

Three Dimensional Voice System for Team Communications and Dispatch Operators

Introduction

3DVX is an evolving platform to provide 3D (positional) audio to active workers and equipment operators in a variety of pursuits.

Based on AuSIM's *AuSIM3D™* technology, the *3DVX*, short for "3D Vox", provides the wearer with multiple voices in full duplex along with advanced aural information display capability.

3DVX is a flexible, expandable technology, starting with Proof-of-Concept (POC) systems and expanding to rugged wearable systems and digital, tracked headsets. The equipment can be built to any required degree of ruggedness for commercial or military applications.

3DVX combines a digital audio processing unit and professional grade analog-digital interface with a network and a tracked headset to present the wearer with voices and auditory icons which maintain accurate 3D spatial relationships regardless of the location or orientation of the listener. In addition to providing listeners with spatial situational awareness through the inherent locations of sounds and voices, the positional separation enhances the ability to discern between multiple sound sources competing for attention, .

The Concept

Combining sophisticated algorithms and efficient signal processing with significant computing power, numerous discrete sound sources can be projected in in space around a head-phone-wearing listener.



Figure 1 - 3DVX prototype system, now undergoing field trials.

3DVX combines this capability with voice communications channels and position/orientation sensing devices (GPS, gyros, etc.). The resulting system allows a user to maintain contact with other team members while hearing their voices propagated from the direction they are physically located. Additional information can also be conveyed in the listener's aural world as "auditory icons".

Using a local network, units share position, orientation, voice, and synchronization. The network may be wireless, as complex as a digital radio

system capable of carrying 300 Kb TCP/IP, or as simple as a standard hardwired office ethernet environment. However, the portable nature of *3DVX* makes a wireless connection a necessity in most applications.

The Goal

Positional, or 3D, sound offers an opportunity to closely link members of a functional team into a more effective, more cohesive unit.

3DVX (Cont.)

Proof-of-Concept Systems

The first generation of the *3DVX*, pictured in Figure 1, is based on an embedded computing platform, which comprises the Digital Audio Processing Unit, or DAPU. Additional components (microphone preamp, headphone amp, and A/D and D/A converters) link the digital processor to the analog outside world. The complete operational connectivity comprises a tracked headset, network (radio), and power (battery). The standard *3DVX* includes a GPS and orientation-tracker equipped headset with active noise cancellation.

The initial prototypes contained fans and internal power supplies. Subsequent units are fanless and feature external power supplies, which may consist of battery packs.

While normal use is without keyboard, mouse, or monitor, the *3DVX* can be configured from another computer over a network or from a console.

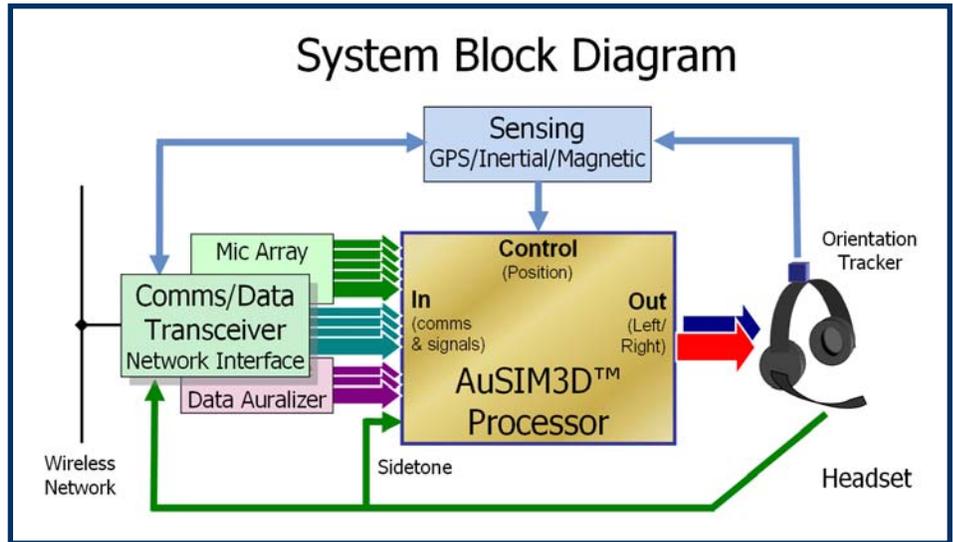


Figure 2 - Common features of all 3DVX configurations

Target Production Systems

3DVX will evolve into a family of products focused on office, industrial, and military applications. Integrating the tracker, amplifiers, and A/D and D/A converters in the headset or helmet will allow simple digital interface connections to a wider variety of embedded computing platforms (wearable, notebook, or desktop)

operating AuSIM's *3DVX* software with the underlying AuSIM3D engine.

Leveraging emerging mobile processor technologies, future versions of the *3DVX* will be optimally efficient.

Other product extensions can include directional augmented hearing and advanced communications management software.

3DVX Family	3DVX-Command	3DVX-Mobile	3DVX-Wearable
Package	Desktop, portable, or rackmount	Vehicle mounted or laptop	Light-weight person-mounted
Power	Local AC Power	Vehicle or Battery DC Power	Batteries
Ruggedization	Minimal	Shock and vibration resistant	Highly resistant to shock and vibration
Interfaces	Tracked Headset, LAN, WAN, WiFi, WiMAX, proprietary digital radios	Tracked Headset, WiFi, WiMAX, proprietary digital radios	Tracked Headset, WiFi, WiMAX, proprietary digital radios
Applications	Teleconference, Command & Control, Dispatch, Surveillance, Industrial Control, Air Traffic Control, Call Centers, 911	EMT, Service Vans, Mobile Cmd Centers, Event Security Cmd, Airplane Cockpits, Military Vehicles, Service Vans, Construction Equipment, Ship Bridges, Race Cars	Soldiers, Emergency Responders, Event Security, Event Management, Construction Workers, Broadcast Teams, LBE, Securities & Commodities Traders

Figure 3 - 3DVX Family Characteristics



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