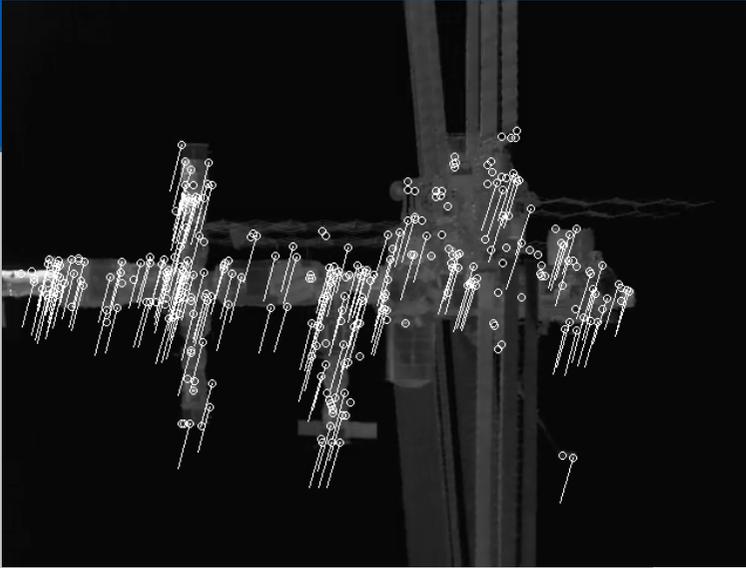


# Hybrid Processing



# Q7

## SOME “HYBRIDIZED” ALGORITHMS

### Feature Tracking and Motion Detection

Xiphos has implemented embedded feature trackers and motion detection algorithms for UAVs and other platforms. In one test, Xiphos' hybridized implementation of ORB performed >100x faster in speed per Watt than a PC (Core i7-2600 @ 3.8 GHz). FAST and KLT detectors and trackers are also available.

### Pose Estimation

Xiphos' hybrid 6 DoF camera pose estimation algorithms operate on monocular or stereo imagery and have been used to implement visual odometry, egomotion estimation, motion detection and object tracking solutions on both air and ground-based platforms. The pose estimators can also accommodate an IMU for improved performance over long trajectories.

### Image Fusion

Xiphos' image fusion algorithm produces HDR images from salient features detected in visible, RGB, thermal and IR images. Saliency is a user configurable function of object motion, image contrast and texture, and the fusion algorithm provides a tunable filter that discerns events of interest from multiple sensor modes.

### Hyperspectral Image Processing

Hyperspectral sensors generate a lot of data. Given that most platforms are downlink constrained, onboard compression is critical. When power is also constrained, Xiphos' CCSDS-123 hyperspectral compression on the Q7 performs >5x faster in speed per Watt than a PC (Core i7-2600 @ 3.8 GHz).

### BTDT

Xiphos has worked with several third parties to hybridize their algorithms. Examples include Hazard Detection and Avoidance, Synthetic Aperture Radar (SAR) processing, and Quantum key privacy amplification. Xiphos has unique experience across a range of complex algorithm implementations – just ask us how we can help you meet your specific mission needs!

## OVERVIEW

Complex algorithms are increasingly required on smaller payloads and spacecraft with constrained size, mass and power. Hybrid implementations of algorithms (or “hybridization”), using both logic and processor capacity on the same low-power computing device like Xiphos' Q7 processor, provide an effective solution.

Xiphos' Q7 processor was designed from the start for hybrid implementation of complex algorithms. The application space in a Q7 is a tight integration of dual ARM Cortex™-A9 MPCore processors and programmable logic, featuring 106,400 flip-flops and 53,200 look-up tables reserved for application-specific use. All of this capacity is available to execute high-performance algorithms.

## Q7 CAMERA BOARD

The Q7 Camera Board is designed to support integration and testing of embedded vision processing algorithms with Xiphos' Q7 processor. The Q7 Camera Board is a daughterboard which allows the Q7 to be inserted into existing systems with high-bandwidth video or imagery streams. Interfaces include:

- 2x Cameralink (2xBase, or 1xMedium, or 1xFull)
- 4x SpaceWire (min 200 Mbps per LVDS pair)
- 1x HDMI ADV7611 Input / ADV7511 Output
- 4x USB2.0 Master Ports (480 Mbps)
- 1x 1-Wire (factory selectable 3.3V or 5V)
- 1x RS232/422/485 interface header

Ask us how we can work with your video/imagery.

