GnomEDU

Offline AI Educational Assistant for Teachers in Schools with Limited Connectivity

INTRODUCTION

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OUR TEAM

ABOUT US

We are Dhruv and Sanya, two high schoolers from Bellevue, WA. Both of us have lots of experience in programming for non-profit and for-profit work, as well as previous hackathons.

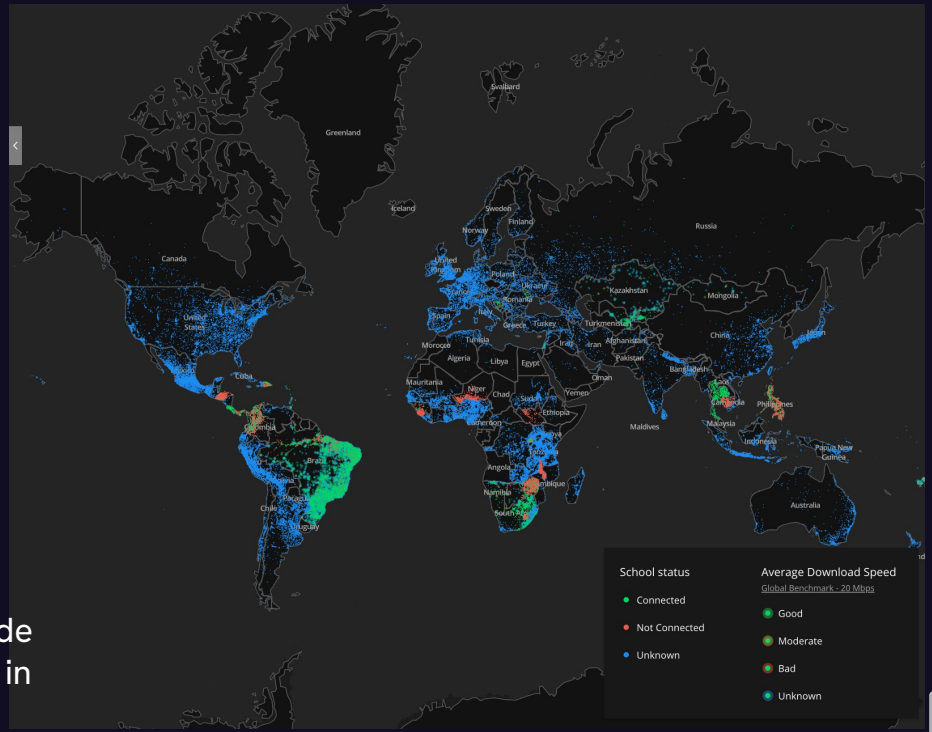
OUR IDEA

When Dhruv went to India a few months ago, he visited many rural schools and saw how hard it was for teachers to get access to educational resources, especially because of inconsistent Internet connectivity and power.

The Problem

- Many underserved schools lack consistent internet connectivity.
- Limited access to educational resources hinders effective teaching.
- Existing devices struggle with offline functionality and storage constraints.

This results in reduced access to quality education, leaving teachers without the tools they need to provide effective lessons and further disadvantages students in underserved areas.



Giga Initiative (https://maps.giga.global/map)

Our Solution

- An offline, AI-powered assistant that provides curated educational content and supports teachers in lesson planning, quiz generation, and concept explanations.

- Device description: Small, portable, credit card-sized Raspberry Pi-powered device with a microphone

Benefits:

- Fully offline functionality.
- Customized resources based on classroom needs.
- Voice-interactive AI for teaching assistance.
- When connecting, can work with email and other resources to create advanced content

Key Features

- Voice-Enabled Offline AI: Teachers and students can interact with the AI using voice commands to generate quizzes, ask questions, and plan lessons—all without internet access, making it ideal for schools with minimal connectivity.
- Multilingual Support: The AI supports multiple languages, ensuring accessibility and usability for diverse classrooms worldwide.
- Curated Resources: Teachers can download educational PDFs tailored to their classroom needs, with the ability to delete outdated materials for efficient storage management.
- Raspberry Pi Powered: Affordable, simple to use, and designed for schools with minimal resources.
- Storage Efficiency: Resources are managed to maximize limited storage capacity.
- Ideal for Low Connectivity: Designed for schools with little to no internet access, ensuring uninterrupted teaching support.

HOW IT WORKS 02

SUMMARY

HARDWARE

We use a Raspberry Pi with an attached microphone and speaker for audio capabilities. This is all powered by a 20,000 mAh battery, allowing for a 40-hour battery life in a small package.

VOICE CAPABILITIES

We also use Kokoro-82M for TTS, along with speech recognition to allow for voice Q&A. We chose this because it is multilingual, which can be important for global underserved areas.

AI PROCESSING

We use Deepseek R1 Qwen 1.5B Distilled to process user queries and generate answers/content. This model is the most performant option for edge use cases like ours.

EMAIL ASSISTANCE

When our device is connected to the Internet, it can send emails containing lesson content for a teacher. Because underserved rural communities often have inconsistent or limited connectivity, having both offline and online functionality is the most useful for these classrooms.

HARDWARE

- We chose a Raspberry Pi 4B+ out of a few other options that were available to us, namely:
  - The Rock Pi
  - The Raspberry Pi Zero W
  - The ESP8266
- The Raspberry Pi stood out because of its:
  - Sufficient RAM size (2GB)
  - Low power consumption (<500mA idle)
  - Software support
  - Hardware extensions
- With this, we also used a USB microphone/speaker device that we had on hand. For a future product, this would be replaced with a more compact and efficient system.

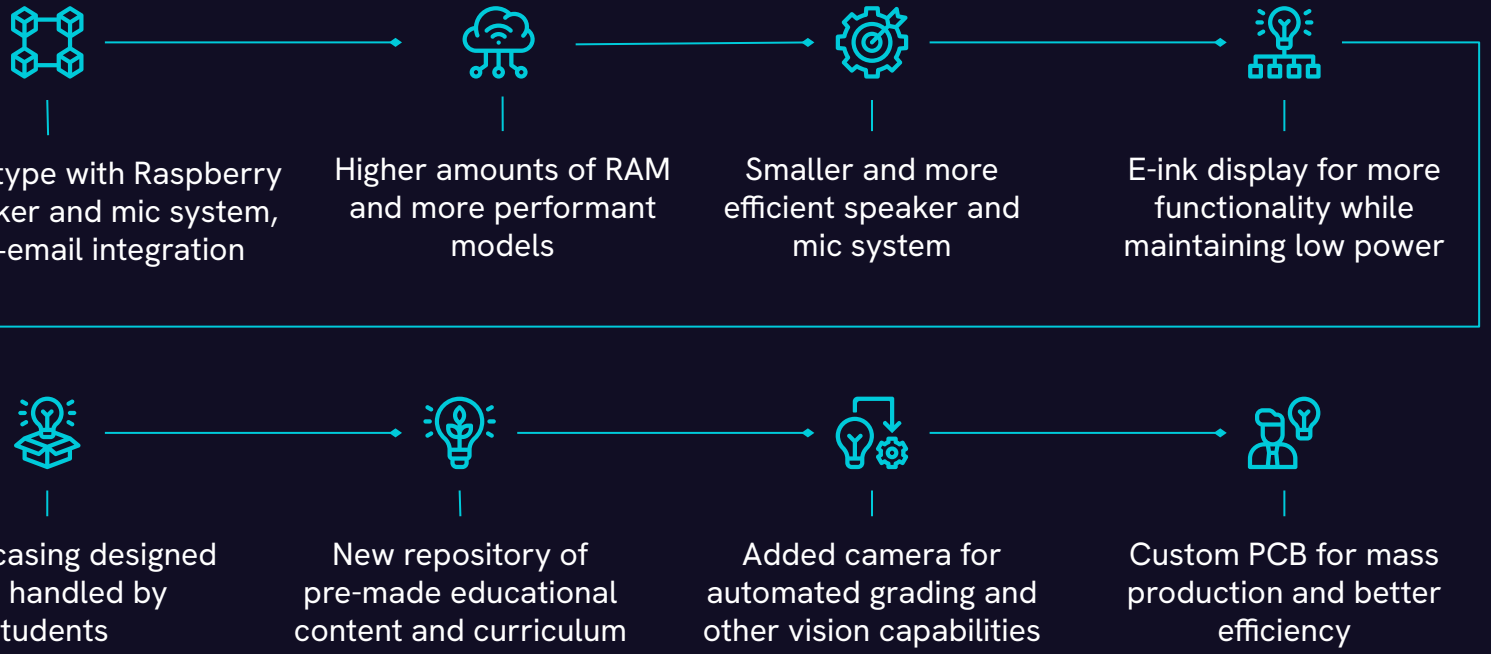
SOFTWARE

- Our options for models were
  - Deepseek R1 Distill Qwen 1.5B
  - Llama 3.2 3B Instruct
  - Qwen 2.5 3B Instruct
- We used Deepseek because of its superior performance and smaller size, achieved through increasing test-time compute similar to OpenAI's o1.
- We used Ollama as a model server because of its low overhead and efficient performance on CPU devices.
- For text-to-speech, we used Kokoro TTS because it was the most performant open-source model of its size available, shown by its human evaluation scores.

FUTURE POSSIBILITIES & CONCLUSION

03

FUTURE ENHANCEMENTS



Empowering Education Everywhere

Through GnomEDU, we work toward bridging the gap in underserved schools, equipping teachers with the tools to educate and inspire—anytime, anywhere.

Any questions? Email us!

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