**YenMozhi**

"Giving a voice to interact with the World"

Introduction

Autism Spectrum Disorder (ASD) affects more than 18 million people in India — nearly 3% of our population. For many, simple communication remains one of the biggest barriers to living independently and with dignity. During a visit to a nearby autism school, I witnessed a deeply moving reality: in just one campus, there were nearly 70–80 students struggling every day to express their needs.

They could not clearly say "I need water," "I am hurt," or "Please help me." Their teachers, caregivers, and even parents often had to guess what they wanted by observing gestures or cries. If this is the condition in one school, imagine the scenario across thousands of schools, in rural areas, across districts and states. This is not just a challenge — it is a silent crisis affecting millions of children and families across India.

This visit became the turning point for me. It wasn’t just an observation — it was a call to act. I started collecting reports, conducting surveys, and speaking with teachers and experts in special education. The findings were eye-opening: while there are communication boards, mobile applications, and AAC (Augmentative and Alternative Communication) software available globally, they are either too expensive, require smartphones or tablets, or demand constant internet access. These limitations make them nearly impossible to implement in government schools, rural setups, and underprivileged families.

I realized that what India needed was not just another app, but a dedicated, standalone, affordable device that works offline, is child-friendly, and can give a voice to those who cannot speak. This is how YenMozhi (Tamil for *“My Voice”*) was born — a small, portable, AI-powered device that can recognize the unique sound patterns of autistic children and convert them into clear speech output, instantly and anywhere.

Through my startup Symphonix, I have already built and deployed more than four major projects aimed at solving real-world problems. But YenMozhi is not just a project — it is my mission. I aim to make this device available at a very low cost (₹450–₹600 per unit) and even provide it completely free of charge to the first school I visited. My ultimate goal is to refine, scale, and distribute YenMozhi nationwide, ensuring that no child remains unheard, no caregiver remains helpless, and no cry for help goes unanswered.

Problem Statement

Autistic and cerebral palsy students face significant communication barriers. Many rely on repetitive sounds, humming, or hand gestures to indicate their needs — but without a way to convert these signals into understandable language, they remain vulnerable and dependent.

This leads to:

* Unmet Needs & Emotional Distress – Basic requirements like food, water, or using the restroom often go unnoticed, causing frustration and meltdowns.
* Isolation in Classrooms – Inability to interact with teachers and peers results in disengagement from group activities.
* Lack of Emergency Communication – During pain, danger, or medical emergencies, children cannot call for help.
* Teacher & Parent Burnout – Constant guessing increases stress and reduces efficiency in caregiving.

Gaps in Existing Solutions

Most available tools are:

* App-based and Internet-dependent, making them useless in low-connectivity areas.
* High-cost imports, unaffordable for government schools and rural families.
* Complex and Non-Child-Friendly, requiring smartphones or tablets that may not be safe or feasible for students to carry.

There was a clear absence of a simple, reliable, hardware-first solution that could be scaled across India.

Proposed Solution – YenMozhi

YenMozhi is a standalone, AI-powered assistive communication device designed specifically for children with ASD and cerebral palsy.

Key Highlights

* No Buttons – Tap to Activate  
  Many autistic and cerebral palsy students have atypical motor control, involuntary movements, or muscle stiffness, making small button presses difficult and frustrating. YenMozhi uses capacitive touch/tap activation, allowing the child to simply tap anywhere on the surface to activate the listening mode.
* Sound-to-Speech Conversion  
  Using a pre-trained ML model, the device recognizes unique vocal patterns — for example, a humming sound, a repeated syllable, or a cry — and maps them to predefined phrases like “I need water” or “Help me.” These are played out loud via the onboard speaker.
* Portable & Lightweight  
  Custom-designed 3D-printed chassis makes it compact, durable, and easy to carry anywhere, including classrooms, playgrounds, and home.
* Offline & Online Functionality  
  The device operates completely offline using a preloaded server and ML/AI model, ensuring uninterrupted use even in rural areas. Internet connectivity is only required for:
  + Firmware and model updates
  + Installing new sound patterns and phrases
  + AI voice enhancements and real-time learning
* Real-Time Alerts & Safety  
  Urgent sounds (e.g., pain cries) are converted into loud, clear alerts to get teachers’ immediate attention.
* Ultra-Low Cost  
  By using ESP32 microcontroller, microphone, speaker, and rechargeable battery, the total cost is kept between ₹450–₹600 per unit, making mass deployment feasible.

Methodology & Working Process

1. Sound Data Collection

* Field visits were conducted to special schools, including the one that inspired this project.
* With consent from teachers, sound samples of students expressing needs were recorded.
* Noise reduction and pre-processing steps were applied to build a clean, labelled dataset.

2. AI Model Training

* Machine learning model was trained using Google Teachable Machine and optimized for microcontroller-level inference with TensorFlow Lite.
* Classification accuracy was improved through iterative retraining and real-world validation.

3. Hardware Integration

* ESP32 microcontroller runs the inference model locally without external servers.
* Continuous microphone input is processed, and AI inference identifies matching sound patterns.
* When a match is detected, the system triggers corresponding audio playback via speaker.
* Capacitive touch sensor is used to wake the device, ensuring accidental activations are minimized.

4. Embedded Software Design

* A mini server-like program runs inside the ESP32, handling:
  + Continuous sound monitoring
  + AI inference and result mapping
  + Power management with auto-sleep
  + Firmware upgrade logic via OTA updates when internet is available

5. Testing & Validation

* The prototype was tested with students under teacher supervision.
* Feedback was collected and integrated into improving accuracy, latency, and voice clarity.
* Safety features were added to ensure robust performance even in noisy environments.

Social & Emotional Impact

* Giving a Voice to the Voiceless – Children can express themselves independently.
* Building Inclusion – Helps integrate them into classroom discussions, group play, and social activities.
* Reducing Anxiety – Teachers and parents no longer have to guess the child’s needs.
* Saving Lives – In emergencies, the child can signal distress, preventing delays in response.
* Inspiring Others – Normalizes assistive devices and encourages innovation in inclusive technology.

Future Scope

* Multi-Language & Dialect Support – Hindi, Tamil, and other regional languages.
* Cloud-Synced Profiles – Personalized models for each child accessible across devices.
* Mobile App Integration – For caregivers to monitor and receive alerts remotely.
* Wearable Version – Clip-on or wristband form factor for better portability.
* Partnerships – Work with NGOs, government bodies, and CSR programs to reach every child in need.

Conclusion

“YenMozhi is more than an innovation — it is an invention, a movement, and a promise.”

This device is not just about technology — it is about restoring dignity, reducing frustration, and giving children the power of expression. It represents a step toward an inclusive India, where every child can be heard, no matter their physical or neurological limitations.

Through Symphonix, I am committed to refining YenMozhi, adding advanced AI capabilities, and making it available at the lowest possible cost, even free for government schools and children from low-income families.

I invite mentors, investors, policymakers, and changemakers to join me in scaling this solution nationwide. Together, we can build a future where:

* No sound goes unheard.
* No cry for help is ignored.
* No child is left behind.

YenMozhi — Giving a Voice to Interact with the World.