FCULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND COMPUTR ENGINEERING

DIGITAL SIGNAL PROCESSING

ENCS4310

Phase #2

Simple Hi/Bye word recognition

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Section: 1

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› **Introduction**

This phase aims to complete the software system that was built on phase1 by constructing hardware system made up of Arduino, LCD and PC speaker. This system can recognize the ‘Hi’ and ‘Bye’ words spoken from different individuals, and recognize if the speaker is female or male.

› **Problem specification:**

There was a problem in determining the gender of the speaker in some cases. Sometimes, the system gave ‘female’ as a result of the spoken record while it was ‘male’ and vice versa.

› **Data:**

Many records were being gathered for the two words, with diversity between female records and male records.

› **Evaluation criteria:**

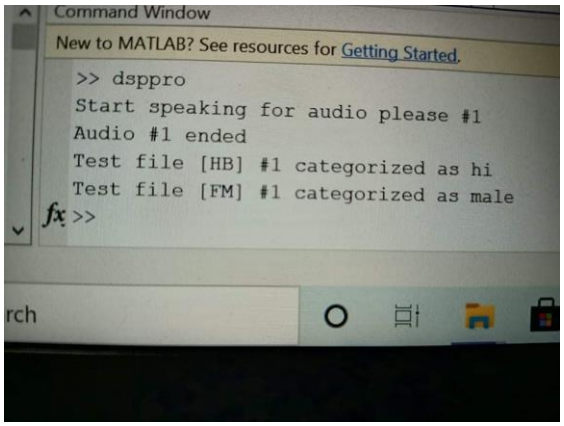
The main criterium is the energy for both words. There were two folders: train and test folders. For train folder, it had 17 records for ‘Hi’ and 17 records for ‘Bye’. The total average of the energy for the whole records was evaluated, then the average for ‘Hi’ records and the average for ‘Bye’ records were evaluated separately. Finding the average of the energy was to compare between these averages and the averages of the records in test folder. According to this comparison, the results were recognized. In addition, zero-crossing rate was a vital criterium that played the main role to compare between the records according to the times the frequencies of the record cross the X axis. The successes rate was 70% which is a good rate.

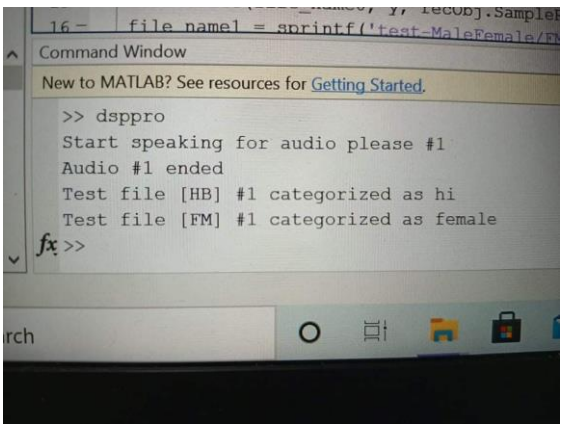
› **Approach:**

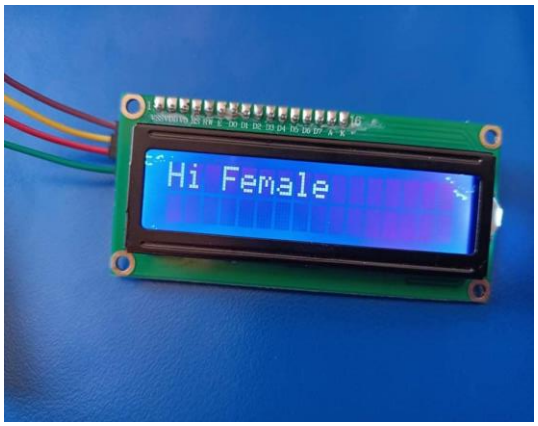
To solve the problem, the records have been clarified more than the first attempt. This solution is important to evaluate the average of the energy accurately for the ‘Hi’ records and compare them with the energy of the ‘Bye’ records. In addition, many other obvious records were added and the files were divided into another files which makes the scope of comparison more precise so we can get more accurate results, especially when determining the gender ‘female’ or ‘male’.

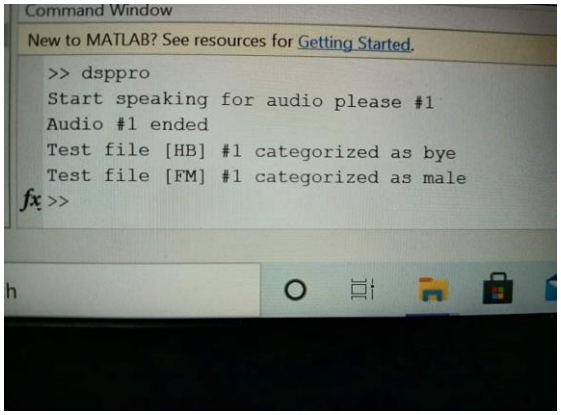
› **Results and Analysis:**

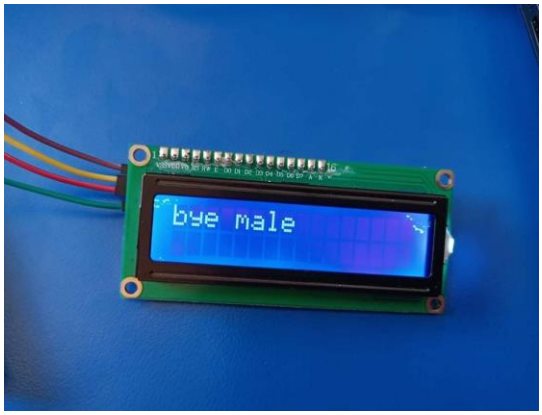
All the results were good as expected. Some results were sometimes wrong, but they are still few times and having some mistakes is possible due to many reasons, such as the surrounded noise while speaking the word. All the results are shown in the figures below.

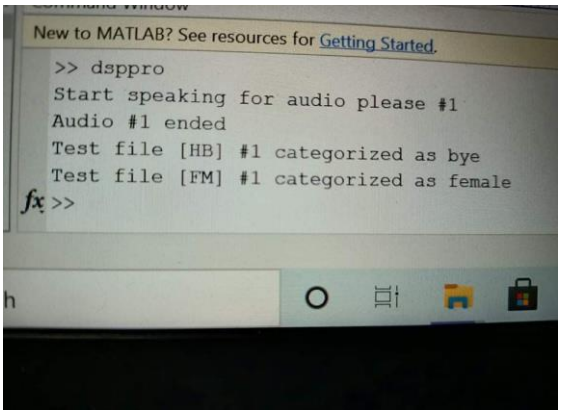


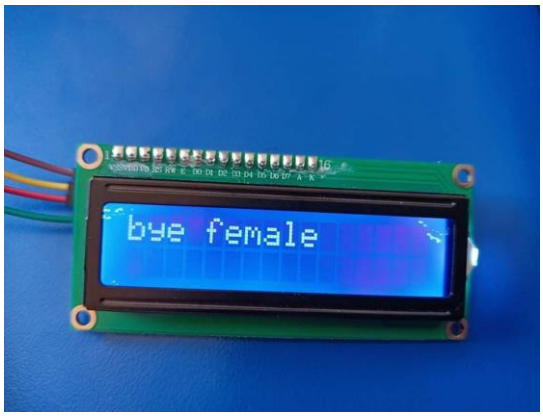












- **Development:**

  This is the developed system building on the software system. Maybe in the future, students can complete this system to determine the range of the ages of the speaker.

- **Conclusion:**

  This phase helped us to become more familiar with many concepts in Digital Signal Processing like energy and zero-crossing rate which made students able to deal with any system built using such these concepts. In addition, students can now deal with the hardware electronics easily.

- **References:**

  - https://www.youtube.com/watch?v=aczsVEtAkps&list=PLnyw1IVZpaTsFgcU2QlK9x2jU8vIFaRBl. Accessed on 15/4/2021 at 10:00 pm.
  - https://www.youtube.com/watch?v=s2P3xnTM1G4.Accessedon 17/5/2021 at 6:00 pm.
  - https://www.youtube.com/watch?v=00Zq4yC0J6o. Accessed on 1/6/2021 at 10:30 am.