

# **CERTIFICATION OF APPROVAL**

## **Sign Language Learning Web Application**

by

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Approved by,

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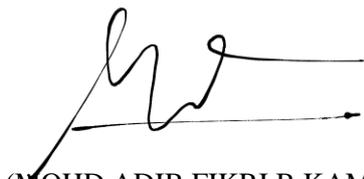
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Ts Faizal B Ahmad Fadzil

UNIVERSITI TEKNOLOGI PETRONAS

## **CERTIFICATION OF ORIGINALITY**

This is to guarantee that I am liable for the work submitted in this venture, that the first work is my own work besides as determined in the references and affirmations, and that the first work contained in this have not been embraced or done by undefined sources or people.

A handwritten signature in black ink, consisting of stylized cursive letters, positioned above the printed name.

(MOHD ADIB FIKRI B KAMAR)

## **ABSTRACT**

The deaf and mute community tend to face difficulty with communicating within our society on a daily basis. This community uses Malaysia Sign Language(MySL) to communicate which consists of different gestures of the hand that signals different meaning. This project aims to remove the communication barrier between normal and verbally-challenged people by developing a sign language learning web application that can act as a dictionary. Having this system built could help encourage people to learn and develop their skill in MySL. Other than miscommunications, hearing impaired communities also face difficulty in building relationships with hearing people, acquiring jobs and the general ignorance of hearing people to attend to the needs of the hearing impaired. For the minority of people who have to deal with deaf people on a regular basis, a majority of these people are unwilling to put up the time to study MSL or have to rely on undependable impromptu signs that only cover a small portion of communication and are unable to converse as fluently as those who sign with MySL.

## **ACKNOWLEDGEMENTS**

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## Table of Contents

<b>CERTIFICATION OF APPROVAL</b> .....	<b>i</b>
<b>CERTIFICATION OF ORIGINALITY</b> .....	<b>ii</b>
<b>ABSTRACT</b> .....	<b>iii</b>
<b>ACKNOWLEDGEMENTS</b> .....	<b>iv</b>
<b>LIST OF FIGURES</b> .....	<b>vi</b>
<b>CHAPTER 1: INTRODUCTION</b> .....	<b>vii</b>
<b>1.1 Background of Study</b> .....	<b>vii</b>
<b>1.2 Problem Statement</b> .....	<b>viii</b>
<b>1.3 Objectives</b> .....	<b>ix</b>
<b>1.4 Scope of Study</b> .....	<b>ix</b>
<b>1.5 Significance</b> .....	<b>ix</b>
<b>CHAPTER 2: LITERATURE REVIEW</b> .....	<b>x</b>
<b>2.1 Sign Languages in Malaysia</b> .....	<b>x</b>
<b>2.2 Hearing Loss and Deafness (Ruben, 2007)</b> .....	<b>xii</b>
<b>2.3 Hearing Impairment from the Islamic Perspective</b> .....	<b>xiii</b>
<b>2.4 FAKIH: A Method to Teach Deaf People ‘Reading’ Quran</b> .....	<b>xiv</b>
<b>2.5 Teaching JAWI Using Android-Based Mobile Application</b> .....	<b>xv</b>
<b>CHAPTER 3: METHODOLOGY</b> .....	<b>xvi</b>
<b>3.1 Research Methodology</b> .....	<b>xvi</b>
<b>3.2 Flowchart</b> .....	<b>xviii</b>
<b>3.3 Technology Tools</b> .....	<b>xix</b>
<b>3.4 Gantt Chart</b> .....	<b>xx</b>
<b>CHAPTER 4: RESULTS AND DISCUSSION</b> .....	<b>xxi</b>
<b>CHAPTER 5: CONCLUSION</b> .....	<b>xxiii</b>
<b>References</b> .....	<b>xxiv</b>

## LIST OF FIGURES

Figure 1 Percentage of Similarities in the use of MySQL in different state.....	xi
Figure 2 Anatomy of Normal Human Ear.....	<b>Error! Bookmark not defined.</b>
Figure 3 Prototyping Methodology.....	xvi
Figure 4 Flowchart Diagram of BIM Web Application.....	xviii
Figure 5 Homepage My-Isyarat.....	xxi
Figure 6 Result of keyword search.....	xxi
Figure 7 MySQL Alphabets Spelling.....	xxii

# CHAPTER 1: INTRODUCTION

## 1.1 Background of Study

If someone is physically disabled such as hearing impairment or physically mute how do they communicate? The easiest and prominent way for communication for this group of people is by performing certain actions by hands which has some meaning known as sign language. In Malaysia, the deaf and mute communication has been using MySL, also known as Malaysian Sign Language and has been the major mode of communication in all states in Malaysia for the hearing impairment community. The main question would be how the deaf community communicate with normal people who does not know any form of sign language. My motivation gets its roots from this thought.

Addition to that, there are growing numbers of classes held and hosted by the deaf community for learning sign language. This motive is driven to promote and upheld the usage of MySL in society. Such classes were performed throughout the country by the *Persekutuan Orang Pekak Malaysia* (MFD) and received huge support from the people of Malaysia (Mohamed Sazali Shaari, 2004).

Furthermore, the usage of MySL can be an impact for learning and teaching of Islamic studies for the deaf community (Hamdi Ishak, 2010). This claim received vast support from teachers at the Proceedings of the 4<sup>th</sup> International Conference on Teacher Education. According to them, the usage of sign language in teaching can aid in the learning process and ease of understanding for the deaf and mute community. Not only that, it can attract many from the community to learn about Islam since they will be able to understand and comprehend the teachings taught through the common sign language.

## 1.2 Problem Statement

Assuming that the person trying to communicate with a deaf person and have no prior knowledge of MySL, there are several problems with current solutions to bridging the gap of communication between the hearing impaired community and normal people. Listed below are some of the challenges faced:

### 1. Impracticality of Books

To attend the need of facilitating the learning of sign language, books are unarguably effective and irreplaceable. However, this source is unreliable to act as a direct translator during conversations seeing that it is impractical to carry books around all the time.

### 2. Time and Money

Realistically, not many people would spend their time, money and effort on taking sign language classes. Those who do are those who have to deal with deaf people on a regular basis such as family and friends as well as social workers who directly deal with the hearing impaired. Hence, a huge portion of the population does not see the need and justification of allocating time and money to attend classes.

### 3. Tediousness of Writing

The most common way of interacting with the deaf is to write down the words that the person would like to convey. Similarly as books, it is tedious and pen and paper is not guaranteed will always be around unlike mobile phones.

### **1.3 Objectives**

1. To identify the criteria that determine what functions should be included in the BIM Learning Web Application
2. To examine the Malaysian Sign Language and investigate the existing related applications in order to attain a firmer grasp on the language and its structure.
3. To develop an application that will facilitate learning MSL and allow for communication between deaf and hearing people.

### **1.4 Scope of Study**

The need to have a firm understanding on MySL is indisputably important to understanding the language structure as well as having a complete set of signs for numerous different situations. Therefore, further research on MySL will be conducted to address these issues. The findings will go into providing a database of all the signs to implement within the application. The findings will go into determining what functions are absolute necessities to be put into the application. However, there are subtle differences in the use of MySL among different states. In this study, only the MySL used within the state of Kuala Lumpur will be used during the research and development of this project.

### **1.5 Significance**

In order to understand the relevancy and justification in pursuing the project, we must look at how engaging in this project will address the problems that is stated in the problem statement and the impact it gives. Hence, we must understand the cruciality and potentiality in which the project could benefits the hearing impaired community and society as a whole. Since the application will help in learning and understanding sign language it will minimize the problems faced by deaf people especially in bridging the gap of communication. Moreover, the project has potential to allow deaf people build stronger bond with hearing people as more people are attracted to learning the signs.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.1 Sign Languages in Malaysia**

A man in the 1960s named Mr. Tan Yap, who is an advocate for the deaf community went to study American Sign Language(ASL) at Gallaudet University in Washington D.C. After learning the signs he then introduced the method to the Education of Deaf in Malaysia. He then developed a system of sign for the use of teaching Bahasa Malaysia at a school in Johor. ASL then became the basis for further development on other forms of sign languages used in Malaysia today, namely the Kuala Lumpur Sign Language (KLSL) and Malaysian Sign Language. Prior to the usage of these two languages, there also existed Penang Sign Language(PSL) which was developed by the indigenous Penang students which catered to deaf people. Over the years, the usage of KLSL and PSL diminished and MSL becomes the dominant sign language used within the hearing impaired community in Malaysia.

The practice of MSL however, changes as we go throughout other states. The next table shows a study on similarities percentage of different states on the use of MSL.

### Percentage of Similarities in the use of MSL in Different States

<b>JHR</b>	<b>JH</b>														
	<b>R</b>														
<b>KDH</b>	64	<b>KD</b>													
		<b>H</b>													
<b>KEL</b>	68	72	<b>KE</b>												
			<b>L</b>												
<b>KL</b>	72	80	80	<b>KL</b>											
				8	<b>ME</b>										
<b>MEL</b>	75	75	75	2	<b>L</b>										
				7											
<b>N9</b>	69	74	79	9	74	<b>N</b>									
				7											
<b>PHG</b>	75	67	80	5	72	74	<b>PH</b>								
				8			<b>G</b>								
<b>PNG</b>	70	76	79	8	75	74	74	<b>PN</b>							
				8				<b>G</b>							
<b>PRK</b>	72	73	78	0	74	78	77	76	<b>PR</b>						
				8					<b>K</b>						
<b>PER</b>	71	77	83	4	75	80	75	84	80	<b>PE</b>					
				8						<b>R</b>					
<b>SBH</b>	73	68	75	0	69	72	72	76	75	74	<b>SB</b>				
				8							<b>H</b>				
<b>SW</b>				8								<b>SW</b>			
<b>K</b>	68	72	76	3	81	73	68	79	71	80	70	<b>K</b>			
				7											
<b>SEL</b>	68	68	73	5	73	73	71	70	74	76	66	70	<b>SE</b>		
				7									<b>L</b>		
<b>TER</b>	68	63	73	4	71	65	75	69	74	75	69	68	69	<b>TE</b>	
														<b>R</b>	

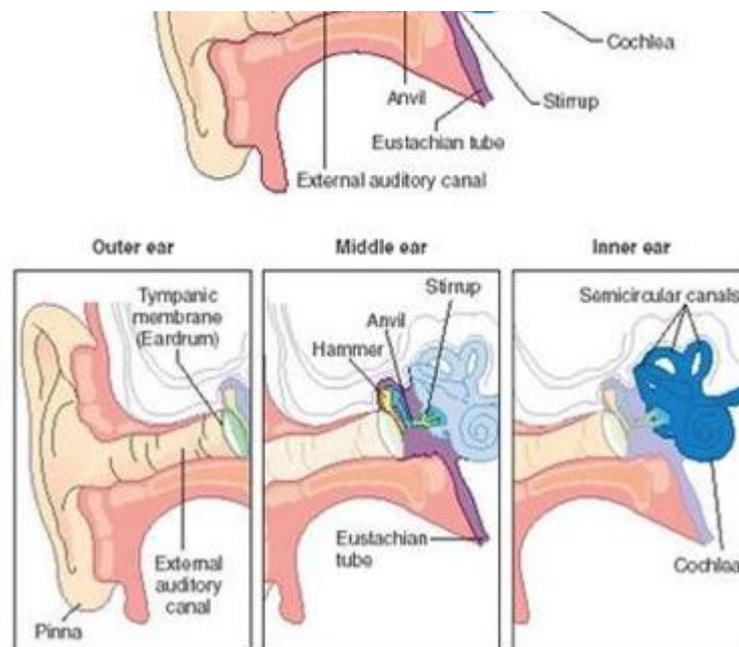
JHR – MSL variation used in Johor  
 KEL – MSL variation used in Kelantan  
 MEL – MSL variation used in Melaka  
 PHG – MSL variation used in Pahang  
 PRK – MSL variation used in Perak  
 SBH – MSL variation used in Sabah  
 SEL – MSL variation used in Selangor

KDH – MSL variation used in Kedah  
 KL – MSL variation used in Kuala Lumpur  
 N9 – MSL variation used in Negeri Sembilan  
 PNG – MSL variation used in Penang  
 PER – MSL variation used in Perlis  
 SWK – MSL variation used in Sarawak  
 TER – MSL variation used in Terengganu

Table 1 Percentage of Similarities in the use of MySL in different states

## 2.2 Hearing Loss and Deafness (Ruben, 2007)

When we think about hearing loss, automatically we would think that they are unable to hear anything at all. However, this is not true as hearing loss can range from mild to intense. This can be caused by injury, genetic defects, disease and even ageing. If someone is found to be deaf since birth it is called as congenital hearing loss whereas, hearing loss after birth is often called acquired hearing loss. Study shows that the most common way people acquire acquired hearing loss is due to noise. This is because being exposed to loud noises for an extensive period can cause damaged cells and membranes in the cochlea.



## **2.3 Hearing Impairment from the Islamic Perspective**

This literature focuses on several studies which are the importance of sense of hearing from Islamic and scientific perspectives, impacts of hearing impairment, limitations in understanding and practicing Islamic teaching due to hearing impairment, Islamic responsibility towards people with hearing impairment, current available methods to facilitate Islamic practices among hearing impaired community and incorporating Islamization in hearing care practice. The verse ‘hear’ and ‘listen’ are mentioned in the Quran frequently as well as the word ‘obey’ which reflects a strong relation between *Iman* and hearing. Belief and social relation in Islamic concepts will required high order of thinking ability in order to understand. There is a possibility that children and adults with hearing impairment have difficulties in understanding Islamic concepts as moral reasoning and human cognitive development solely rely on their ability to hear.

## **2.4 FAKIH: A Method to Teach Deaf People ‘Reading’ Quran**

In this study, the author mentioned that when it comes to teaching Quran, they have implemented the ‘skip’ method, meaning that they are not teaching Quran to their students due to some constraints. Hearing impaired students often face difficulty when it comes to mastering the skill of reading the Quran using sign language since there are limited sign codes available that translates the verses in the Quran. Not only that, methods to memorize the signalling phrases contained in the Quran’s *tajweed* has not been created. Addition to that, these students have the thought of unimportance in reading and understanding the Quran due to their disability and difficulty of reading the Quran.

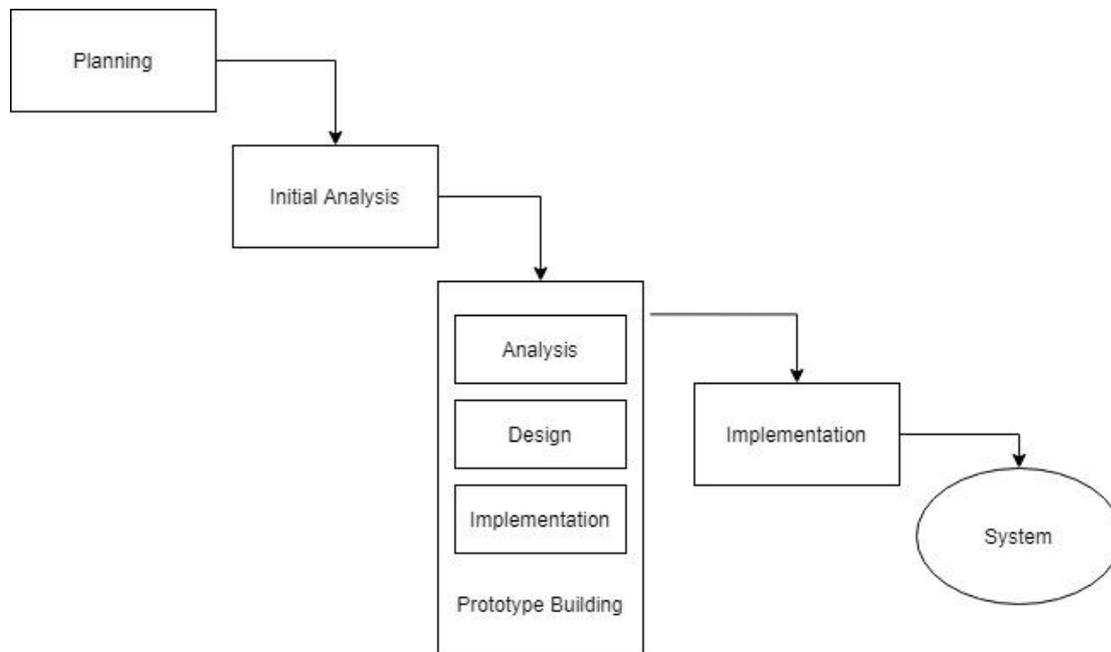
The FAKIH method stated in this literature is to help Quran literate by applying coloured and numbered techniques to represent each Arabic alphabet in the Quran. However, hearing impaired people recites the Quran by using sign language and this method highlights the issue in the lack of teaching material and learning aids in Islamic knowledge for teaching children with learning disability.

## **2.5 Teaching JAWI Using Android-Based Mobile Application**

This literature focuses on the design and development processes of an android-based application called Jom Pandai Jawi. It provides three different modules named Jom Kenal Huruf, Jom Tulis Huruf and Aktiviti. The application is not only interactive but the developer also included a cartoon mascot to stress the importance of animated character to increase the effectiveness of learning especially among children. Interactive activities on the mobile application uses the concept of drag and drop. It starts with the user clicking the button ‘Start’ and then match the letter by the sound of the animated character. When the user gets the wrong answer a trombone sound effect will be come out, whilst the answer is correct the animated character will applaud and cheering sound effect can be heard.

## CHAPTER 3: METHODOLOGY

### 3.1 Research Methodology



*Figure 2 Prototyping Methodology*

The methodology used to conduct the research on the project is the prototyping model. This methodology is chosen because there are several uncertainties concerning the development of the project that could change the implementation of certain functionalities to be featured within the system. The development of the application is made easier using this methodology as it allows for active participation of the developer and its target users. This will allow for early testing and ease of determining what works and what needs to be improved upon during the development of the system. Given the limited time given the prototyping methodology allows for faster development of the system. By using the prototype method, it allows for a smooth development cycle as it allows for a better understanding on the final product.

#### 1. Planning Phase

Research during the planning phase must be conducted before the development can take place. Research helps to determine what criteria needs to be scrutinized in order to establish an understanding on the basic requirements of the system. Further research on the problem of

communication barrier between the deaf and hearing people will aid in setting the benchmark on the basic functionalities of the system.

## 2. Analysis Phase

The analysis phase is conducted by gathering data and statistics which determines the specification and requirements for the system. Any incomplete requirements during this phase will be addressed during the prototyping phase. The deliverables for this phase will give way for the design of the prototype.

## 3. Prototyping Phase

Development for the prototype of the system will occur during this phase. This is to allow for several testing on the product in order to validate the system's specifications and requirements, tackling any design flaws and address newly discovered requirements. This phase will take some time and repetitively done until the prototype reaches its desired outcome.

## 4. Implementation Phase

Upon finishing the initial prototype of the system and reaching a significant level of approval in terms of performance and executability, implementation of the system is conducted with the target user. In this case, the implementation of the system will occur between a deaf and a hearing person to determine whether or not the system achieves its set purposes in helping the user to learn new sign language. At the end of this phase, the final product, the development of the system is complete and the application is the final deliverable of the project.

### 3.2 Flowchart

The figure below shows the proposed flowchart of the system, the user will be directed straight to the homepage whereby they are able to input a word for search or click on tabs that offers them to learn MySQL alphabets or view the list of categories. After a word search, the system will display the image or video that shows how to perform the related hand gesture. If they were to click on MySQL alphabets tab, a list of alphabets will be shown and they can click on each of the alphabets to understand how to perform the hand gesture. Once the user clicks on the categories tab, a list of categories will be displayed for the user to choose. When the user has chosen its desired category, a list of word contained in the category will be displayed and the hand gesture performance will be shown to the user once they have decided to click on a word.

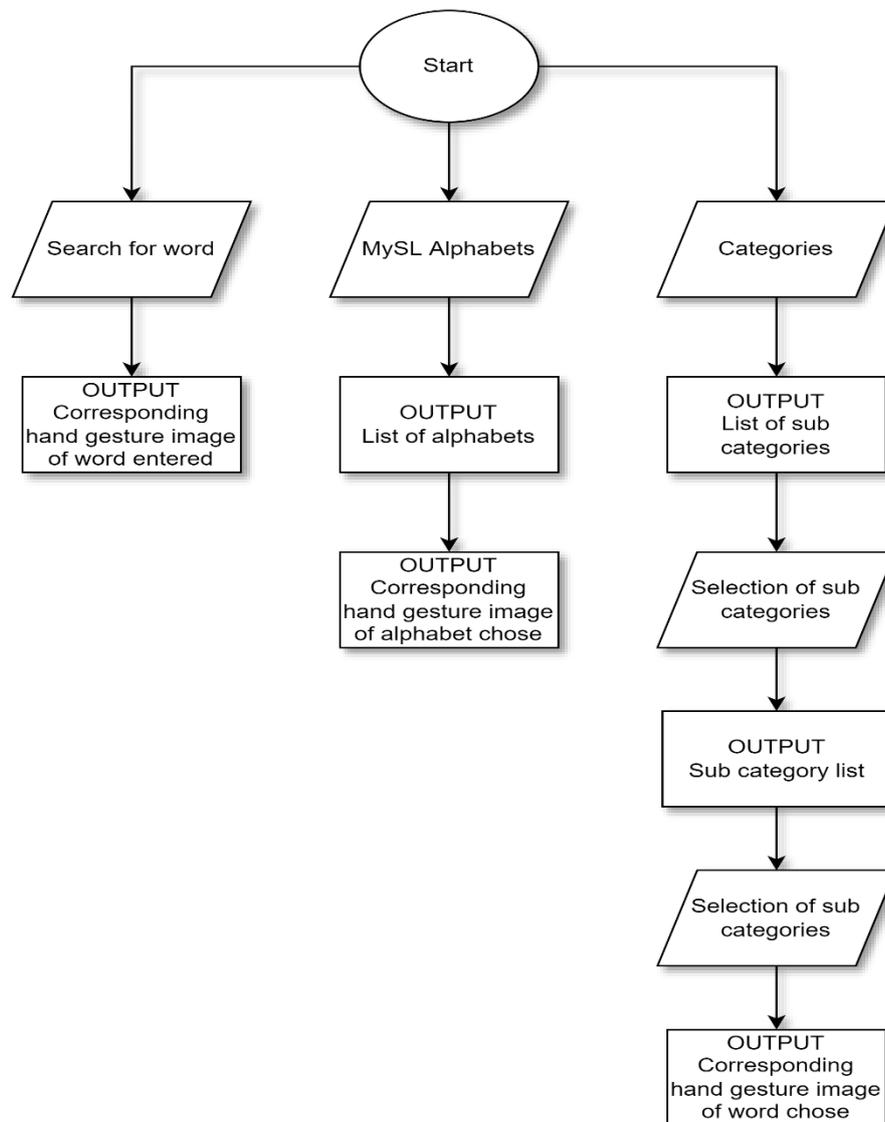


Figure 3 Flowchart Diagram of BIM Web Application

### 3.3 Technology Tools

Category	Specification
Dataset	A total of 25 images and 53 videos containing Malaysian Sign Language gestures were inserted into the database.
Development Tools	React JS – an open-source JavaScript library that is used to build user interface.
	Django REST Framework – a package built on top of Django for creating web APIs.
	Visual Studio Code – a source-code editor which can be used with a variety of programming languages including Java, Javascript, Python and C++.

### 3.4 Gantt Chart

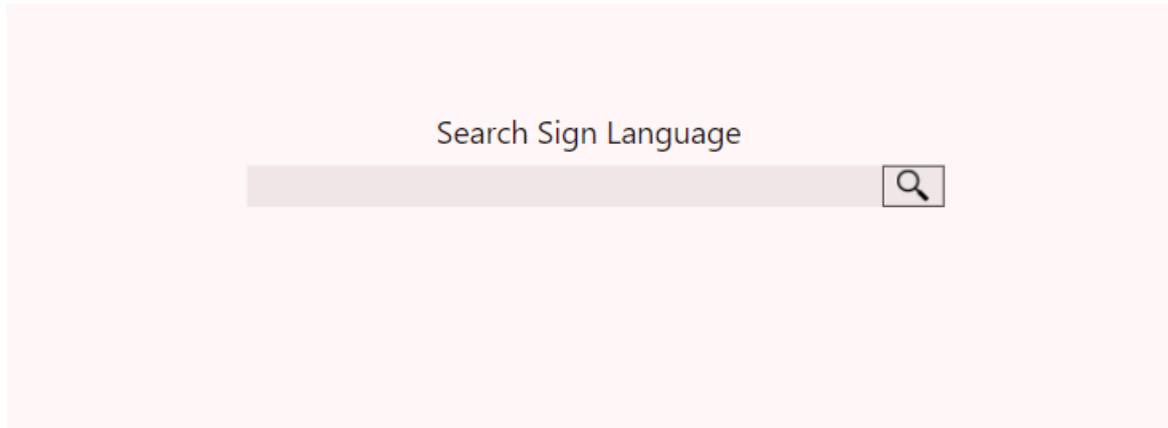
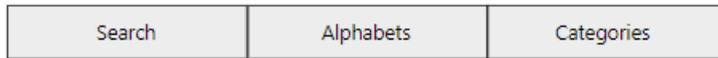
		Week											
No	Project Activities	1	2	3	4	5	6	7	8	9	10	11	12
1	Dataset and Tools Collection	■	■										
2	Coding of application			■	■	■	■	■	■	■	■		
3	System Testing					■	■	■	■	■	■	■	
4	Implementation											■	
5	Presentation												■

Table 2 FYP 2 Gantt Chart

## CHAPTER 4: RESULTS AND DISCUSSION

The homepage of the website will direct the user straight to the search menu. On the page, user will also be able to navigate to tabs such as alphabets and categories.

My-Isyarat



*Figure 4 Homepage My-Isyarat*

The search bar allows you to search for a hand gesture using a keyword that you want to find. The search bar can be found on the home page of the website which allows the user to quickly find the hand gesture after typing the keyword. This quick access for the search bar can be useful when the user is in a hurry of finding out their answer.

My-Isyarat



Keyword

Islam

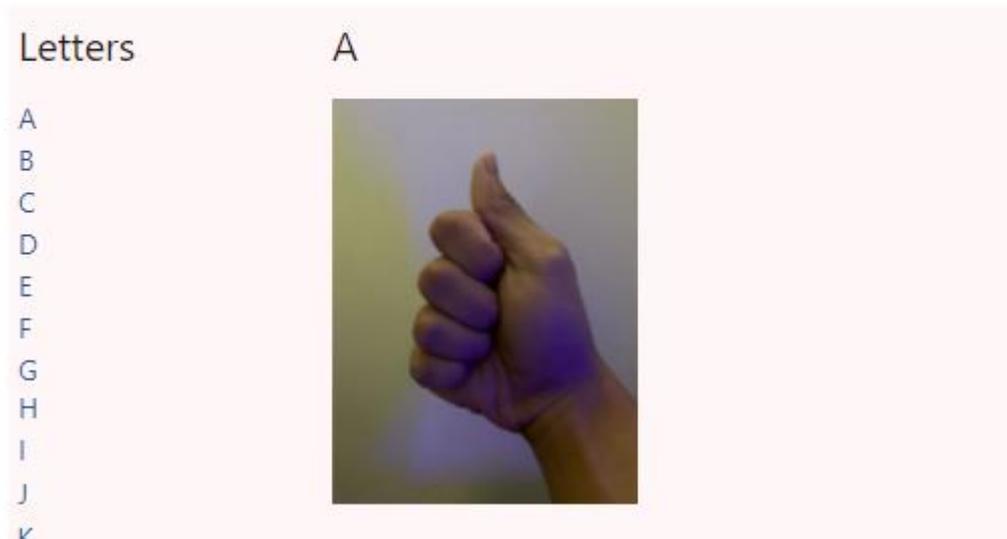


*Figure 5 Result of keyword search*

The next available menu is the MySL Alphabets fingerspelling. In this part of the website, users can navigate through each of the following alphabets and the system will show its respective hand gestures. Fingerspelling will be displayed as images which enables the user to copy the gestures easily.

## My-Isyarat

Search	Alphabets	Categories
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*Figure 6 MySL Alphabets Spelling*

## **CHAPTER 5: CONCLUSION**

The project desires an outcome of developing a sign language learning web application which can benefit the hearing impaired and normal people. By using the application, students and teachers alike can increase their knowledge of sign language interpretations especially in Islamic studies. In conclusion, this initiative takes aim to strengthen the skills of hearing impaired students and social workers with their understanding of sign language is MySQL. It is hoped that with this innovation, more people will be keen to learn and obtain the same benefits. Not only that, it is hope that more people will contribute to learning sign language as a medium to interact with the hearing impaired and for social interactions.

Future work and study, includes adding more features into the application. Some examples can be a section whereby users can test their MySQL skills by taking an online quiz. Not only that, more data should be included in the database to offer more variety of keyword searches.

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