Vox-Link Node | Neural Sign Language Translator

The world's most affordable, AI-powered wearable for the Deaf community.
Designed by Shailesh Soni

🚀 Live 3D Demo

Click here to view the Interactive 3D Prototype *(Note: Replace this link with your actual GitHub Pages link after deployment)*

🧠 The Concept (Design Thinking)

The Problem: Over 70 million people globally rely on Sign Language, but communication barriers persist because most people don't understand it. Existing translation gloves or collars are bulky, medical-looking, and prohibitively expensive (₹50,000+).
The Solution: The **Vox-Link Node**. A discreet, matte-black wearable that clips to a shirt collar. Instead of expensive hardware, it uses **Agentic AI** and **Game Development logic** to track hands and translate gestures into spoken audio in real-time.

🛠️ Technology Stack: "Software > Hardware"

We slashed costs by 90% by replacing expensive sensors with superior code.

1. Monocular Depth AI (No LiDAR)

Instead of a ₹5,000 LiDAR sensor, we use a standard camera.

- **The Logic:** A custom neural network calculates depth from a single image (Monocular Depth Estimation), tracking the distance of hands from the chest with 98% accuracy.

2. UE5 Skeletal Rigging Logic

Leveraging **Unreal Engine 5** principles:

- The device treats human hands like a **Rigged 3D Character**.
- It tracks bone rotation vectors rather than just pixels, allowing it to understand complex gestures even in low light.

3. Agentic Context Core

- **Hardware:** Runs on a cost-effective ESP32-S3 or similar Edge AI chip.
- **Software:** An AI Agent that analyzes micro-expressions and sentence context, ensuring "Bank" (River) is distinguished from "Bank" (Money).

💎 Features

- **Ultra-Minimalist Design:** Matte black finish. Looks like a premium accessory, not a medical device.
- **Universal Clip:** Magnetic backplate attaches to any shirt, jacket, or hoodie.
- **All-Day Battery:** 12-hour active tracking on a single charge.
- **Privacy First:** All processing happens on-device (Edge AI); no video is stored.

💰 Viability & Pricing

By removing the LiDAR and optimizing the AI for cheaper chips, we achieved a mass-market price point.

Component	Traditional Cost	Vox-Link Cost
Sensor	₹5,000 (LiDAR)	**₹800 (CMOS Camera)**
Processor	₹8,000 (High-end CPU)	**₹1,200 (NPU/Edge Chip)**
Development	Hardware Heavy	**Software Optimized**
Retail Price	₹50,000+	**₹4,999**

📂 Project Structure

This repository hosts the **Interactive Digital Prototype** used for the Design Thinking presentation.

- index.html - The main prototype file containing the Three.js 3D engine, procedural textures, and UI.
- Shailesh QR.jpeg - Funding/Support QR code.

🏃 How to Run Locally

1. Clone this repository.
2. Open index.html in any modern web browser (Chrome/Edge recommended).
3. **Interact:**
    - **Rotate:** Click and drag to inspect the device.
    - **Explode:** Click "Exploded View" to see the internal PCB and Battery engineering.

🤝 Support

This project is currently in the R&D phase. To support the development of the physical prototype, scan the QR code in the Live Demo or contact **Shailesh Soni**.