

# Development System for Audio Simulation

## 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™, which is a complete sound peripheral. Other components of any GoldSeries system may include headphones, position trackers, analog audio converters, cables, rack enclosure, and client software.

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

## GOLDMINER

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

A standard GoldMiner™ contains one *AuSIM3D™* rendering processor, twelve hundred seconds of audio buffering memory, eight balanced audio inputs and outputs, sixteen digital audio I/O streams (eight used), a patch panel, headphones and isolated amplifier, and a head orientation tracker.

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

## OPTIONS

- Multiple *AuSIM3D™* Processors** - Second processor available for additional signal sources or independent listeners, or more-complex applications
- Tracking** - Standard head-orientation tracker can be upgraded or deleted
- Multiple Listeners** - Additional headphones and amplifiers; up to 16 listeners with one *AuSIM3D™* processor, or 32 listeners with two processors
- Headphones** - Wide variety of circumaural, studio, wireless designs w/wo mics, all designed for tracker compatibility
- Expanded Analog I/O** - 24-bit analog channels in blocks of 8 input and 8 output; upgradable to 96 KHz
- Expanded Audio Buffer Memory** - to over 10,000 seconds!
- AuProbe** - Extension of GoldMiner to extract physical world parameters
- HeadZap** - Tool to measure Acoustic Head Maps (HRTF datasets)

## *Preconfigured Package for 3D Audio Research and Development*



## FEATURES

- Complete solution
- Broadly Applicable Options
- Flexible Architecture
- “Virtually” Expandable
- Elegant API
- Higher-level programming than with DSPs
- Portable software
- Affordable alternative

## BENEFITS

- Options are actually optional, and not necessary to build a useful system
- Easily configured for a wide variety of applications
- Single system can be used in multiple research projects
- Several GoldMiners can be clock-synchronized to create much larger servers
- Allows the widest range of simulation options for research in many aural aspects
- Changes in simulation code require less time and resources
- Applications developed on one system can easily migrate to a non-identical system
- Much less expensive than DSP systems of similar performance

**AuSIM**  
Engineering Solutions

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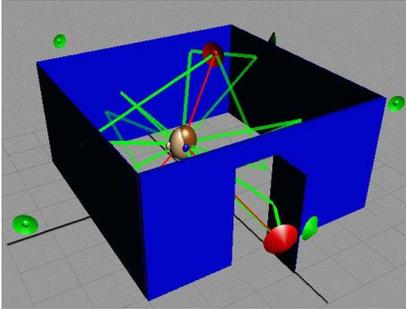
<http://audiosimulation.com>

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**GoldMiner™**

## 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 to be a peripheral to one or more "host" computers running a user's applica-



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

## GOLDMINER SPECIFICATIONS

### ■ AuSIM Audio Simulation Engine

- single *AuSIM3D™* processor; expandable to dual
- supports 128 sound-sources; expandable to 256
- supports one to four listeners; expandable to 32
- supports custom minimum-phase HRTF filters up to 512-taps
- audio buffering memory: 1200 seconds, expandable to 170 minutes
- 4U expandable black chassis, rack-mountable

### ■ Analog/Digital I/O

- 16 digital input channels (8 unused by analog interface), up to 24-bit @ 48 KHz; expandable to 64 channels
- 16 digital output channels (8 unused), up to 24-bit/48 KHz; expandable to 64 channels
- 10 analog input channels, (8 are 24-bit); expandable to 66 channels
- 10 analog output channels, (8 are 24-bit); expandable to 66 channels
- 4-way balanced headphone amplifier
- 24-channel balanced analog patch-panel (input and output)
- four RS-232 client interfaces

### ■ Black 8U rack-enclosure with carrying handles, pre-wired with power distribution

### ■ High-fidelity, specifically equalized, open-circumaural headphones

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

### ■ Pre-installed, royalty-free library of over 600 wavfile samples

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

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

### ■ Server console: keyboard, mouse, and flat-panel monitor

### ■ Performance

- localization: 128 concurrent sources @ 44.1 KHz sample rate, 110 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

tion. 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 an embedded processor hosting an audio filtering engine and digital audio stream controller, a 16-channel digital audio interface, an 8-channel analog audio interface, and monitoring console. The filtering engine is optimized to filter 128 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 many example programs with source, demo applications, and diagnostic tools, along with hundreds of royalty-free sound samples to include in user simulations.

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