

# **SYSC3010 Project Proposal**

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## **About Us**

MINS Inc is a team with talented Carleton Computer Systems Engineering students, Idir, Neethan, Mohammad, and Solan. Our Team are excited to bring our Braille Printer to consumers all around the world.

## **The Project**

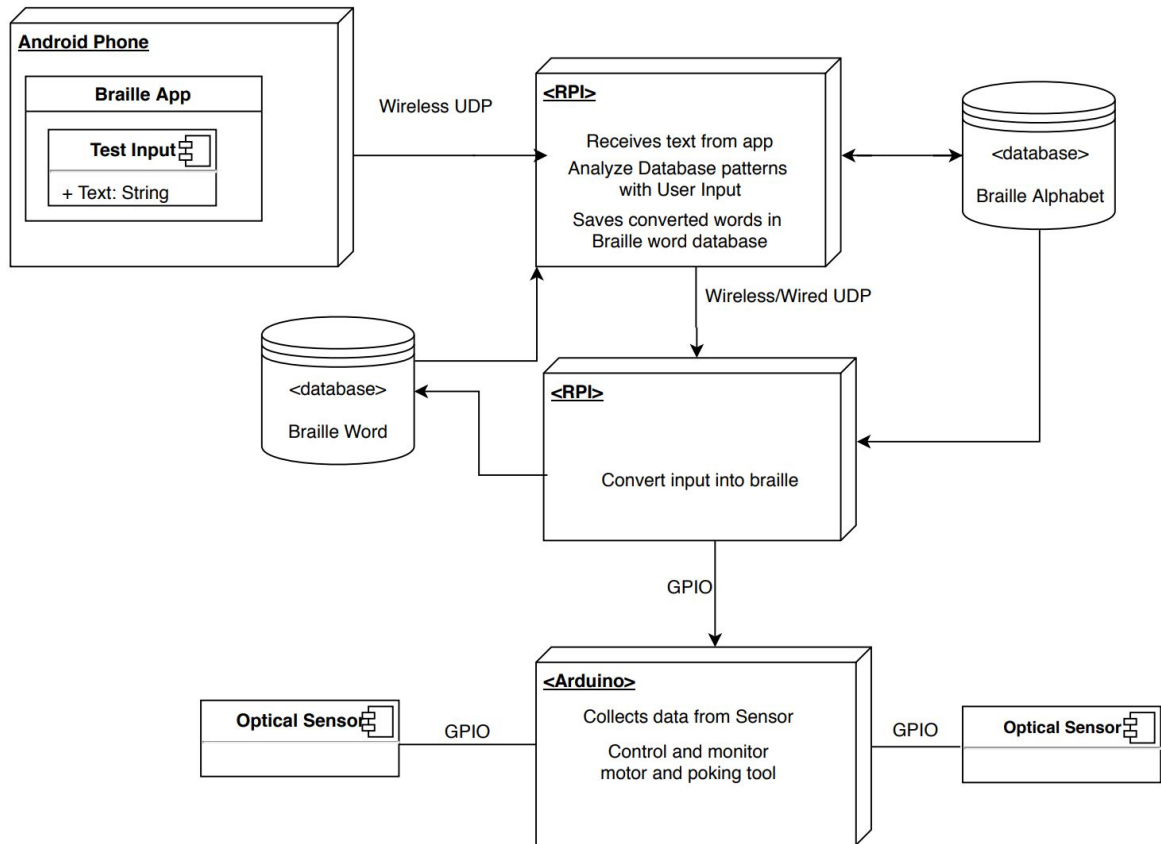
Nearly 360,000 Canadians have identified as deaf and blind. This toll has continued to increase and has increased nearly 108 times of that recorded in 2005. As the numbers increase the need for resources that help the deaf-blind in everyday tasks increases. Here at MINS Inc, we believe the next generation Braille printer will provide every deaf-blind individual the means of communication from text to braille.

The Braille printer is a printer that will take text as an input and provide a printed Braille translation. No more feeling different and no more difficulties that divide regular people from deaf-blind people. The printer has a wide variety of uses that does not just surround simple communication within two individuals. The printer will provide blind-deaf individuals the ability to sit in on classrooms and read all the notes through the printer, the ability to receive text from long distant range and ability to read any books and text content from any website using the printer. With all these uses for the printer and many more, the Braille printer will not only save by avoiding the cost of an interpreter but will help every individual in need have the appropriate resources to be a part of society with no troubles.

The Braille Printer will:

- Receive input text messages, notes and any text through the android app
- The word will be split into individual letters
- The Letters will convert the text to braille and allow the blind-deaf individual to read notes, text messages, books and any kind of text with no worries

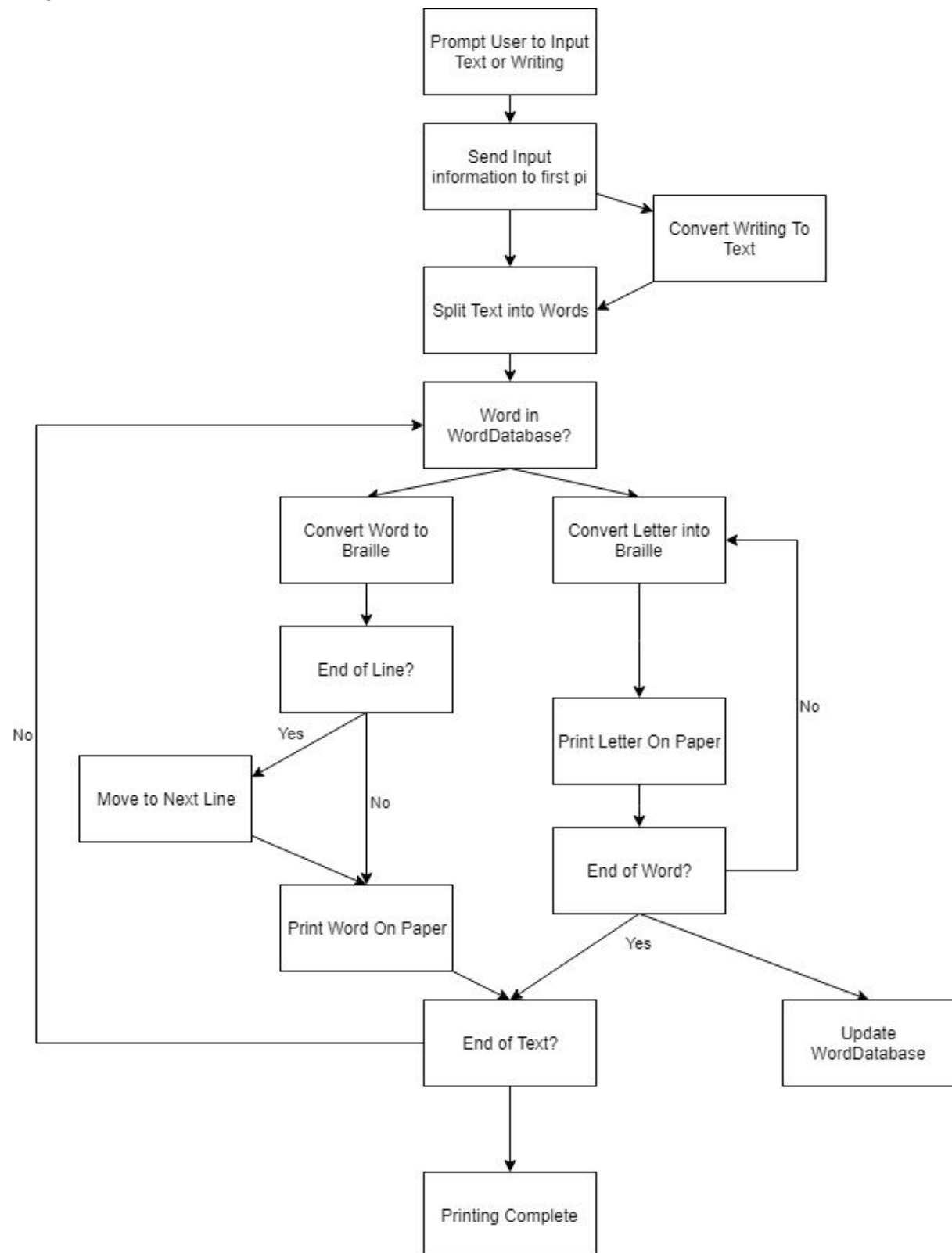
## Project Design



## **Components:**

- Optical Sensors will be used to detect the edge of the page, detect new line needed to print braille patterns
- Optical Sensor 2 used to detect calibration lines for the poking tool
- Database1 will contain the Braille alphabet that will be used to help convert the input
- Database2 will contain words that have been previously converted to help with efficiency

## Project Implementation



The implementation of our braille printer will be using an android app to take in text input from the user. The app will include a large text area for the user to either type or write by using the touchscreen. With a pre-made database containing: letters, numbers and special characters, the raspberry pi will be used to convert the input into braille. The braille will then be used to create a sequence of movements for the motors to print the braille onto a sheet of paper. There will also be a second database used to store words to make the conversion process more efficient. This database will be updated by adding any new word written in the input. Our device will also know when the end of the line has been reached using an optical sensor, which will then prompt the device to start a new line.

### **Data Collection and Storage:**

As previously mentioned, our device will not only make use of one basic database, but two databases. The first database will be constant database containing the 26 letters of the alphabet, number 1 through 9 and various special characters, all with their respective braille representation. The second database will be a variable database which will contain words and their braille representation. The key difference between this database and the first is that this one will continuously grow in size as it will be updated after each new word is written in the text box. These two databases will be used depending on what word is written as input. If the word is one that has already been written in the past, it will access the word database. If it is a new word, it will access the character database. Once completed, the new word created will then be added to the word database for future use. This will allow the writing process to become more efficient since there will be less calls to the database from the pi if the word is already there. For example, the word “cat” when first entered will have to access the character database three times (1 for each character), but will only need to access the word database once for any later entries of “cat”.

### **Printing Procedure:**

Our printer will take pre-printed paper with marked edges and lines that will provide the sensors with indication that the end of the line has been reached and provide a line of calibration for the starting point of each braille word. To accomplish the printing of the braille writing, the printer will consists of 3 needles to poke holes within the paper and will have a motor moving the paper horizontally till the end of the line is reached marked by the edges and detected by one of the optical sensors. A second sensor will be used during the printing process to detect every calibration line before writing the next letter.

## **Test Plan and Results**

- Use one motor OR use 2 or 3 motors:
  - To paint on the paper with thick paint
    - More convenient
  - To poke through the paper
    - Easier to control
  - Use objects that will indent the paper with a supporting layer behind the paper
    - More professional but more complicated
- Predicting Results:
  - Easier to use 2 or 3 motors because they can be placed depending on the shape of the letters in braille
  - Easier to poke through the paper or indent than paint; because the paint drying would make the process longer
- Data Collection and Comparison:
  - Data as input text will be taken as the input from the Android App
  - The input data will be tested to see whether all the individual letters are split with no spaces
  - The letters will then be tested to see if each letter matches with the corresponding braille letter
- Test between devices:
  - This is a quick test that will run before anything kicks off, where the connection between the two pi's and the arduino is tested by pinging
- Testing using sensors:
  - A minimum of two sensors for now are going to be used for testing. First sensor is used to test the end of the line after printing the words into braille. It checks to see if the end of the paper is reached using the pre-printed margins, if so; then move down and left to start a new line.
  - Second sensor will test to see when a letter is done using the small vertical lines on the pre-printed paper; where then it will move onto the next letter or leave a space if the word is done.
  - Test to see which part of the process takes the most time; which then can be optimized to be more efficient for time and resource

## Project Timeline

2019

CALENDAR YEAR

SEPTEMBER

CALENDAR MONTH

MONDAY

FIRST DAY OF WEEK

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
26	27	28	29	30	31	01
02	03	04	05	06	07	08
09	10	11 Learn Raspberry PI functionality	12	13	14	15
16	17	18 Learn to run Python code on Raspberry PI and upload code using GIT	19	20	21	22
23	24	25 Learn the usage of Arduino kits	26	27	28	29
30 Project Proposal First Draft	01	02 Edit first draft of Project Proposal	03	04 Project Proposal Final Submission	05	06

2019

CALENDAR YEAR

OCTOBER

CALENDAR MONTH

MONDAY

FIRST DAY OF WEEK

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
30 Project Proposal First Draft	01	02 Edit first draft of Project Proposal	03	04 11:55 PM: Project Proposal Final Submission	05	06
07	08	09	10	11 Print 3D hardware component for printer	12	13
14 Create Database	15	16	17	18	19	20
21	22	23	24	25	26	27
28 Project Design First Draft	29	30 Begin GPIO pins set up	31	01 11:55 PM: Project Design Final Submission	02	03
04	05	06	07	08	09	10

# 2019 NOVEMBER

CALENDAR YEAR

CALENDAR MONTH

MONDAY

FIRST DAY OF WEEK

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
28 Project Desgin First Draft	29	30	31	01 11:55 PM: Project Design Final Submission	02	03
04	05	06 Code GUI Interface	07	08	09	10
11 Collaborative Preparation for Code Review	12	13	14	15	16	17
18 Code Review First Draft	19 11:55 PM: Unit Tests Final Submission	20	21	22	23	24
25	26	27 Demo Test Plans to Tas	28	29	30	01
02	03	04 Project Final Submission	05	06	07	08

## **References**

[1] M. Correspondent, “‘My eyes and ears’: Deaf-blind in Canada lack support, except in Ontario,” *CTVNews*, 06-Aug-2019. [Online]. Available: <https://www.ctvnews.ca/health/my-eyes-and-ears-deaf-blind-in-canada-lack-support-except-in-ontario-1.4537281>. [Accessed: 30-Sep-2019].

[2] “Number of deaf-blind Canadians on the rise | CBC News,” *CBCnews*, 26-Jan-2005. [Online]. Available: <https://www.cbc.ca/news/technology/number-of-deaf-blind-canadians-on-the-rise-1.560472>. [Accessed: 30-Sep-2019].