

Optimize downlink by minimizing unnecessary data transmission

SKAISEN is an on-board AI-based cloud and object detection solution designed for optical EO missions. SKAISEN offers multiple benefits, such as cost reduction by avoiding the download of unnecessary pixels, saving communication bandwidth for more valuable data, and faster access to critical data through prioritization.

Key benefits

REDUCTION OF DOWNLINK-RELATED COSTS

Save your costs by avoiding downloading data acquisitions polluted by clouds.

FASTER ACCESS TO CRITICAL DATA

Prioritise which data should be downloaded with the highest priority based on AI-based on-board object detection.

NO DATA IS CHANGED OR DISCARDED WITHOUT CONSENT

Your data from the sensor is safe, SKAISEN will generate only metadata for an operator.

HIGHLY REUSABLE FOR ANY OPTICAL EO MISSION

Seamlessly supports a range of commonly used sensors and data processing units, currently tested with Simera Sense cameras and boards equipped with Xilinx® Zynq™ SoC and NVIDIA® Jetson™ SoC. More configurations and options will be added in the near future.

ENHANCING MISSION AUTONOMY

Data-driven on-board decision-making is enabled.

UPDATE ANYTIME IN-ORBIT

In case a new/updated solution exists, we upload it anytime directly on-board the spacecraft/satellite.

SKAISEN Edge

Standalone FPGA IP Core with AXI DMA interface, GPU, or CPU-optimized binary for specific embedded processors. This powerful AI-based solution enables on-board cloud filtering and advanced object detection capabilities, significantly reducing downlink costs and providing faster access to valuable insights.

PRODUCT AUDIENCE

Solution for customers developing their own software and on-board data processing pipeline, offering easy integration with their existing software stack.

FLIGHT PROVEN

The SKAISEN Edge running on Xilinx® Zynq™ Ultrascale+™ will be deployed on the TROLL 6U mission, with a hyperspectral camera as the main mission payload. The mission launch is planned for Q1 of 2025.

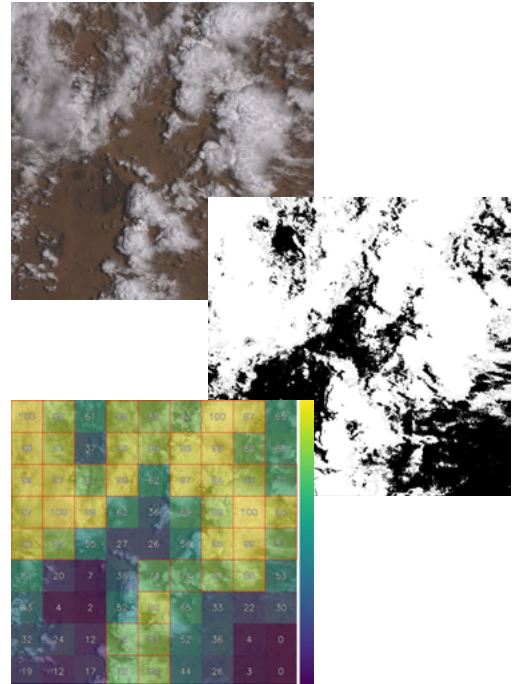
Additionally, there are more scheduled missions for 2024 and 2025 that will utilize SKAISEN technology on-board.

FPGA IP Core	CPU OPTIMIZED Binary	GPU (NVIDIA® Jetson™)
Cloudiness prediction and object detection from optical EO imagery		
Optimized AI model with over 90% accuracy for cloud predictions. It can be further fine-tuned to your sensor		
Tested with Xilinx® Zynq™ 7020 and Xilinx® Zynq™ Ultrascale+™	Tested with 32/64-bit ARM CPUs	Tested with NVIDIA® Jetson Orin™
Python SDK for integration with your pipeline or CLI application		
Delivered as Vivado IP Core with example SW project	Delivered as executable binary for your target processor	Delivered as executable binary
Lossless and lossy compression using JPEG2000 or CCSDS123.0-B2		
Ground support scripts to enable visualization and interpretability of the SKAISEN outputs		
Support with integrations, commissioning and operations		

Cloud detection

Research indicates that approximately 67% of the Earth's surface is typically covered by clouds, which presents a significant challenge for Earth observation satellites. Cloud-contaminated imagery not only reduces the quality and utility of the data but also leads to inefficiencies in satellite-to-ground communications by consuming valuable bandwidth on irrelevant or unusable information. As modern satellites capture vast amounts of data across different spectral bands, transmitting cloud-covered data to the ground adds unnecessary noise to the data stream and burdens communication resources.

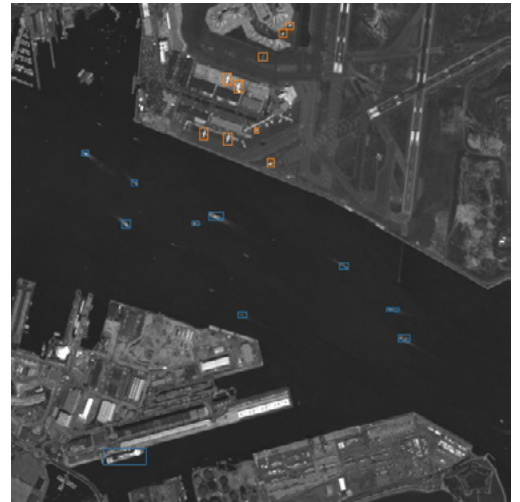
We address this challenge with SKAISEN, our on-board AI-based cloud screening system. SKAISEN utilizes advanced machine learning algorithms to process satellite imagery in real-time, identifying and filtering out cloud-covered regions before data transmission. By analysing the spectral and spatial characteristics of the data, SKAISEN ensures that only cloud-free and high-value information is prioritized for downlink. This approach significantly reduces communication overhead, optimizes bandwidth usage, and improves the efficiency of Earth observation missions, allowing for better data quality and faster decision-making in applications such as environmental monitoring, disaster response, and agriculture.



Object detection

Accurately identifying and tracking objects such as ships, airplanes, and other targets of interest in real-time presents a challenge for Earth observation satellites. Traditionally, vast amounts of data collected by satellite sensors are transmitted to the ground, where computationally expensive object detection algorithms are run. This process leads to latency in detection, inefficient use of communication bandwidth, and delays in responding to critical events. Additionally, with the increasing importance of monitoring civil use-cases, such as detecting methane leaks or infrastructure damage, real-time on-board detection becomes crucial for timely and efficient response.

We solve this challenge with SKAISEN, our on-board AI-based object detection system. SKAISEN uses advanced machine learning models to automatically detect and classify multiple categories of objects directly on-board the satellite. Whether identifying ships in maritime surveillance or pinpointing methane leaks from industrial sites, SKAISEN processes satellite imagery in real-time. By performing these operations on-board, the system prioritizes relevant data for transmission, significantly reducing communication overhead, improving response times, and enabling rapid decision-making in critical scenarios such as environmental protection, disaster response, and public safety.



SKAISEN is available in multiple configurations. To ensure transparent pricing, we offer two types of licenses:

1 SKAISEN spacecraft licensing

2 SKAISEN instrument licensing

To make an inquiry, request a quotation, or learn more about Zaitra's products and services, please contact us at: sales@zaitra.io

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