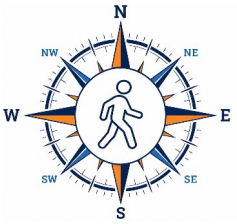
Technical Brief

Yost Labs - Extended Embedded Pedestrian Tracking System (EEPTS)



Personnel Tracking Without GPS, RF, Optics, or Other Infrastructure

Overview

Yost Labs is proud to present the Extended Embedded Pedestrian Tracking System (EEPTS). Yost Labs' EEPTS is an innovative defense-grade real-time AI-based Dead-Reckoning Inertial Sensor-Based Personnel Tracking System designed to revolutionize the way organizations manage and monitor personnel within indoor and outdoor environments.

Leveraging cutting-edge inertial sensor technology, along with advanced on-board AI processing, the EEPTS system is completely self-contained, operates without GPS, RF, optics, or other external infrastructure needs, and offers unparalleled accuracy, real-time tracking, and seamless integration possibilities for diverse application domains.

The system functions with a single body-worn inertial sensor node that is position independent, orientation independent, and user independent. EEPTS is fully-self contained and requires only data from the integrated inertial sensor components along with on-board processing to reconstruct a fully characterized motion-path in real-time. EEPTS works across a variety of terrains including indoor and subterranean spaces as well as a full range of outdoor spaces including urban, non-urban, and challenging mixed terrains.

The EEPTS system is fully embedded and outputs full motion-path data in real-time with no need for post-processing or an external host. The EEPTS system seamlessly transitions between usage domains and can even support and classify a variety of locomotion modes including walking, jogging, running, and crawling.

The EEPTS system was designed for direct integration within next generation defense systems, but is available for general use within v3.0 of Yost Labs' award winning 3-Space Sensor family of products. The EEPTS system is also available for license as a linkable/loadable binary code module for qualified users.

Applications

- GPS-denied personnel / pedestrian navigation and tracking
- Military/Defense, Warfighter Tracking, Firefighter and First-Responder Personnel Tracking
- Industrial Employee Monitoring for Safety and Operational Efficiency
- Tracking for compliance and personnel traceability
- Asset tracking for hand-carried tools and devices

Key Features

Yost Labs' Extended Embedded Pedestrian Tracking System (EEPTS) is designed to be an ideal solution for personnel tracking across a wide range of usage domains.

Below are some of the key features:

- Real-time motion path extraction from body-worn devices or hand-carried equipment without GPS or other external infrastructure
- Robust personnel tracking works seamlessly across usage domains and terrains including indoor and outdoor usage and urban, non-urban, and mixed terrains including rough and undeveloped trails, dense forested areas, subterranean areas, urban canyon areas, indoor buildings and warehouse spaces, etc.
- High accuracy results across all usage modes: Error of <= 3% over distance traveled (positional error of <= 3 meters / 100 meters CEP)
- Available within Yost Labs' 3-Space Senor v3.0 family of sensors as a fully embedded drop-in solution
- All processing is performed within the sensor platform in real-time
- Position and orientation independent wearable location options: chest, shoulder, waist, back, etc.
- Supports a range of personnel locomotion modes: walking, jogging, running, and crawling.
- Robust open protocol allows all data and settings to be accessed in real-time
- Seamless transition to and from GPS-available locales.
- Built-in World Magnetic Model automatically corrects for magnetic declination offsets
- Motion-path output available in real-time as longitude/latitude or as positional offsets in meters.
- Full 3-Space Sensor AHRS/IMU functionality also available simultaneously
- 3-Space Sensor Suite application and EEPTS evaluation mapping application allows for quick experimentation and evaluation
- Python and C APIs available
- Development kit available

Example Use-Cases and Results

Use Case: Rough Non-Urban Terrain Through Dense Forest

This use-case illustrates typical performance seen when the EEPTS system is used for traversal of rough / challenging terrain through dense forested terrain. These trial sessions were gathered over an 879.4 meter trail over challenging rough terrain that included significant elevation gain and switch-back trails. The results shown were obtained entirely from dead-reckoning as GPS was not used at any point throughout the trials.



Trail Map – Rough Forested Terrain



EEPTS Output – Rough Forested Terrain

The map on the left shows the planned path across significant elevation gain through a challenging terrain which includes steep rises, switch-backs, and rough trail surfaces. The map on the right shows the realtime EEPTS dead-reckoning output in fully GPS-denied usage as produced directly from the EEPTS system.

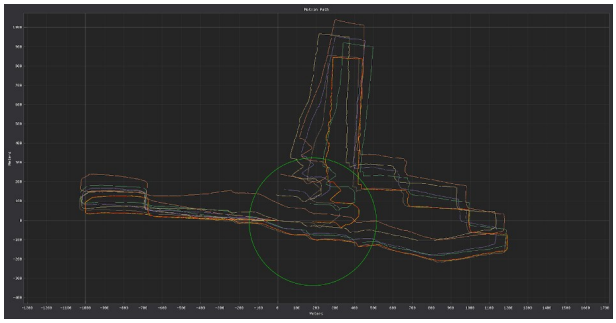
Use Case: Urban Terrain

This use-case illustrates accuracy when the EEPTS system is used for traversal of urban terrain over a significant distance, including terrain that is typically difficult for GPS to maintain accuracy due to buildings, urban canyons, and other features that cause GPS signal reflections.

These trial sessions were gathered over a 3,740 meter path through urban terrain. Results are entirely from dead-reckoning as GPS was not used at any point throughout the trials.



Trail Map – Urban Terrain



EEPTS Output – Urban Terrain

The map on the left shows the planned trail path through urban terrain. The map on the right shows the realtime EEPTS dead-reckoning output in fully GPS-denied usage as produced directly from the EEPTS system. Note that despite the significant distance of this map path, all trials resulted in location estimate end-points well within the error-ring.

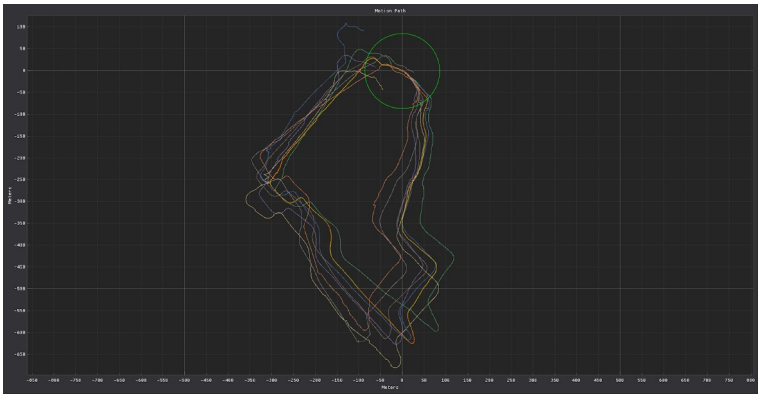
Use Case: Mixed Locomotion Mode Usage Across Mixed Terrain

This use-case illustrates accuracy when mixed terrains that include developed trail segments as well as undeveloped segments are used across multiple locomotion modes including walking, running, and crawling. As such, these trials are considered to be the most complete and representative of the expected performance of the EEPTS system across the entire range of use.

These trial sessions were gathered over a 1702.7 meter path through mixed terrain and across a range of locomotion modes and transitions between those all modes. Results are entirely from dead-reckoning as GPS was not used at any point throughout the trials.



Trail Map – Mixed Mode Over Mixed Terrain



EEPTS Output – Mixed Mode Over Mixed Terrain

The map on the left shows the planned path through mixed terrain. The map on the right shows the realtime EEPTS dead-reckoning output in fully GPS-denied usage as produced directly from the EEPTS system.

Summary

Yost Labs' Extended Embedded Pedestrian Tracking System (EEPTS) delivers defense-grade, real-time personnel tracking in the world's most challenging environments - without relying on GPS, RF, cameras, or external infrastructure. Powered by advanced AI-driven inertial sensing and fully embedded onboard processing, EEPTS transforms a single body-worn sensor into a highly accurate, self-contained tracking solution capable of reconstructing full motion paths in real-time across indoor, outdoor, subterranean, urban, and undeveloped terrains.

Designed for mission-critical defense, industrial, and first-responder applications, EEPTS provides reliable tracking with ≤3% positional error over distance traveled while supporting walking, running, crawling, and other locomotion modes. Its position-independent wearable design enables flexible deployment on the chest, waist, shoulder, or back, while seamless integration into Yost Labs' 3-Space Sensor v3.0 platform allows rapid drop-in deployment into next-generation systems.

With seamless switch-over, real-time path output, embedded AI processing, open APIs, and no dependence on external infrastructure, EEPTS enables organizations to maintain operational awareness and personnel accountability anywhere GPS fails.

EEPTS is available as a drop-in solution within the 3-Space Sensor v3.0 family of products or, for qualified users, is available as a linkable / loadable binary library module.

Experience the future of personnel tracking with our EEPTS Inertial Sensor-Based System. Contact us today to learn more about how our solutions can transform your organization's operations.

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