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CHAPTER 1

INTRODUCTION

1.0. Task Overview

When we talk a certain word it will produce a signal. The signals produce varies because of different scenario when we said a certain word. Nowadays, there are a lot of method to analyse the signal produce to seek the outcome or the purpose of the signal produced.

1.1 Problem Statement

The signals can be analyse and observe by talking a word in dwibahasa, English and Malay numbers from 1 until 10. The signals must observe in three different conditions of surrounding:

- Normal Environment
- Quiet Environment
- Noisy/Crowded Environment

1.2 Summary

The signal produce clearly can be heard the word said in Quiet place and continue to Normal place and Crowded place if think logically. Unfortunately, the surrounding is not the only reason that will affect the signal produced but for this task, we will focus only on the surrounding mentioned above.

CHAPTER 2

METHODOLOGY

2.0 Introduction

In this chapter will discuss the steps and software use to produce the signal. The steps are important in order to analyse the signal correctly and produces a reliable also desired results.

2.1 Environment

The environment or surrounding chosen take a big part in this task. For normal environment, the task took place in a room with a fan ON. The quiet environment is in a room without any electricity ON such as fan, laptop or light also the windows close. Lastly, the noisy environment recorded at Pusat Sukan, UMS at the evening.

2.2 Recorder

The Recorder that involved in this task is Xiaomi Recorder that already build in the phone systems as Figure 2.0.

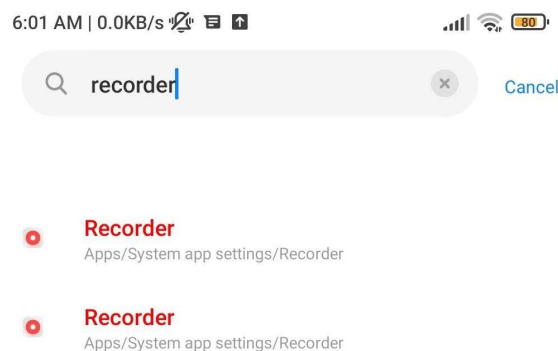


Figure 2.0 Xiaomi Recorder

The function of this Recorder is to record the voice of the number 1~10 in English and Malay language. Before recording we need to change the settings of the Recording format into WAV. format.

2.3 Microphone Position

The device that been used to record the numbers is Xiaomi Redmi Note 10 Model M2101K7AG. As usual, most of the microphone located on the bottom side of the phone. By makes the phone upside down and hold the phone on the range of my chest as Figure 2.1.



Figure 2.1 Microphone Position

For this task, external microphone such as from the Earphone, Bluetooth Microphone etc. did not used because some devices have noise cancelation on it that will affect the desired output signal.

2.4 OCTAVE

One of the math solver software like MATLAB is OCTAVE. OCTAVE is a freeware that will be use to generate the signal of each numbers of the recording 1~10. Figure 2.2 and 2.3 shows some of the example code and signal produced.

```
>> [y1,fs1]=audioread('EmpatNars.wav');
>> [y2,fs2]=audioread('EmpatQars.wav');
>> [y3,fs3]=audioread('EmpatWars.wav');
>> t1=linspace(0,length(y1)/fs1,length(y1));
>> t2=linspace(0,length(y2)/fs2,length(y2));
>> t3=linspace(0,length(y3)/fs3,length(y3));
>> figure;
>> plot(t1,y1,"g","linewidth",2.5,t2,y2,"k","linewidth",5,t3,y3,"y","linewidth",0.5);
>> title('Empat Environment Signals')
>> xlabel('time, s')
>> ylabel('amplitude, a')
```

Figure 2.2 Source Code of Octave

The source code applied the same code for all numbers in English and Malay Language.

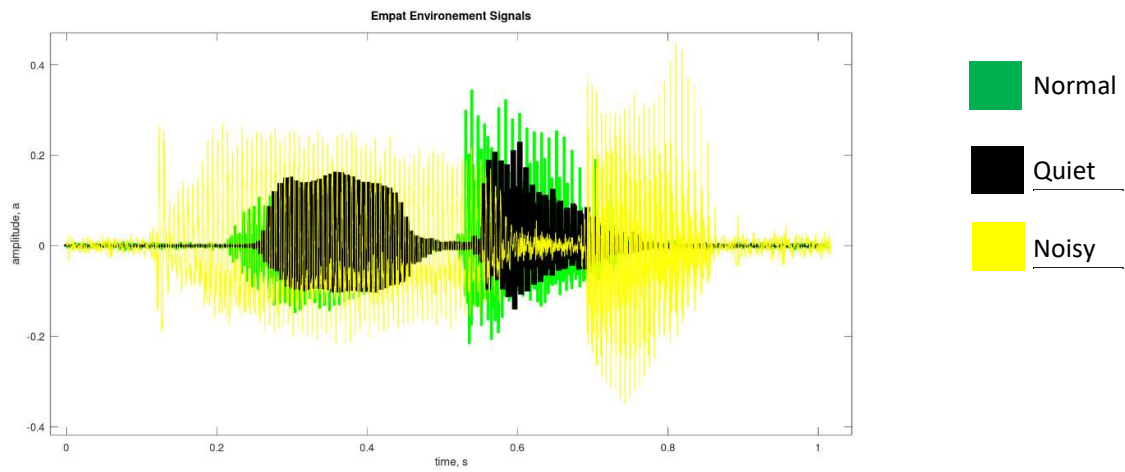


Figure 2.3 Signal Produced using OCTAVE

CHAPTER 3

OBSERVATIONS AND RESULTS

3.0 Malay Number 1~10 Output Signals

Figure below show the results from the recording on Malay language for numbers 1~10 signals:

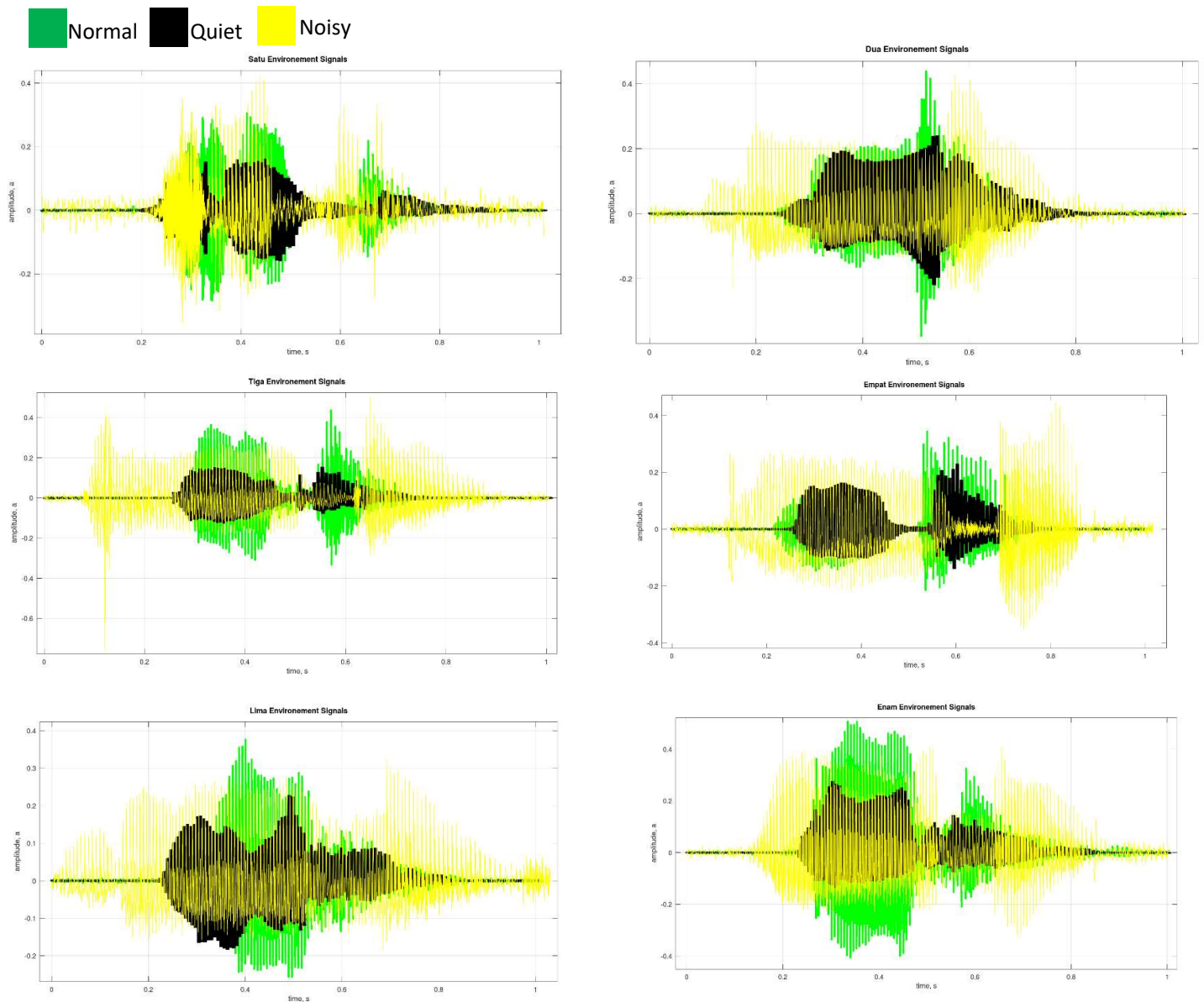


Figure 3.0 Malay Output Signals for 3 Environments Number 1 to 6

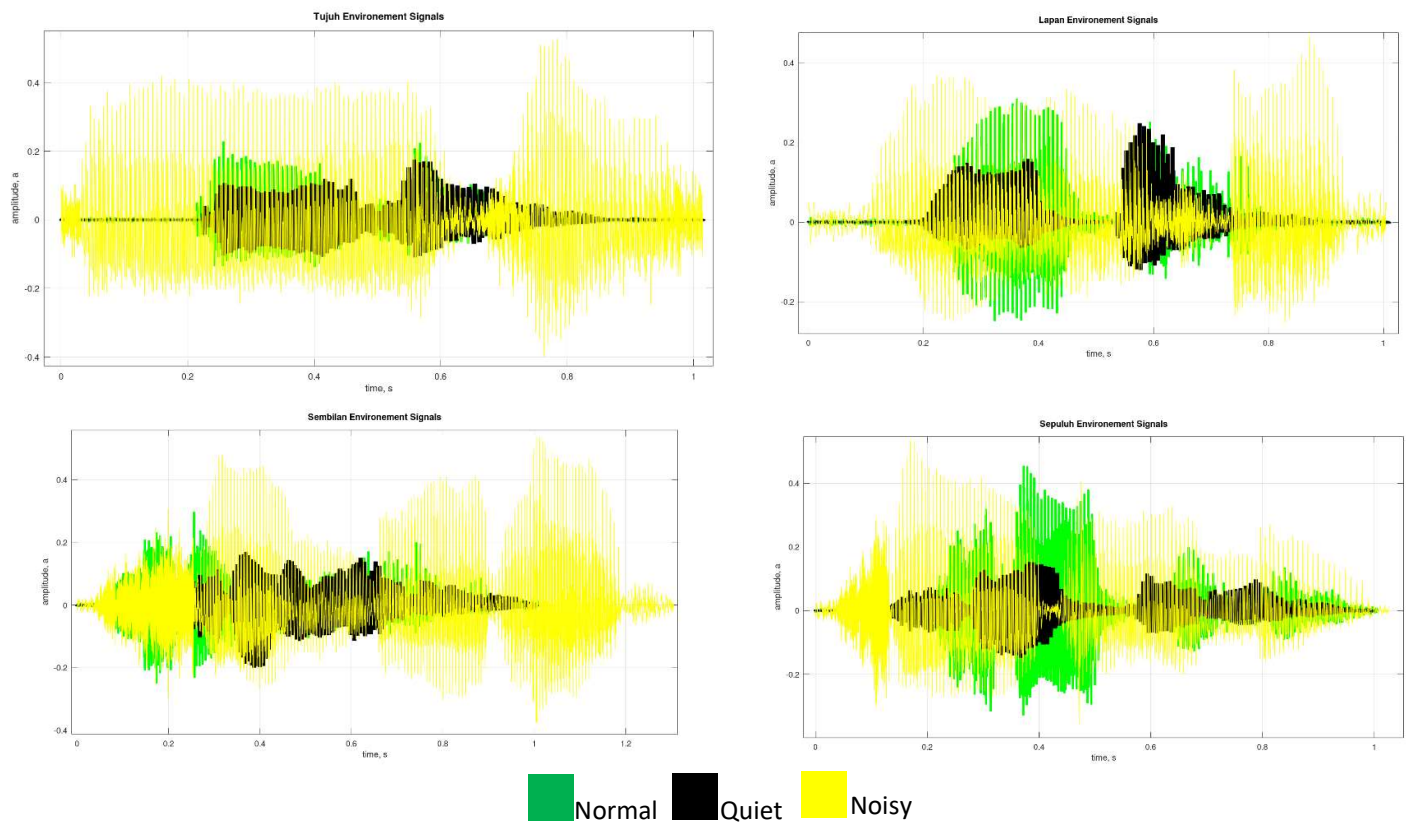


Figure 3.1 Malay Output Signals for 3 Environments Number 7 to 10

3.1 English Number 1~10 Output Signals

Figure below show the results from the recording on English language for numbers 1~10 signals:

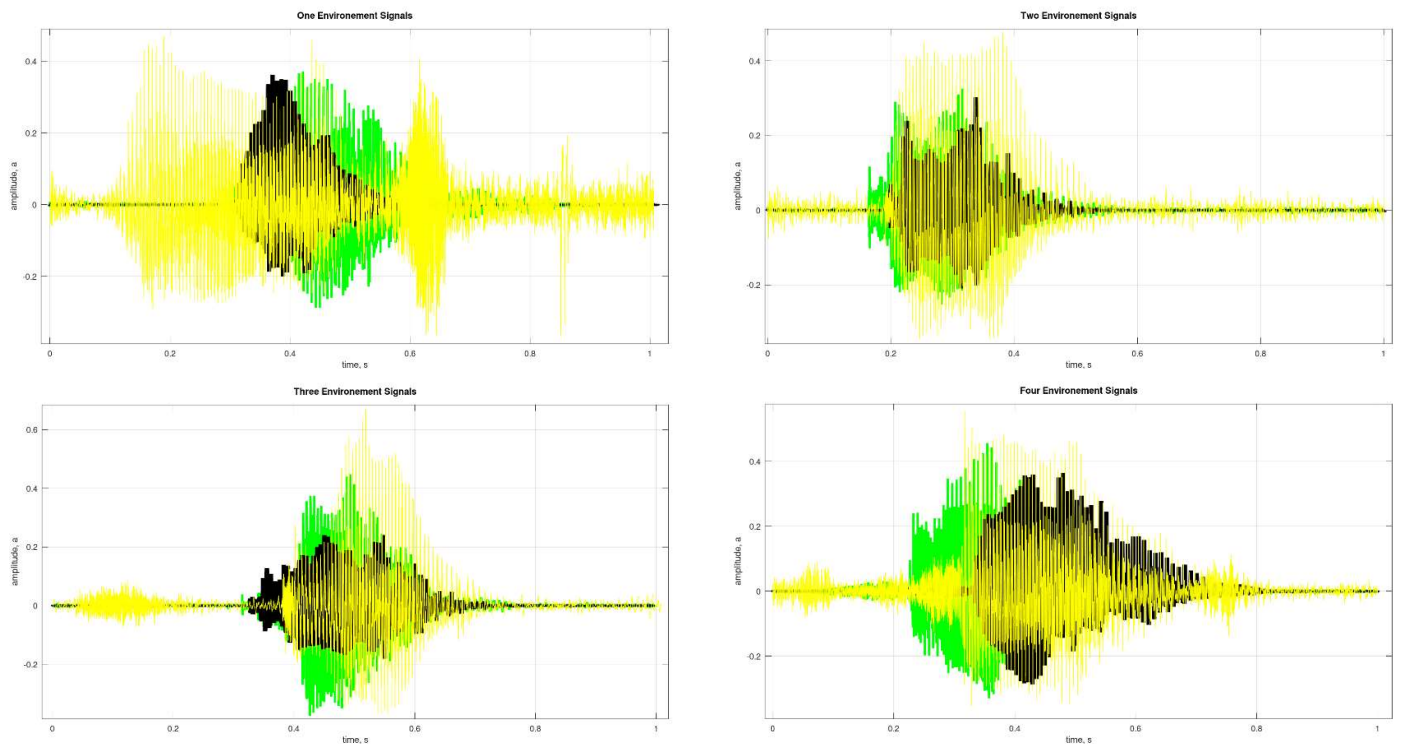


Figure 3.2 English Output Signals for 3 Environments Number 1~4

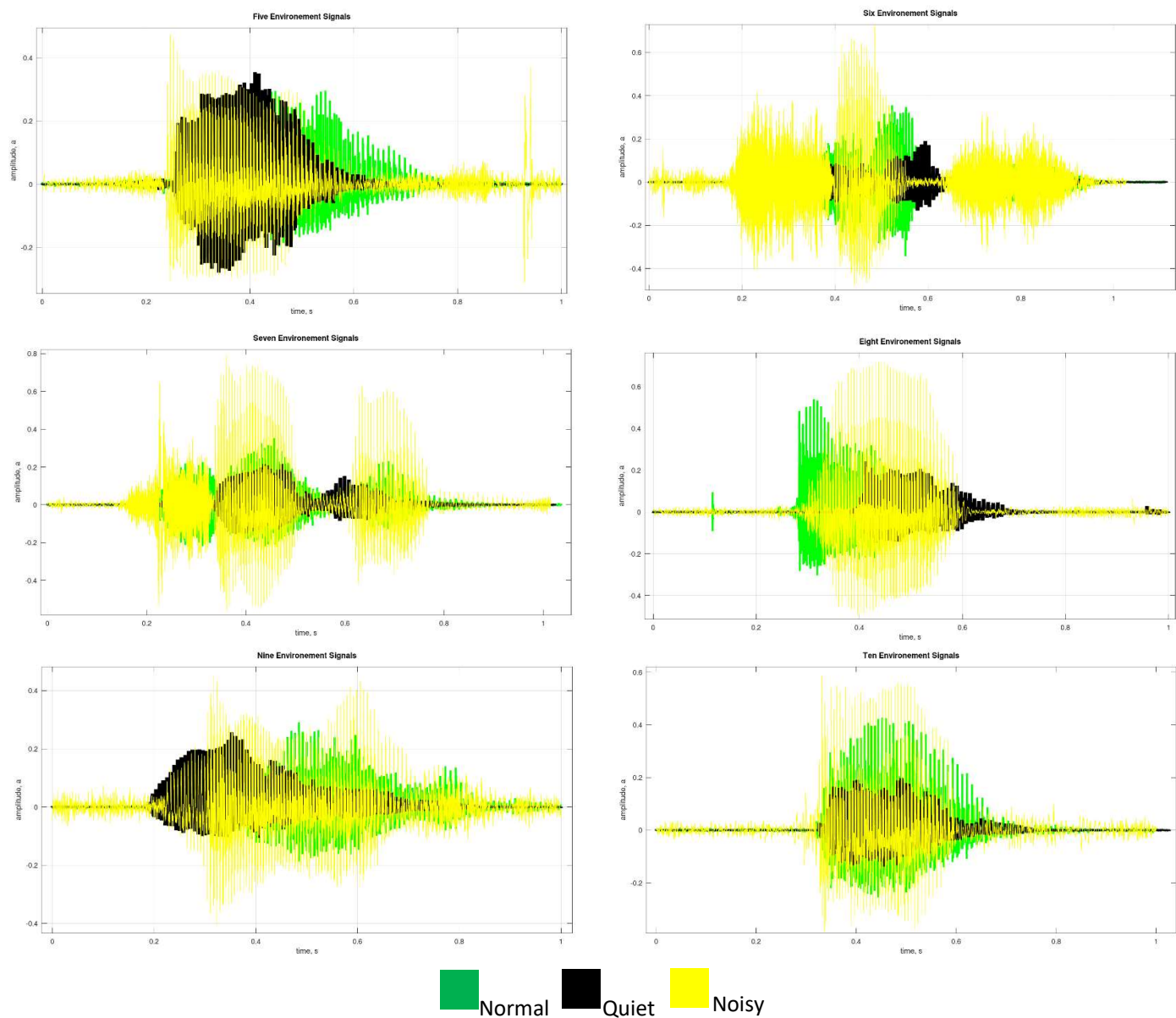


Figure 3.3 English Output Signals for 3 Environments Number 5~10

3.2 Malay Number follow Syllables Output Signals

Figure below show the results from the recording on 2 Syllables Malay Language signals:

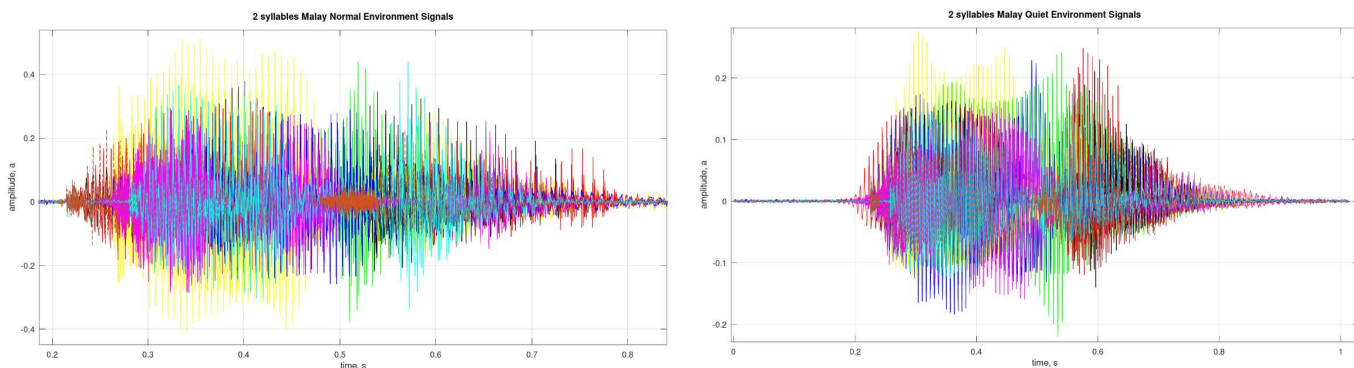


Figure 3.4 2 Syllables Malay Normal and Quiet Environment Signals

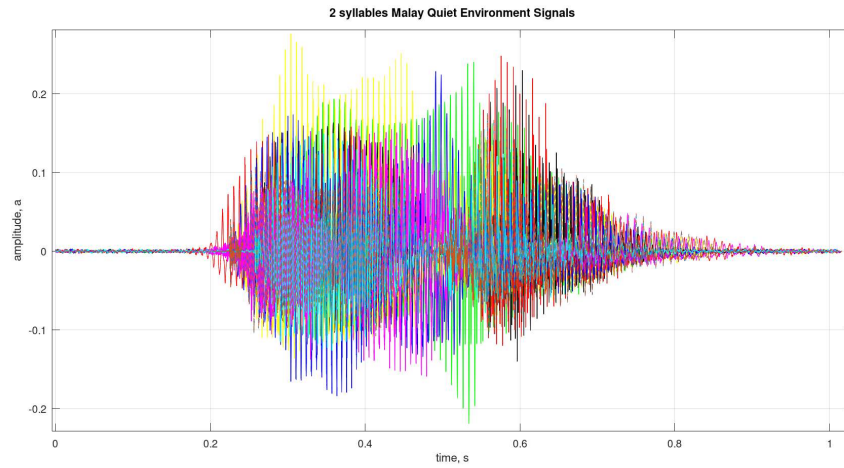


Figure 3.5 2 Syllables Malay Noisy Environment Signal

Figure below show the results from the recording on 3 Syllables Malay Language signals:

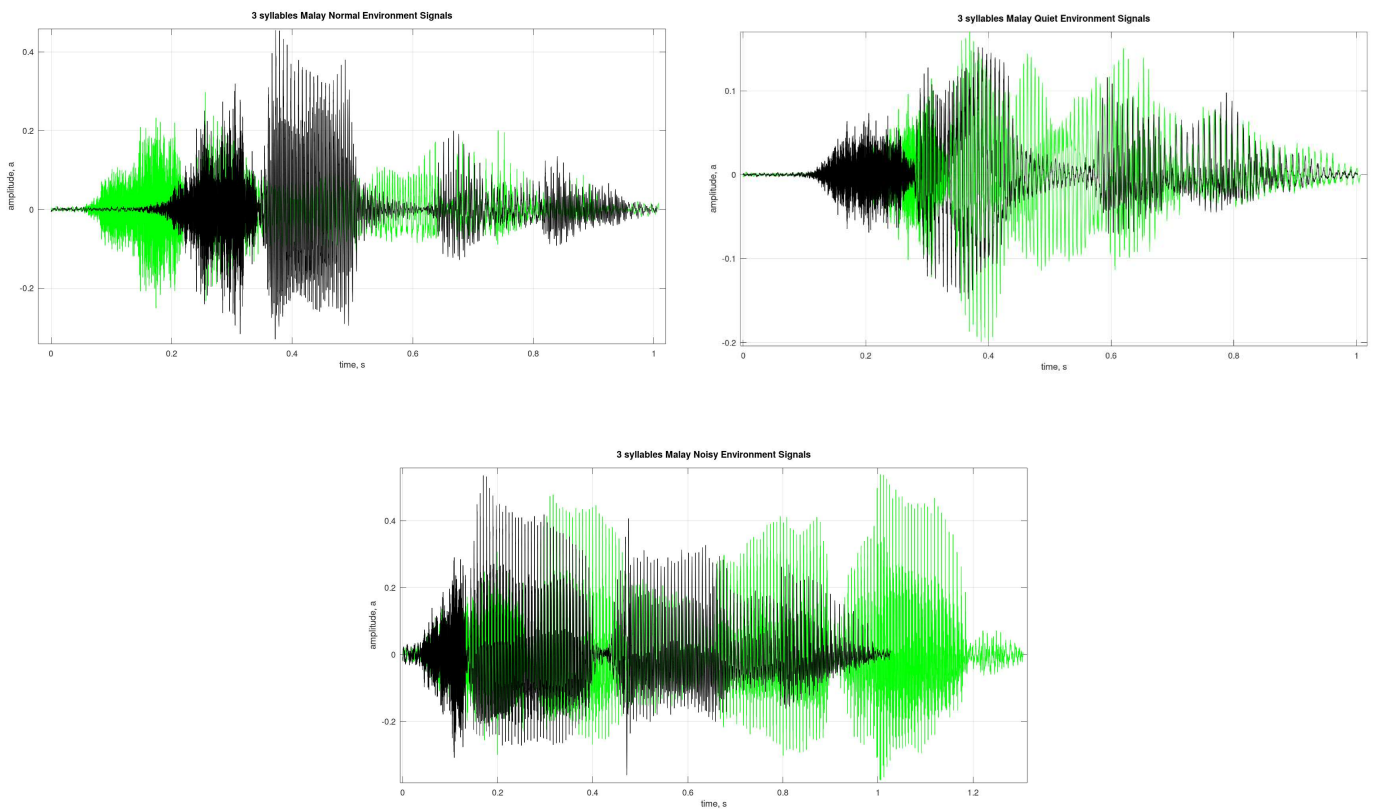


Figure 3.6 3 Syllables Malay in 3 Environment Signals

3.3 English Number follow Syllables Output Signals

Figure below show the results from the recording on 1 Syllable English Language signals:

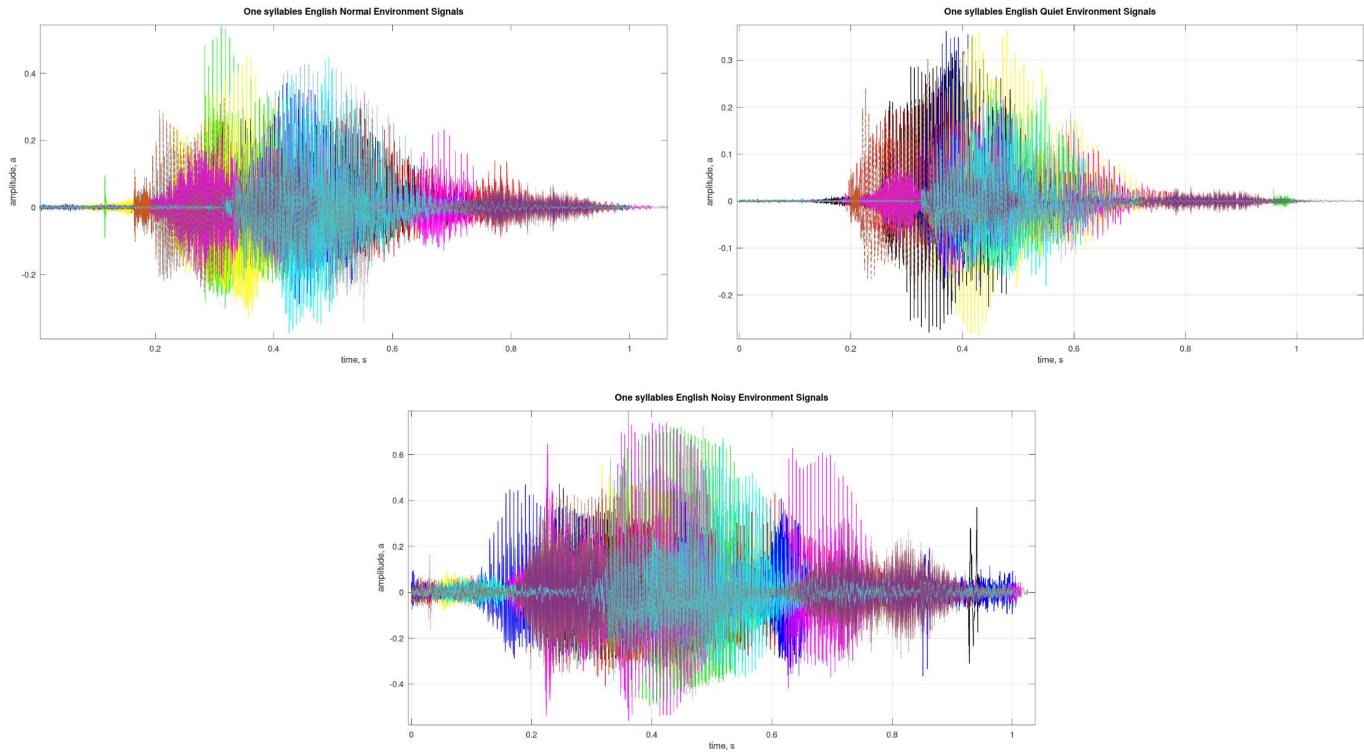


Figure 3.7 1 Syllable English in 3 Environment Signals

3.4 Observations on the Output Signals

The output generates in time-domain signals. Hence, we will discuss the results in time-domain perspective. The input of the audio/recording already been cut exactly in 1 second in order to observe in specific time which is the voiced area. Thus, almost all of the audio recording have a sample rate, $F_s=48000$ Hz.

Between each number of Malay Language & English Language:

- The output signals of each number 1~10 for Malay Language are vary because of the way of pronunciation and noise are different.
- The peak of amplitude is also varying for number 1~10 because of the way you speak the number while recording either too loud or otherwise.

- If we consider the 3 environment for each number on **Figure 3.0** and **3.1** the output generate are identically the same because of the pronunciation of the number but the amplitude of the signals is different.
- The Noisy Environment has a bigger amplitude value than the Quiet Environment while the Normal Environment placed in between Noisy and Quiet Environment.
- The reason behind it as mentioned at point 1 & 2 because of the noise of the background sound or the talk loudness.
- Hence, the Quiet Environment is the ideal case of the signals in recording session followed by Normal Environment and lastly and crucial case the Noisy Environment.
- We also can conclude **each number of English language as point above** as the reason are identically the same as **Figure 3.2** and **Figure 3.3**.
- Error: There are some signals which are not followed our conclusion as number "Enam Environment Signals" **Figure 3.0** and "Five Environment Signals" **Figure 3.3**.
- Some reason of the error is because of the talk loudness and the surrounding noise loudness suddenly quiet for a while.

Between Syllables of each number of Malay Language & English Language:

- The purpose of splitting the number into each syllables is to determine whether if there is any different of the signals in terms of pronunciation.
- Since all of the English Language number 1~10 have only 1 syllables hence the output signals generated are as **Figure 3.7**.
- While Malay Language number are splits into 2 syllables for number 1,2,3,4,5,6,7 & 8, **Figure 3.4** and **Figure 3.5** while 3 syllables for 9 & 10 **Figure 3.6**.
- For 1 syllables on English Language and 2 syllables on the Malay Language, it is hard to determined which one have the ideal signals between the 3 Environments waveform because of the overlapping but as we can see the amplitude of each number are different on specific time.
- But, we can see clearly the different on the 3 Syllables Malay Language which is number "Sembilan" which is the *green colour* line & "Sepuluh" which is the *black colour* line signals.

- The amplitude for the both signals are different on a specific time even under the same 3 Syllables pronunciation.
- Hence, we can conclude that the pronunciation of each Syllables number are different and can affect the signal amplitude on the specific time.
- We can also use this conclusion if we compare both **English and Malay Language** together which mainly the reason of the signals being different because of the pronunciation of each number.

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- (2020, July 25). Retrieved November 28, 2021, from <https://www.youtube.com/watch?v=UGChHxnuLSE>
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