Portable Development System for Audio Simulation

AuSIM Engineering Solutions

RollingNugget™

GOLDSERIES

AuSIM GoldSeries Systems are integrated packages for delivering *AuSIM3D™* technology to almost any computing platform. At the core of any GoldSeries system is AuSIM's GoldServer™; a complete sound peripheral. Other components of all GoldSeries system include headphones and headphone amplifier, position trackers, analog audio converters, cables, enclosure, and client software.

The RollingNugget™ is an portable, prepackaged system for both laboratory-oriented and field-oriented applications. Other AuSIM GoldSeries systems include the expandable GoldMiner™ and the reCREate™, a replacement for legacy systems from Crystal River Engineering.

ROLLINGNUGGET

RollingNugget™ is a completely functional portable system with the features most commonly needed in an R&D environment. It will run current and planned features of *AuSIM3D™* technology.

A RollingNugget™ is based on a high-end laptop computer, connected to separate headphone amplifier and analog I/O units. The headphones integrate an advanced head orientation tracker.

As the RollingNugget™ is intended for rougher-than-normal use a hard-sided travel case with fitted foam is provided for the complete system.

Upgrades and options, shown below, to are available to configure a RollingNugget™ to to precisely match your application requirements.

Preconfigured Package for 3D Audio Research and Development

FEATURES	BENEFITS
■ **Complete solution**	■ Options are actually optional, and not necessary to build a useful system
■ **Portable System**	■ Can be easily moved to remote sites or between departments
■ **Flexible Architecture**	■ Single system can be used in multiple research projects
■ **Elegant API**	■ Allows the widest range of simulation options for research in many aural aspects
■ **Higher-level programming than with DSPs**	■ Changes in simulation code require less time and resources
■ **Portable software**	■ Applications developed on one system can easily migrate to a non-identical system
■ **Affordable alternative**	■ Much less expensive than DSP systems of similar performance

OPTIONS

Tracking - Standard head-orientation tracker can be upgraded, downgraded, or deleted

Multiple Listeners - Additional headphones for up to 4 collective listeners

Headphones - High quality headphones are standard, but can be deleted or upgraded with a wide variety of circumaural, studio, or wireless designs with or without microphones, all designed for tracker compatibility

Travel Case - Soft-side cases for use when the hard case is not necessary
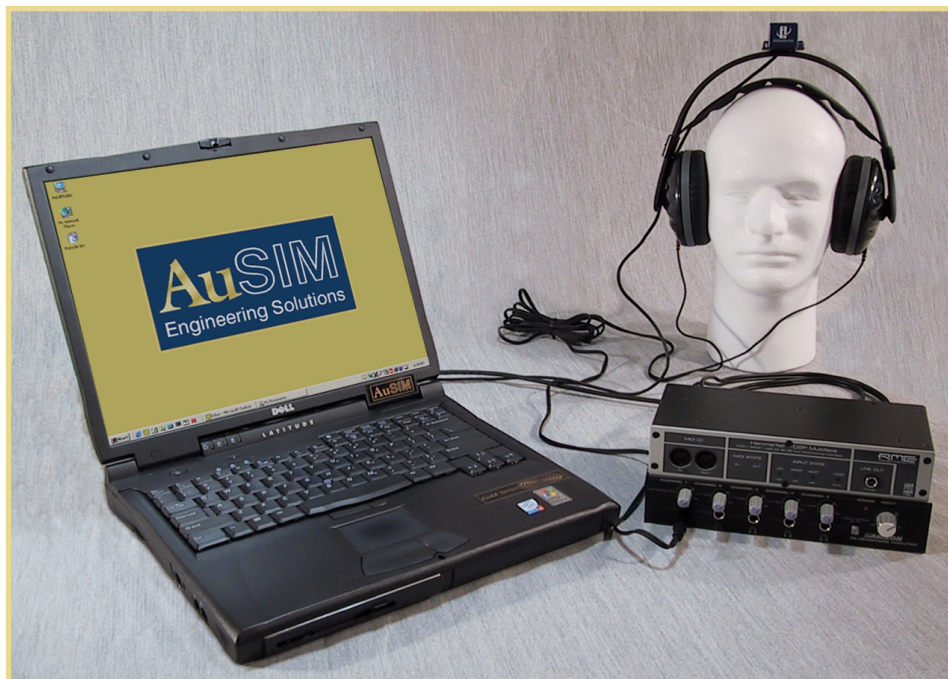
Expanded Analog I/O - Up to a maximum of twenty-six analog channels

Expanded Audio Buffer Memory - Up to over 72 minutes!

AuProbe - Extension of GoldMiner to extract physical world parameters

HeadZap - Tool to measure Acoustic Head Maps (HRTF datasets)

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TECHNOLOGY

The audio simulation technology, *AuSIM3D™*, from AuSIM, Inc. uses physical modeling and empirical data to synthesize a sound space in a completely natural and realistic way. When listening to a system incorporating such technology, a user not only feels immersed by real-world, three-dimensional sounds, but also can use natural filtering to discern and comprehend any of several layered concurrent sound streams.
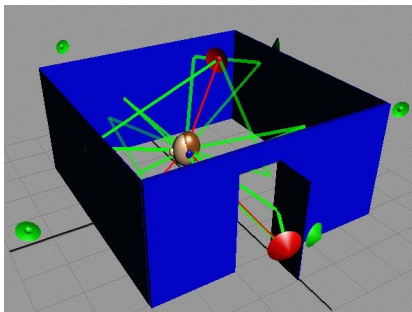
For each audio source, the system produces a left and right output pair dependent on the direction of emission from the source, path of propagation, and direction of arrival to the listener. The output pairs corresponding to each source are mixed and played through conventional headphones or nearphones. The processing creates the perception that the source is positioned at any specified location in three-dimensional space.

GoldServe™ is a complete 3D sound-localization server subsystem; a peripheral to one or more "host"

AuSIM headphones, with standard head-orientation tracker mounted on the headband

ROLLINGNUGGET SPECIFICATIONS

■ **AuSIM GoldServer Audio Engine**
- single *AuSIM3D™* processor
- supports 64 sound-sources
- supports one to four listeners
- supports custom minimum-phase HRTF filters up to 512-taps
- audio buffering memory: 1200 seconds, expandable to 72 minutes
- mobile notebook computer with integral screen and keyboard

■ **Analog/Digital I/O**
- 8 digital input channels, 24-bits (to 96 KHz); expandable to 24
- 8 digital output channels, 24-bits (to 96 KHz); expandable to 24
- 10 analog input channels, (8 are 24-bit); expandable to 64 channels
- 10 analog output channels, (8 are 24-bit); expandable to 64 channels
- 4-way balanced headphone amplifier for a single listener
- One RS-232 client interface, expandable to four
- sensitive analog signals isolated from digital environment in separate unit

■ **Portable hard-side carrying case with form-fitting foam padding**

■ **High-fidelity closed, specifically equalized, circumaural headphones (can be upgraded to headphones with ANR for use on airplanes)**

■ **InterSense *InertiaCube²* inertial-based head-orientation tracker**

■ **Pre-installed, royalty-free library of over 600 wavefile samples**

■ **System, server, renderer, and client software licenses**

■ **Manuals, cables, and RS-232 null-modem cable to client computer**

■ **Integrated console with high-resolution flat-panel display**

■ **Performance**
- localization: 64 concurrent sources @ 44.1 KHz sample rate, 64 concurrent sources @ 48 KHz sample rate
- pitch: 20-500% shift control for all sources
- dynamic update rate: better than 120 Hz
- analog input: 128X oversampled, 24 bit A/D converters
- analog output: 8X oversampled, interpolating filters
- stereo crosstalk: 100dBV @ 100Hz, 80dBV @ 1kHz, 60dBV @ 10kHz

computers running a user's application. A host can be any modern computer workstation. Host computers can control a GoldServe™ system via an RS-232 communication protocol (called ATRON), which is easily implemented in the user application through a high-level 'C' application programming interface (API).

Components

The system consists of a high-performance laptop computer hosting an audio filtering engine and digital audio stream controller, running under a specially configured operating system. An external I/O unit has eight balanced audio inputs and outputs, eight digital audio I/O streams, ADAT and SPDIF sync clocks, and one MIDI I/O. The filtering engine is optimized to filter 64 streams with 64 coefficients per left/right pair. All filtering is performed with 32-bit floating-point accuracy. All digital audio

streams are maintained with 21-bits of resolution. The analog interface supports 24-bit encode and decode at 44.1 or 48.0 kHz.

Software on the server side includes the "GoldServ" server interface to the AuSIM3D rendering engine and the "ChannelManager" to manage input and output streams. Multiple instances of the GoldServ can be simultaneously run, each managing a single virtual aural environment. Each virtual aural environment can support multiple listeners, up to the license limit of the system. The ChannelManager allows multiple GoldServ's to share stream I/O devices.

Bundled software also includes example programs with source, demo applications, diagnostic tools, and hundreds of royalty-free sound samples to include in user simulations.

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