Prosody-on-Demand:
An Active Earplug to Support Memory Recall

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Problem

- **Low retention from flat speech.** Neutral/low-prosody speech is encoded weakly, so details are lost.

- **Daily impact.** Missed instructions and reduced independence for people with memory difficulties.

- **Not only clinical.** Under stress/noise/fatigue, healthy listeners' recall of spoken details also drops.

Why It Works

- **Prosody boosts memory:** Rhythm and intonation give the brain timing cues that make speech easier to encode and recall.

- **Everyday proof:** Rhymes and chants ("one, two, buckle my shoe") show how patterned speech sticks better.

- **Scientific evidence:** Alzheimer's patients remember sung/prosodic material more reliably than neutral speech (Simmons-Stern et al., Neuropsychologia, 2010)

Solution

- **Content-preserving real-time transform:** neutral → prosodic speech; words/meaning unchanged.

- **LLM-guided prosody:** a high-speed streaming LLM selects rhythm/intonation at phrase/sentence boundaries.

- **Low-delay re-synthesis for listening/learning:** renders the prosodic output fast enough for talks, briefings, and media.

Development Roadmap

- **Prosody Engine R&D** – Design a high-speed, content-preserving LLM for neutral → prosodic conversion.

- **Bench Prototype** – Test end-to-end latency, intelligibility, and quality in controlled lab setups.

- **Pilot Study (Lab)** – Evaluate memory gains vs neutral speech; assess usability and acceptability.

- **Earplug Hardware α** – Build ear-level prototype with placeholder for embedded AI converter.

- **Verification & Pathway** – Validate device performance, address ethics/IP, and prepare for health-standards compliance.