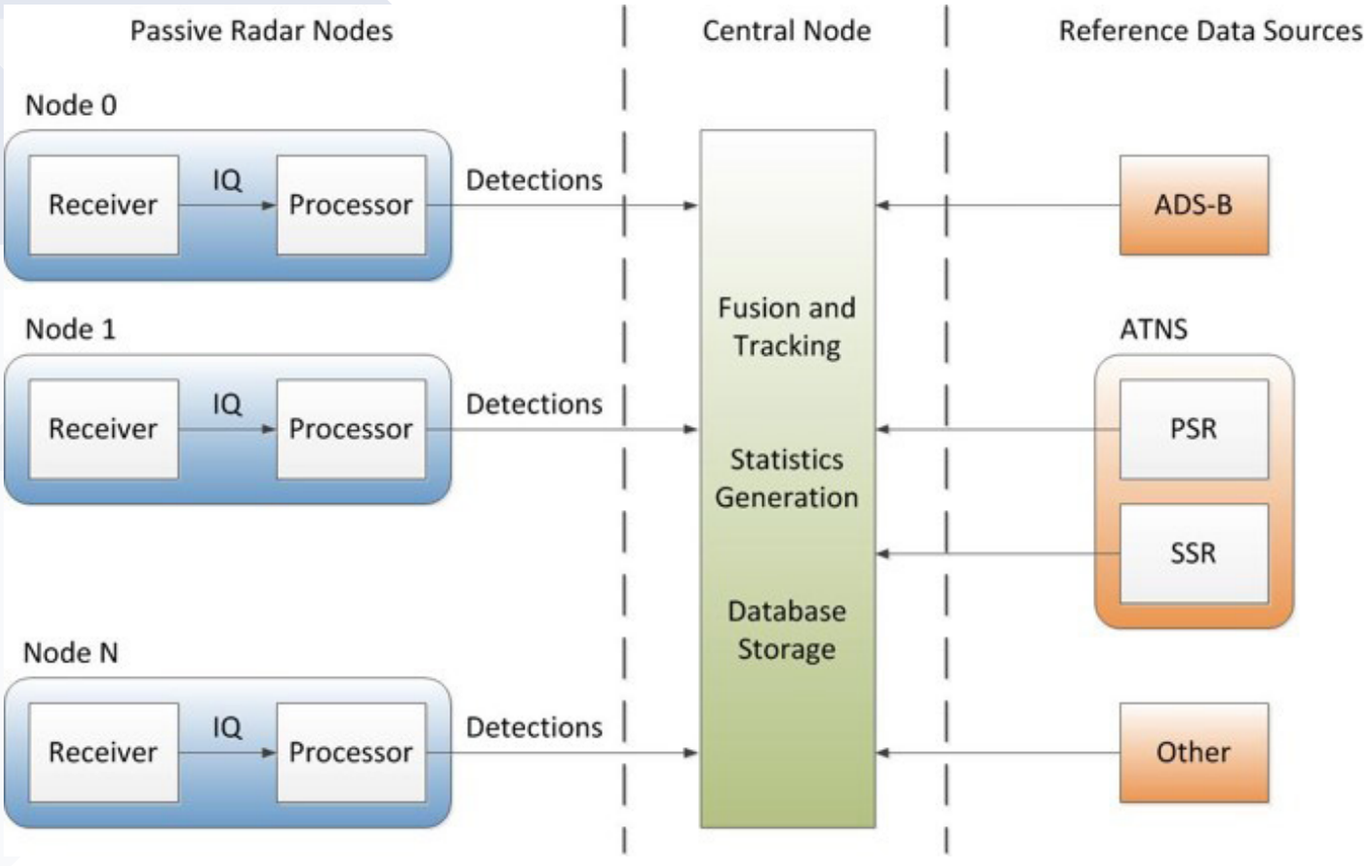
AIR TRAFFIC & NAVIGATION SERVICES ATNS

The CSIR and Air Traffic and Navigation Services (ATNS) company are collaborating on Passive Radar. The CSIR leading technology development, ATNS has provided technical know-how on system configuration to meet Air Traffic Management (ATM) technical standards requirements, in line with the International Civil Aviation Organization Standards and Recommended Practices (ICAO SARPs).

The CSIR has obtained funding from the Technology Innovation Agency (TIA) to mature passive radar for air traffic control which aims not only to mature and commercialise passive radar technology but also to foster innovation and technological advancement within South Africa.

This strategic collaboration aligns with the broader national strategy to promote homegrown technologies that address regional needs while contributing to global advancements. Through TIA's support, the initiative endeavours to deliver cost-effective solutions that enhance airspace safety, benefiting South Africa and the broader African continent.



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