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

Hamed Ghane, University of Glasgow

WEARABLES INNOVATION FORUM

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

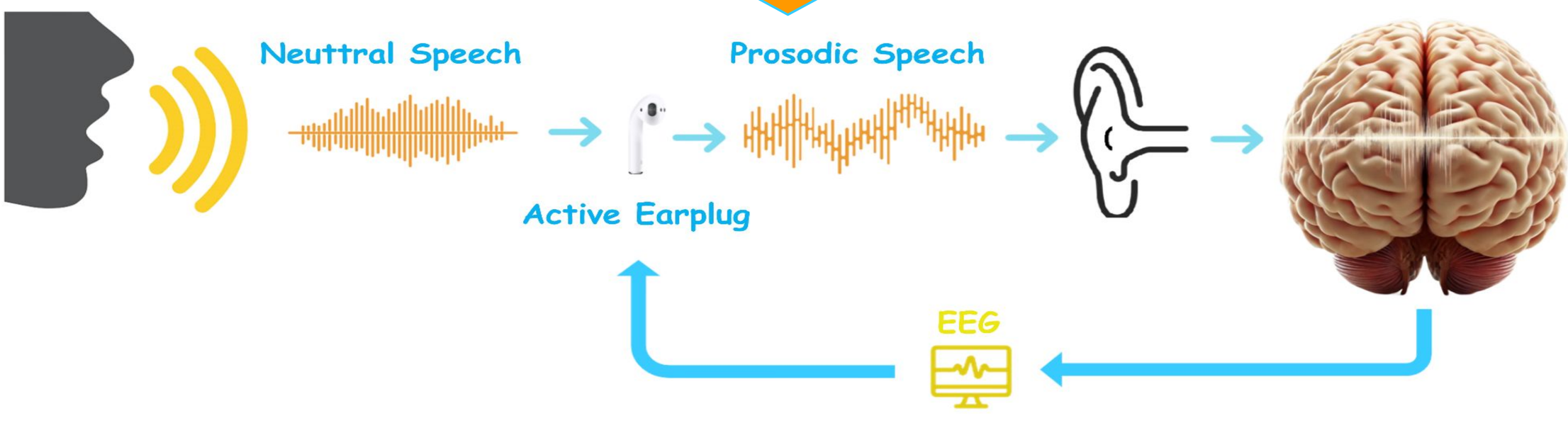
Prosody Engine R&D – Design a high-speed, content-preserving LLM for neutral → prosodic conversion.

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.



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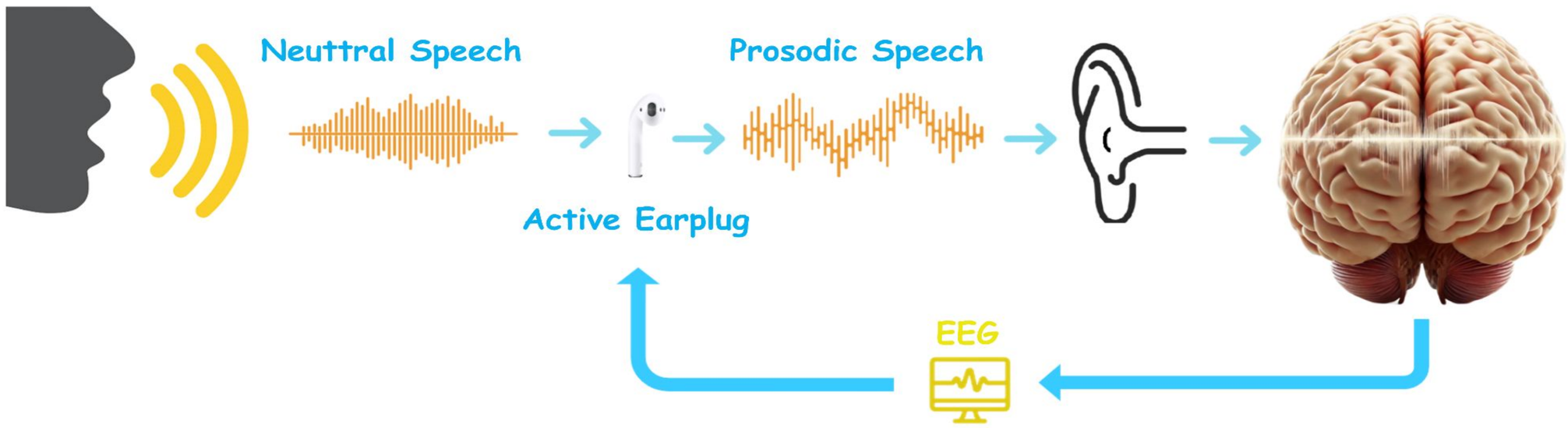

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