



# ARTIFICIAL LASER HORIZON

PERSONNEL TRACKING AND ROBOTIC NAVIGATION

iTrack



Itrack's multi-channel Quartz Crystal Microbalance (QCM) portable acquisition instrument can be used to add low-cost bio-chem detection to robotic vehicles or first-responders. The device can also be used to monitor the air quality or water contamination in the field in less than

## Features:

- ◆ Complete stand-alone position tracking system without the need for GPS input.
- ◆ Full self-configuration in less than 5 seconds
- ◆ Infinite scalability
- ◆ Positioning off other moving targets
- ◆ 2D and 3D tracking capability
- ◆ Minimum of 2 beacons in range for 2D tracking
- ◆ Easy-to-use graphical user interface
- ◆ Personnel tracking and autonomous robotic navigation with one single system
- ◆ Can augment existing positioning systems. E.g. which use GPS or Laser.

## The Problem:

A pilot's peripheral vision is responsible for instinctive sense of spatial orientation or simply stated, the pilot's sense of "which way is up". Since peripheral vision is the pilot's primary means of spatial orientation, fog, clouds, night skies, and other conditions that reduce peripheral vision can be detrimental to the pilot.

Spatial disorientation (SD) is a well-known contributing factor in aviation accidents. SD can be described as an erroneous sense of the pilot's position and motion relative to the earth's horizon. SD causes the erroneous processing of orientation information in poor visual conditions. These potentially dangerous conditions require the pilot to use additional efforts in monitoring the instrument panel's attitude indicator for pitch and bank angle information. Additionally, the small size of the attitude indica-

tor compared to the environment's natural horizon can become a problem for the pilot.

## The JADI Solution:

The JADI Laser Extended Artificial Horizon System is a significant enhancement to the proven concept of the Malcolm artificial horizon. The patented JADI system can be compared to a large extended attitude indicator. It utilizes the pilot's superior ability to process orientation information using his peripheral vision. It also greatly helps increase the pilot's ability to maintain continuous awareness of aircraft attitude and to simultaneously monitor other instrument panel gauges for other flight data. Studies of instrument panel display sizes have concluded that "bigger is better". This is an important reason that the JADI's Laser Extended Artificial Horizon System can offer superior attitude information to the pilot



in a poor visibility environment.

JADI has received funding from Michigan SATS (<http://www.misats.com>) for developing the Artificial Laser Horizon System.

The iTrack QCM instrument was developed to demonstrate the potential of quartz crystal microbalance technology as a potential biochem sensor device.

The iTrack Local Positioning Tracking System (LPTS) provides the military and a diverse community of commercial users a complete stand alone position tracking solution in environments where GPS is unavailable or unreliable. Additionally, the LPTS can be utilized to augment and significantly improve the operational capability of numerous currently available positioning technologies.



#### Specifications:

◆ Robotic Module weight	1.5 lbs
◆ Personnel Tracking Module weight	0.25 lbs (ex. Battery)
◆ Beacon weight	5 lbs
◆ Power consumption	1 W
◆ Robotic Module size	5" x 5" x 2.5"
◆ Personnel Tracking size	2.25" x 3.75" x 0.5"
◆ Beacon size	7.25" x 4.75" x 2.25"
◆ Update rate	20 Hz
◆ Horizontal accuracy	± 4"
◆ Vertical accuracy	± 1'
◆ Directional accuracy	± 5 deg
◆ Frequency of Operation	6.1—6.6 GHz
◆ Temperature range	-40—70 °C
◆ Operator Interface	Windows XP or Vista

#### Benefits:

- ◆ Ability to track first responders in a hostile environment without the need for existing infra-structure or elaborate system setup.
- ◆ Replacement of personnel by autonomous robotic systems for certain tasks that are mondan and repetitive, or that are hazardous.
- ◆ Semi-autonomous operation for tele-operated robots. For example: 1) autonomously bringing a robot to and from a stand-off vehicle checkpoint; 2) autonomously tracking a manually driven trajectory back to the operator location.
- ◆ Situational awareness within the commanding vehicles. I.e. the crew of a Striker vehicle can track precise relative location of dismounted warriors and autonomous robots to the vehicle.

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