Cover page

Project title: **Braille Printer with Wireless PDF Transfer**

Academic Year: **2024/2025**

Group Members: 1- **Sami Haji 12042708** 2- **Faiq Bakri 12029377**

Department Name: **Computer Engineering Department**

Project Type ~~*Software*~~ or **Hardware** (Choose one)

Supervisor Name: ……**Dr. Saed Tarapiah**……

Format:

- Single space, Times New Roman.
- 12 pt,
- Maximum 1 page.

Abstract Body:

Items must be provided in the Abstract:

- Why do you think this project is important? Please explain the significance of this Project in brief.
- In your point of view what are the important aspects that should be covered in the project?
- Objective(s): In your view, please explain the main objectives of the project.
- Methodology: Give a brief outline of the application development process.
- Had this project been done before? Are there any similar applications available today?
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- **Note:** Please deliver this abstract early to ensure that your Project has been approved by the department's projects committee. **Registration will not be done without this approval.**

Project's Abstract:

Why do you think this project is important?

This project is important because it addresses the needs of individuals who are blind or have low vision, particularly their need for accessing textbooks. When books are typically printed and distributed to libraries or bookstores, people with visual impairments are often excluded from this process. Our project seeks to change that by offering an accessible solution through Braille printing. We aim to make Braille printing more accessible, customizable, and efficient for institutions, libraries, and individuals alike, ensuring greater inclusion in the world of printed materials.

In your point of view what are the important aspects that should be covered in the project?

- **Braille Translation Accuracy**: Ensuring that the PDF-to-Braille conversion is accurate, as it directly affects the quality of the printed Braille.
- **Wi-Fi Integration**: Incorporating a reliable wireless interface (ESP32) for easy file transfer, making the printer more user-friendly.
- **Safety Features**: Implementing robust safety features, such as motion sensors, to ensure safe operation during printing.
- **User Interface**: Including an intuitive interface with an LCD screen and keypad to provide users with easy control over the number of copies and other settings.
- **Reprint Functionality**: Enabling the reprinting of Braille documents without reprocessing the original PDF, using SD card storage and Git repository integration for efficiency.

Future work:

Depending on time availability and project progress, we plan to explore several additional features to further enhance our printer's functionality:

- **Paper Storage and Feeding Mechanism**: While the basic version we will work on of the project will include a simple paper feeding mechanism, we aim to refine this in future work. This would involve developing a more efficient and robust paper storage system that can reliably feed one sheet at a time, similar to commercial printers. We could explore using advanced roller mechanisms to handle paper jams.
- **Voice Feedback System**: We plan to integrate a voice feedback system that reads the messages displayed on the LCD screen, such as "Welcome," "Printing has started," "Printing is complete," or warnings when there are issues with the paper storage or motion sensors.
- **Bluetooth Connectivity**: As an enhancement to Wi-Fi, we could add Bluetooth support to allow for multiple file transfer options, making it more convenient for users.

Objectives:

- To design a fully functional Braille printer that can wirelessly receive and print PDF files in Braille format.
- To create an accessible and cost-effective printing solution for libraries, institutions, and individuals with visual impairments.
- To integrate safety features and an intuitive user interface to ensure the printer is easy and safe to use.

Methodology:

- **Hardware Selection**: Choosing appropriate microcontrollers (Arduino for hardware control and ESP32 for Wi-Fi), motors for precise paper movement, solenoids or small motors for Braille embossing, IR/Ultrasonic sensor for motion detection, 16x2 LCD Display for user interface, SD Card for file storage, 4x4 Keypad for input, and Power Supply that is appropriate for the motors and sensors.
- **Software Development**: Writing the firmware to handle motor control, needle actuation for Braille dots, and Wi-Fi file transfer, including processing the PDF and converting it to Braille text.
- **Sensor Integration**: Implementing motion sensors for safety, and develop the software to respond to sensor inputs.
- **Testing and Iteration**: Testing the printer's functionality in various conditions, and optimizing the system for accurate and reliable Braille printing.

Previous Work and Similar Applications:

- Had this project been done before?

To the best of our knowledge and based on information provided by our supervisor, this project has not been done before. No similar projects or applications have been identified on our end at the time this abstract was written.

- Are there any similar applications available today?

While Braille printers do exist, they are often expensive and typically lack modern features such as Wi-Fi connectivity and customizable file storage. Our project distinguishes itself by offering these additional functionalities, making it a more innovative and accessible solution for Braille printing.