TiMax TRACKER

Location tracking for voice and effects imaging

- Radar-controlled audio and showcontrol
- Tracks multiple performers in 3D space
- Unparalleled UWB tracking accuracy and speed
- Performers audio follows them round the stage
- Improved intelligibility, greater dramatic impact
- Operator-free realtime delay imaging
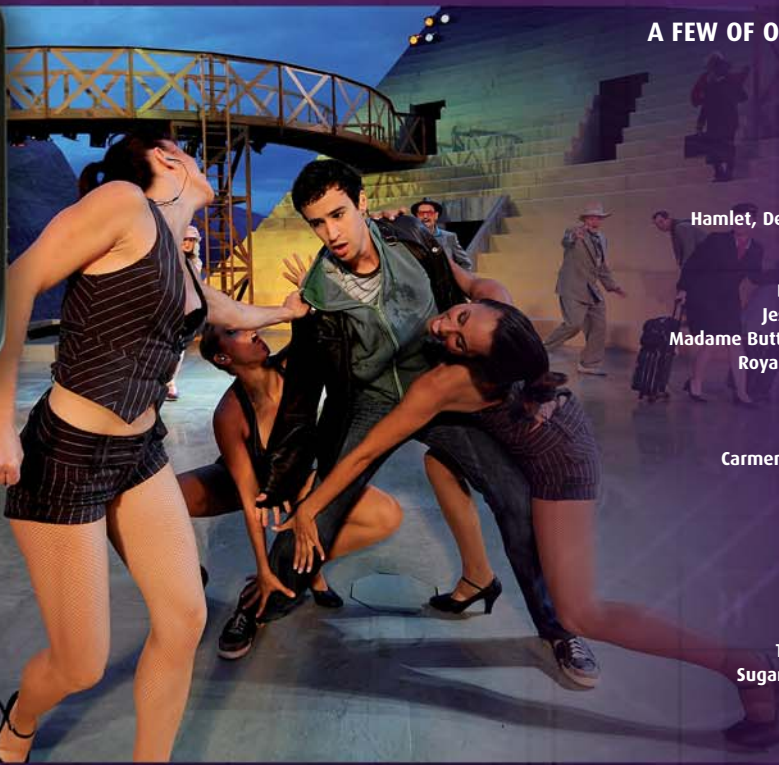- Indoors or outdoors, any sized venue

AUTOMATED VOCAL LOCALISATION AND EFFECTS PANNING

Stunningly accurate · Reassuringly smart · Unparalleled versatility · Tracks height too

The **TiMax Tracker (TT)** uses ultra-wideband (UWB) RF technology to track actors and performers around a stage or event arena in 3D. TT controls a TiMax delay matrix to continuously localise the actors' radio mics to their position on stage, maintaining realism and enhancing intelligibility. The TT system can also be used to make sound effects follow the movement of actors, animatronics or stage scenery, within 3D audio panoramas created by the TiMax audio matrix. TiMax Tracker's real-time showcontrol outputs can also control other media such as lighting or video servers.

TiMax Tracker's multi-sensor UWB localisation is more accurate (~15cm/6"), responsive and reliable in challenging environments than conventional RFID or WiFi based systems.

The system consists of three components:

· Battery powered miniature TT Tags worn by the performers;

· TT Sensors mounted around the performance area which receive the signals from the Tags;

· Software platform which analyses the data from the Sensors, generates an animated image of actors moving around the stage, and sends control data to the TiMax audio matrix (or other media).

The TT Tags transmit UWB pulses in the license-free 6-8GHz radar band which are received by the TT Sensors around the stage. The Tags are located using a combination of Angle Of Arrival (AOA) and Time Difference Of Arrival (TDOA) measurement methods. These combined measurements coupled with the wide range of frequencies contained in the UWB pulses make TiMax Tracker less susceptible to multipath reflection errors than single-frequency, carrier-based RTLS systems.

SYSTEM SCALING AND REDUNDANCY

For a large-scale performance such as arena operas and pageant-style events typically six TT Sensors would be mounted around the auditorium perimeter. A conventional proscenium stage configuration would usually need only three or four sensors. Smaller proscenium stages and studio theatres can achieve good results with just two sensors. The TT Tags only need to be seen by two sensors at any time to maintain accurate 3D localisation. Additional sensors help cover a larger performance area and also eliminate tracking errors caused by body blocking and stage scenery.

For very large outdoor events or in a theme park, the TT system can be scaled up indefinitely by creating adjacent groups of Sensors as "cells" which interact as one large system. These are linked via an Ethernet network to a central Location Server computer. The server can have multiple clients so that the sound engineer, stage managers and radio mic handlers can all monitor stage action, tag signal strength and battery levels at the same time. TiMax Tracker is ideally suited to outdoor shows by mounting TT Sensors around the perimeter of the performance space.

TiMax TRACKER SOFTWARE AND TiMax2 SOUNDHUB DELAY MATRIX

The TiMax Tracker (TT) software displays the TT Tags locations across multiple stage Tracking Zones and maps them to TiMax audio delay matrix Image Definitions. These are pre-programmed to create audio localisations to match performers' positions on the stage.

The TT software communicates with the TiMax audio matrix showcontrol software via MIDI messages which contain the Tag numbers (i.e. TiMax Inputs) and their stage locations (i.e. TiMax Image Definitions). The TiMax delay-matrix applies level and delay values to the actors' microphones to achieve accurate audio localisation for the whole audience.

This all happens in real-time without intervention from the operator thereby greatly reducing pre-programming time in rehearsal. And the TiMax showcontrol software and audio matrix can also respond to TiMax Tracker simultaneously with other Playlist imaging or sound effects Cues.
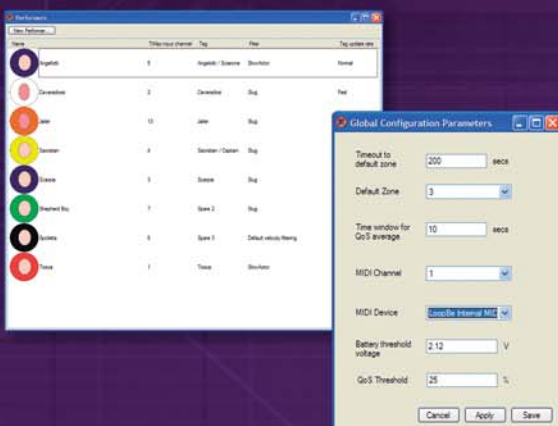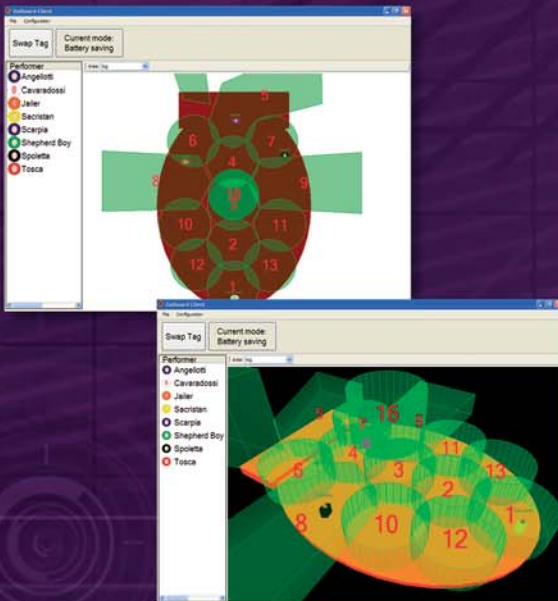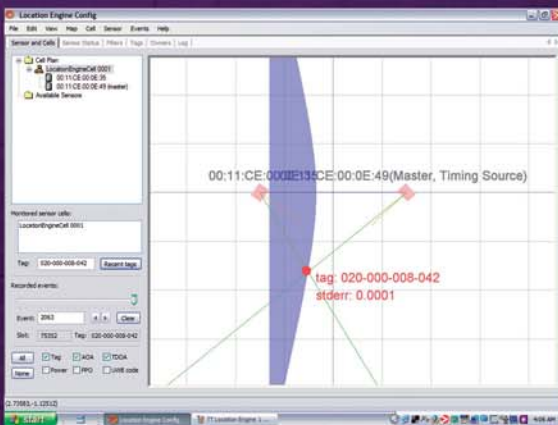
INTELLIGENT LOCATION SOFTWARE

TiMax Tracker incorporates a sophisticated Location Engine configuration utility which self-calibrates the system after entering a few simple location details. An intelligent Calibration Wizard automatically orientates each Sensor's AOA and TDOA tracking resources in a few seconds.

The Sensors are networked back to a POE (power-over-ethernet) router which provides their power. The router is connected to a PC running the TT Location Engine platform and TiMax Tracker Map software which controls and monitors the TT Tags during the show.

The Map screen displays an outline representation of the stage in 2D or 3D, and also lists the TT Tags, their signal strength (QoS), battery level and their current Zone location.

If a tag fails or strays out of range it is placed into a Default Zone and this is displayed on the Map. TT Tags can be hot-swapped during a show, and a Performance Mode disables the default battery-saving time-out function.

Multiple 2D or 3D Tracking Zones are shown on the Map either as square or oval shapes, any complex shaped Zone to be covered on stage. This is useful for extending Tracking Zones onto thrusts and ramps, or up staircases and stage-lifts. Clear coloured icons or imported jpeg avatars show the location and movement of performers in 3D space.

Up to 60 tags can be accommodated within each TiMaxTracker cell, or even across interlinked cells. Each Tag's refresh rate can be individually adjusted so bandwidth can be reduced for slow movers and increased for roller-skaters or dancers. In large-scale environments the system can automatically change individual Tag refresh rates based on continuous analysis of their movements. Statistical data filtering can also be applied separately to each Tag to compensate for local interference.

TT SENSORS TECHNOLOGY

The TT Sensor is a precision measuring instrument, containing an array of internal antennae and ultra-wideband (UWB) radio receivers. The sensors calculate the location of the TT Tags based on reception of the detected UWB signals transmitted from the tags. Each sensor also has a bi-directional 2.4GHz control and telemetry link for instructing and monitoring the tags.

Each Sensor determines both the azimuth and elevation Angle of Arrival (AOA) of the UWB signal, providing a bearing to each tag. The Time Difference of Arrival (TDOA) information is determined between the network of sensors interconnected with a timing cable. This unique combination of AOA and TDOA measurement techniques delivers a powerful and robust location system, enabling a precise 3D location to be determined when only two sensors receive the signal.

TiMax Tracker therefore offers a very low entry-level cost which can be scaled incrementally to provide a high degree of redundancy and reliability for more complex or hostile environments. TT Sensors are environment-resistant to IP30 as standard and fully weatherproofed versions are available.

Rear view of TT Sensor
(Actual size approx 20cm x 14cm

TAGS TECHNOLOGY

TT Tags employ a unique dual-radio architecture. At the command of the TT Sensors, the tags transmit ultra-wideband (UWB) radar pulses for the sensors to use as location data. They also have a bi-directional which is used as a control and telemetry channel.

A 2.4GHz two-way communication function allows the system to instruct and dynamically manage the tags; vary update rates, and monitor battery life. TT Tags are water-resistant to IP63 as standard.

Actual size

TT SENSORS TECHNICAL SPECIFICATION

Size and Weight:
Dimensions: 20cm (8") x 14cm (5.5") x 6cm (2.4")
Weight: 650g

Operating Conditions:
Temperature: Standard: -20°C to 60°C (-4F to 140F)
Extended temperature ranges available on request
Humidity: 0 to 95%, Non-condensing

Enclosure:
Standard IP30

Operating Range:
Standard up to 160m (500 feet) OFM

Precision:
Achievable accuracy better than 15cm (6") in 3D

Radio Frequencies:
Ultra-wideband 6GHz – 8GHz
Telemetry channel 2.4GHz

Certifications:
FCC part 15; EU CE
Intrinsic Safety – Class 1 Div 1, Zone 1 on request

Power Supply:
Power-over-Ethernet IEEE 802.3af
Low voltage 12V DC @ 10W

Mounting Options (supplied):
Adjustable mounting bracket, truss-clamp or screw plate

TT TAG TECHNICAL SPECIFICATIONS

Size and Weight:
Dimensions:
38mm (1.5") x 39mm (1.5") x 16.5mm (0.65")
Weight: 25g

Operating Conditions:
Temperature: Standard: -20°C to 60°C (-4F to 140F)
Extended: -30°C to 70°C (-22F to 158F)
Further temperature ranges available on request
Humidity: 0 to 95%, Non-condensing

Enclosure:
Standard IP63

Peripherals:
LED (user programmable)
Push button (user programmable)
Motion detector

Radio Frequencies:
Ultra-wideband 6GHz – 8GHz
UWB pulse Update Rate 0.01Hz - 20Hz
Telemetry channel 2.4GHz

Certifications:
FCC part 15, subpart F (pending); EU CE
Intrinsic Safety – Class 1 Div 1, Zone 1 on request

Power Supply & Battery Life:
3v coin cell (CR2477)
Over 5 years at a continuous 5 second beacon rate
3-4 months under typical show conditions