

# Demonstration of a spherical source with 32 loudspeakers

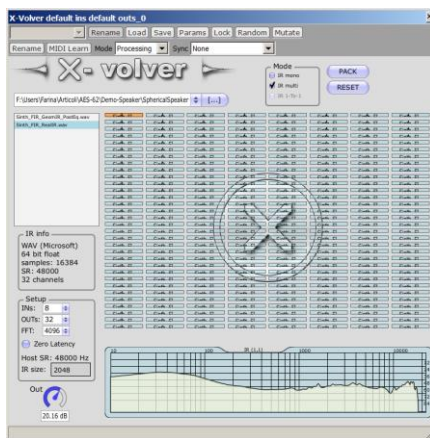
By Angelo Farina and Lorenzo Chiesi



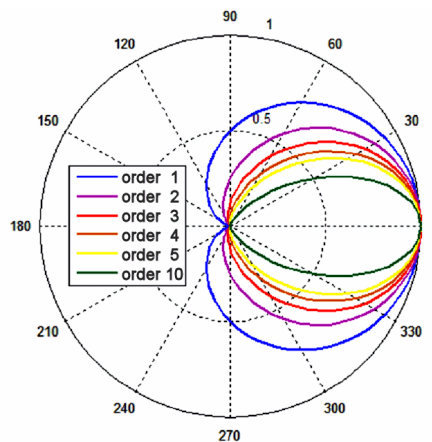
- 20 cm diameter spherical array
- 32 x RCF 2" 30W Neodymium Full-Range speakers  
Total power  $32 \times 30 = 960 \text{ W}$
- Low cost hand crafted prototype made by wood
- Sphere obtained gluing a couple of IKEA bowls



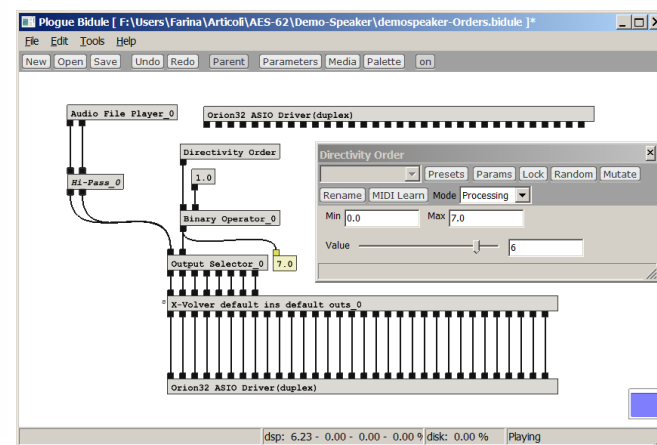
- 32 channels portable class-D amplifier packed in a light 3U trolley
- Orion USB 32ch interface
- 1500W, 18 kg



- 8x32 FIR filter matrix
- Realtime, CPU load: < 6%
- Can send up to 8 different signals in sharp beams pointed in arbitrary directions
- The patterns are high order cardioids (up to 7<sup>th</sup> order)



- The beam is always pointing in frontal direction
- Moving the selector, the cardioid order changes from 0 (omni) to 7



DEMO 1

# Demonstration of a spherical source with 32 loudspeakers

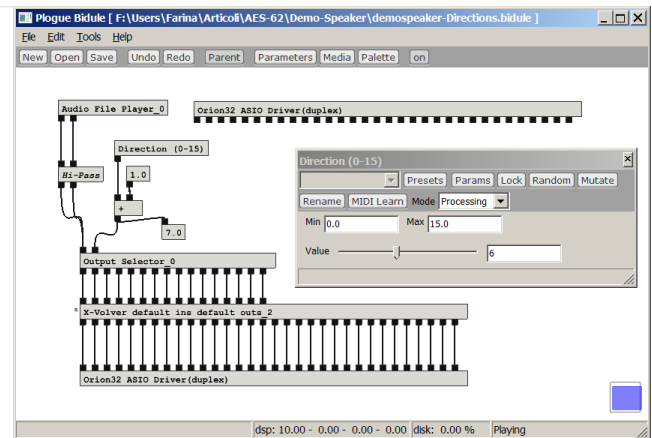
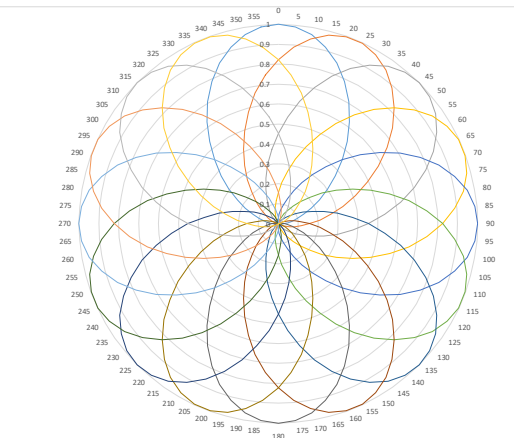
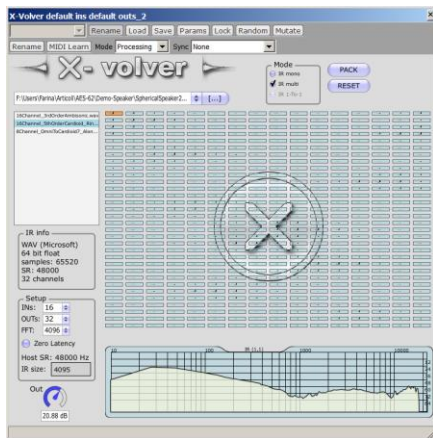
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- 32 channels portable class-D amplifier packed in a light 3U trolley
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- 16x32 FIR filter matrix
- Realtime, CPU load: < 10%
- Can send 16 different signals in sharp beams pointed in 16 directions
- The patterns are high order cardioids (5<sup>th</sup> order)

- The 16 beams are pointing all around in 22.5° steps
- Moving the selector, the input is routed to one of these beams

DEMO 2

# Demonstration of a spherical source with 32 loudspeakers

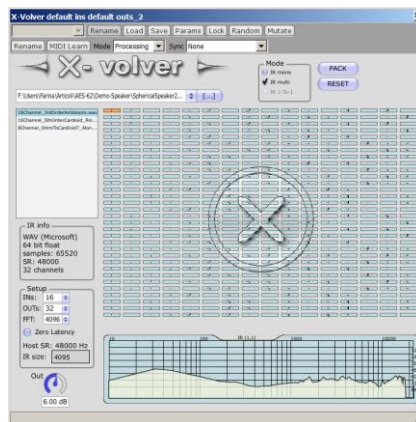
By Angelo Farina and Lorenzo Chiesi



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Total power  $32 \times 30 = 960 \text{ W}$
- Low cost hand crafted prototype made by wood
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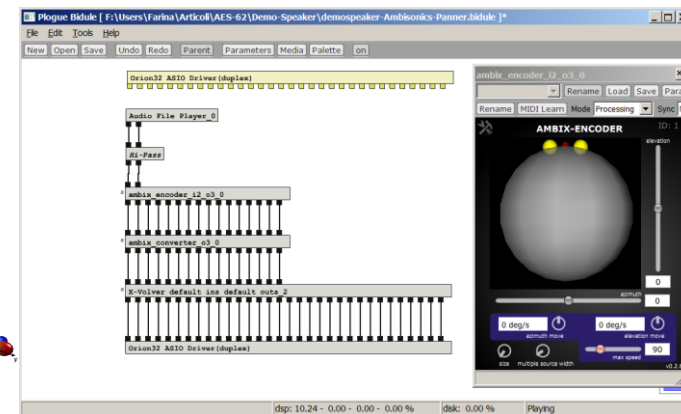
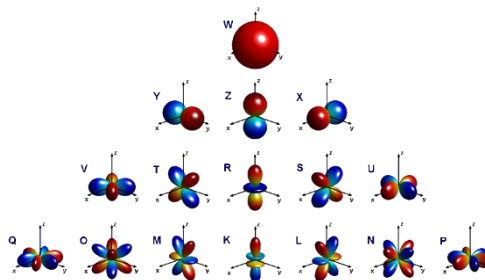


- 32 channels portable class-D amplifier packed in a light 3U trolley
- Orion USB 32ch interface
- 1500W, 18 kg



- 16x32 FIR filter matrix
- Realtime, CPU load: < 11%
- Creates 16 virtual loudspeakers with directivities corresponding to spherical harmonics up to 3<sup>rd</sup> order (FuMa)

Ordine 0  
Ordine 1  
Ordine 2  
Ordine 3



- HOA Encoding of two directive virtual sources
- The sources can be rotated with Ambix-Encoder
- The resulting 16-channels HOA signal is sent to the 16x32 beamforming filter matrix
- The 32 channels feed the spherical loudspeaker array

DEMO 3