

iIPSC-OET²

Opto-Electronic Target Tracking on an Inertial Stabilized Platform

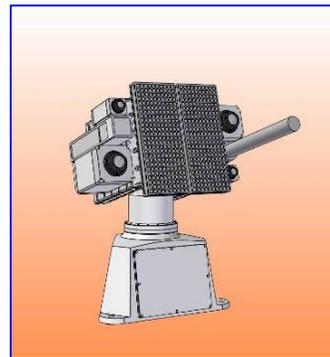
Tracking targets in the sky, on the road or in the sea requires an automatic video tracking (also called TV-tracking) system to perform this task. With the iIPSC-OET² we have merged several devices to a powerful platform:

- iIPSC : Inertial Platform Stabilization & Control
 - iSCU : Gyro based Stabilization & Control Unit
 - iOET² : Opto-Electronic Target Tracker
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- remote controlled 2 or 4 axes stabilized platform
 - daylight & infrared camera + laser ranger all on one platform
 - **gyro stabilization**; using MEMS or FOG or RLG sensor technology
 - **advanced opto electronic target tracking**, processing of up to 50 images / second
 - high bandwidth, fast response
 - robust system design, fully sealed
 - for use on helicopters, fixed wing aircrafts, drones, speed boats, naval vessels or trucks

The iIPSC-OET² can be installed on land vehicles, helicopters, fixed wing aircrafts, naval vessels or speed boats.

Where the iIPSC with its included inertial sensors is

stabilizing the optical platform and decoupling it from the vessels motion, the iOET² opto electronic target tracker, which is based on an advanced image processing, is able to track the target even under difficult conditions. An integrated trajectory estimator allows a



continuous tracking even if the target is temporarily covered by buildings, clouds or other targets. The tracker can work with daylight cameras as well as with IR cameras.

A user friendly configuration tool is included, which

allows the application specific configuration of the system. Furthermore a teach-in and education mode is available which can be used to educate the operator (if required) in an HIL (hardware-in-the-loop) mode. For advanced applications also a camera calibration tool is provided.

iIPSC-OET² Special Feature "Moving Baseline Positioning"

- A local Multi-Station DGPS Network is built up between all tracker stations
- Position of all trackers within the network is calculated with an typical accuracy of 2 cm + 1 ppm x distance CEP (i.e. 4 cm over 20 km baseline, 1 sigma)
- The global position of the "moving tracker network" is calculated with a land based DGPS reference station or via the globally available Omnistar DGPS service (1 m absolute position accuracy, 1 sigma)
- Data used in iMAR's post-processing software: GPS raw data and inertial data from all tracker stations.

Output: - Relative position/distance between all tracker stations
 - Absolute position of all tracker stations in WGS84
 - roll, pitch, true north heading, velocity, angular rates, acceleration
 (all data with 2000 measurements per second)



moving Tracker #1 with GPS



moving Tracker #2 with GPS



moving Tracker #3 with GPS



moving Tracker #4 with GPS

The optical head can be equipped with standard cameras and a laser range finder or with customer specific sensors. Semi- or fully customer specific solutions can be provided.



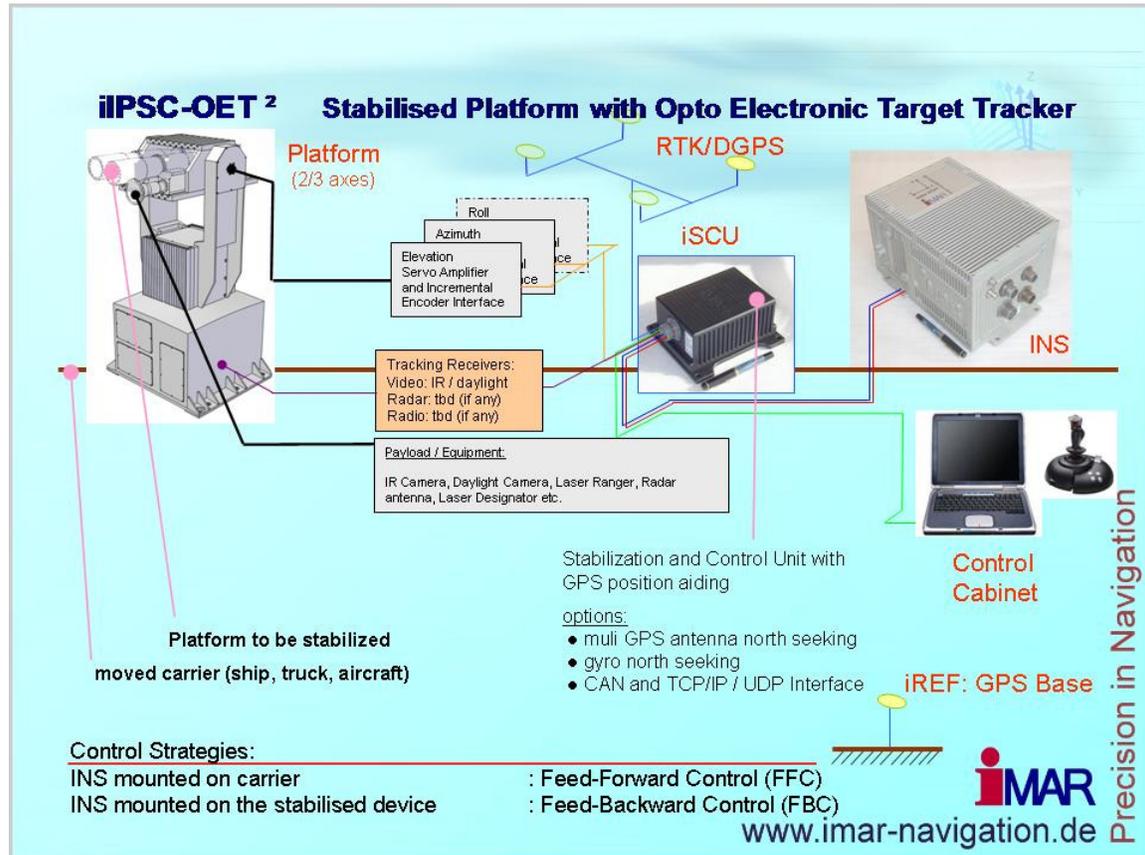
For the stabilized platform typically the iPSC-MOD or iPSC-GP40 or the iPSC-HSG or the iPSC-MSG / iPSC-LSG are used. They

are constructed as a highly modular system with strong drive systems, designed to be operated in

harsh environment (also available also with nitrogen filling) and they can easily be adapted to the customer's needs.

The systems can be equipped with FOG based gyro system for standard applications (iVRU-FC, iVRU-FQ), with a MEMS gyro based inertial sensor system for most economic applications and with a ring laser gyro based INS/GPS system (iNAV-RQH) where the application requires true heading related tracking / initial target searching and most accurate target position surveying.

The integrated iSCU (Stabilization & Control Unit) provides the interface between the gyro system, the video tracker, the user operated joystick (iJP) or command computer and the servo drive system incl. encoders.



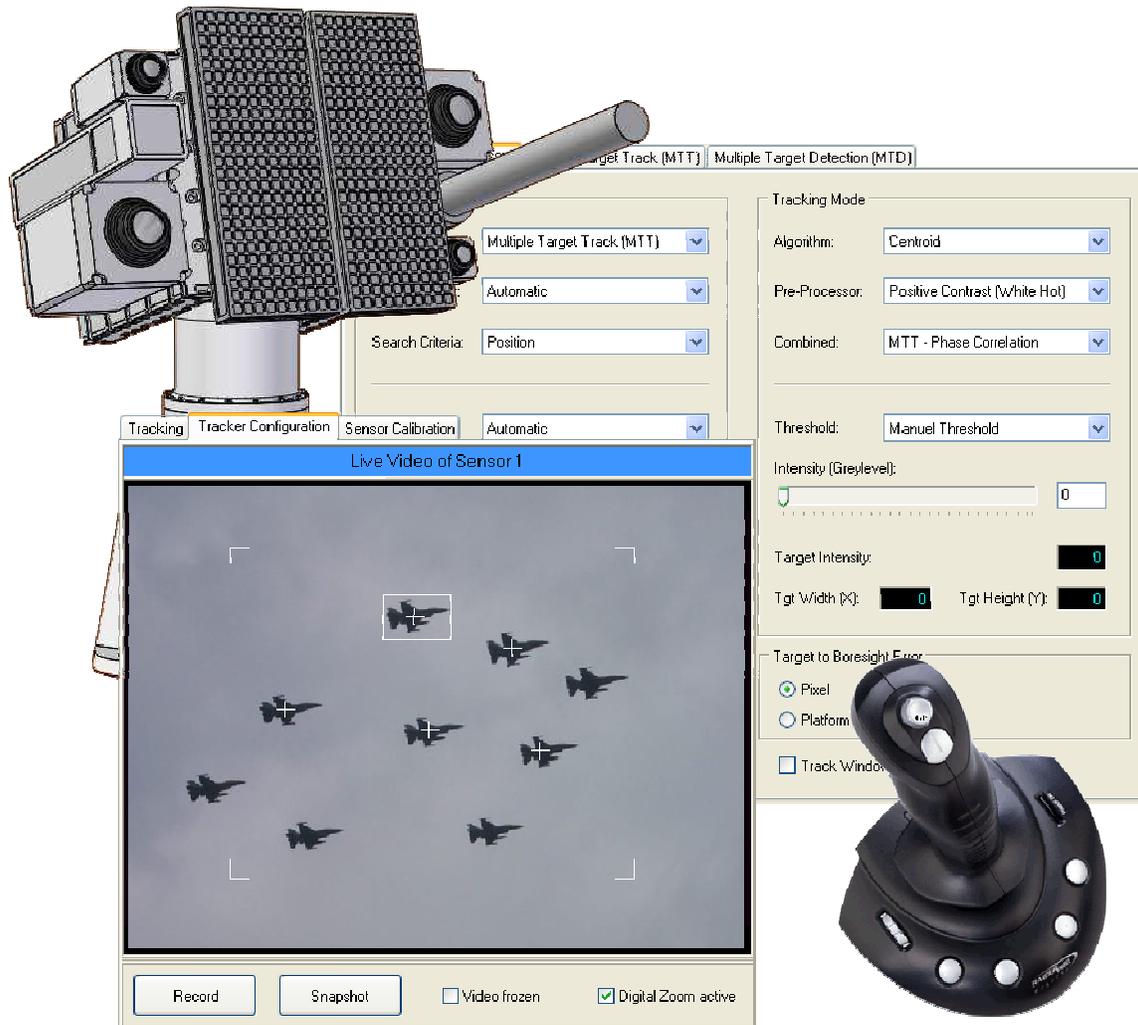
iMAR GmbH

Im Reihersbruch 3 • D-66386 St. Ingbert, Germany

Phone: +49-(0)6894-9657-0 • Fax: +49-(0)6894-9657-22

<http://www.imar-navigation.de> • eMail: sales@imar-navigation.de

Advanced Control Software for iOET² Operation:



The iOET² control software supports an operation by common users as well as by highly skilled tracking experts. For fast integration success several standard configurations like

- Air-to-Air Tracking
- Ground-to-Air Tracking
- Air-to-Ground Tracking
- Ship-to-Air Tracking

and many features like

- automatic search and tracking of targets
- multiple target selection and tracking
- tracking of fast or slow moving targets, even in front of demanding background environment
- automatic re-acquisition of temporary hidden targets
- each 2 channels of video input and video output

are provided. Furthermore using the Windows based software which is delivered together with the tracking system, the user can create application specific configurations with very deep access to the algorithm adjustments. It also enables the operator to use snapshot and record features during the online

session. iMAR provides full support in system adaptation and integration including application specific parameter optimization support and system design consultancy.

Features like multi target detection and joystick or external interface driven target selection or motion control are provided. As an option also a user operated camera calibration is supported.

iOET² supports the switching between 2 cameras (e.g. daylight and IR camera), the capability of online/offline parameter adjustment, a playback mode for optimisation and training purposes and it provides a direct interface to every iMAR based iPSC platform stabilisation and control system for automatic target tracking operated on moving vehicles (trucks, aircrafts or naval vessels).

The high processing rate of 50 images per second, combined with high performance gyro stabilisation and most accurate motion systems leads to one of the most advanced inertial stabilized Opto Electronic Target Tracking systems (iOET²) on the market.