

AGIR Project Proposal

2023-2024

Title (titre):

OpenBraille

A low-cost open-source speech-to-Braille assistive system

Partner/Client (partenaire/client):

None

Dimensions (dimensions):

TECHNIQUE / SOCIETALE / SCIENTIFIQUE / METHODOLOGIQUE / ARTISTIQUE / AUTRE

TECHNIQUE : Hardware design (Arduino-compatible microcontroller, mechanical design, 3D printing), embedded systems, and software development for deterministic Braille actuation.

SOCIÉTALE : Accessibility and inclusion for blind and/or visually impaired and/or hearing-impaired users, as well as for users who benefit from multimodal access to written information.

SCIENTIFIQUE : Algorithms for deterministic text-to-Braille conversion compliant with Braille standards, signal processing and natural language processing techniques

MÉTHODOLOGIQUE : Open-source and modular design approach, with clear documentation to ensure reproducibility, adaptability, and long-term maintainability.

Summary including Objectives and Deliverables (résumé y compris les objectifs et les livrables):

Commercial refreshable Braille displays remain extremely expensive, limiting access for many visually impaired users, especially students, associations, and users in low-resource contexts. This project aims to design and develop a low-cost, open-source speech-to-Braille system that provides a functional and accessible alternative to proprietary devices.

The project consists of a 3D-printable Braille display, based on low-cost electronic components (Arduino-compatible microcontroller and actuators), and a PC application capable of converting text into Braille through a deterministic, standards-compliant conversion engine.

Speech-to-text functionality is considered an optional input feature, intended to support specific use cases such as hearing-impaired or visually impaired users, real-time transcription of spoken content, or situations where users wish to read tactilely while listening.

Main objectives :

- To design a fully open-source assistive device that can be built, repaired, and improved by anyone
- To ensure reliable and deterministic Braille output, prioritizing correctness and usability

Expected deliverables :

- 3D-printable mechanical designs (STL files)
- An electronic architecture based on accessible components
- Arduino firmware to control the Braille pins
- A PC application implementing text-to-Braille conversion, with optional speech-to-text input
- Complete documentation: assembly guide, bill of materials, software usage guide

References (références):

None

Project Team (groupe-projet):

Enzo Dos Anjos

Karim Madrane

Lilas Dureuil

Méline Spoto

Stéphane Grondin

The team is open to 1-2 new members as 2 others might join