

# Data Set Generation of Pakistan Sign Language.

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## **Dedication**

We have successfully completed our work with the help of All Mighty Allah, under the supervision of Sir Nabeel Sabir. We dedicate this project of ours to Sir Nabeel Sabir and the other staff of UMT who were very kind, helping and dedicated there time in this project. We also dedicate it to our family and friends. We got great help and support from the deaf students of UMT as well as the deaf students of various other institutes we visited personally who made us learn sign language, so we also dedicate this project to them as well.

## Final Approval

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## **Acknowledgment**

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<b>Project Title</b>	<b>DataSet Generation of Pakistan Sign Language</b>
<b>Objective</b>	<b>Communication between normal and deaf people</b>
<b>Undertaken by</b>	<b>Syed Annus Ali Shah and Muhammad Hassan</b>
<b>Supervised by</b>	<b>Prof. Dr. Nabeel Sabir</b>
<b>Starting Date</b>	<b>28 Nov 2018</b>
<b>Tools Used</b>	<b>HamNoSys Keyboard, Sigml Conversion tool, PHP, HTML</b>
<b>Operating System</b>	<b>Window, MacOS</b>
<b>Documentation</b>	<b>Microsoft Office</b>

## **Plagairism Report**

## REVISION CHART

Version	Primary Author(s)	Description of Version
<i>Requirement Analysis</i>	Syed Annus Ali Shah	Gathered all the information so as to develop a helpful corpus.
<i>Data Collection 1</i>	Syed Annus Ali Shah	Gathered information regarding the most often used words through books of deaf and by visiting various deaf centers.
<i>Data Collection 2</i>	Muhammad Hassan	Captured videos of all words that were finalized in “Data Collection 1”.
<i>Data Conversion 1</i>	Muhammad Hassan	All the videos were then automated using Sign Imitator Avatar and HamNoSys of those signs were created.
<i>Revision of Data Conversion 1</i>	Syed Annus Ali Shah	Did revision of all HamNoSys and increased their accuracy.
<i>Website Development</i>	Syed Annus Ali Shah	Development of website step by step and interface by interface.
<i>Creation of Database</i>	Muhammad Hassan	Created a database and stored the data in it.
<i>Creation of Admin Panel</i>	Muhammad Hassan	Created an admin panel for administration.
<i>Revision 1</i>	Syed Annus Ali Shah	Overviewed the user interface and functioning of admin panel
<i>Revision 2</i>	Syed Annus Ali Shah	Enhanced the User Interface and fixed bugs
<i>Revision 3</i>	Syed Annus Ali Shah	Verification of complete data set by deaf persons and various other techniques
<i>Final</i>	Syed Annus Ali Shah	Finalized the interface and further functionalities of the website.

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## Definitions and Acronyms

<b>Acronym</b>	<b>Definition</b>
HamNoSys	Hamburg Notation System
PSL	Pakistan Sign Language

**Table 1: table of acronym and definition**

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# 1. INTRODUCTION

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Peoples in this world interact and communicate with each other. Language plays a role to make communication possible. The peoples having the ability to talk can reduce their communication gap by learning different languages. On the other hand there is large number of population in every country who has a deficiency of hearing and speaking. Due to this deficiency they become unable to communicate with a normal person or to express their ideas to them. As many countries have made their own corpus for their sign language but there is no corpus for PSL (Pakistan Sign Language). It is basically a dictionary for the words used by deaf in daily routine. Corpus made these words used as machine readable. Corpus consists of words and videos of the signs.

The people of Pakistan have strong cultural preference for consanguineous marriage and prevalence of recessively inherited disorders. This consanguineous marriage causes many disabilities in the new generation of which deafness (Lack of hearing) is one of them. Deafness is the disability to hear normally whether permanent or fluctuating. It is clinically and genetically heterogeneous and can be caused through environment as well as genetic factors. It is estimated that the hearing disability is 1.6 per 1000 in Pakistan and 70% of hearing loss arises from consanguineous–families. It is estimated that about 10% of genetic disorders are caused due to consanguineous marriages, in most of the middle-east the percentage is 30%, while in Pakistan it is about 40%. According to WHO 278 million peoples worldwide have disability to hear. This could increase up to 700 million by 2015 and up to 900 by 2025.

## 1.1 Motivations

The literacy rate of Pakistan is about 55% and is ranked seventh among the most populated countries in the world. Keeping in view the low literacy rate of Pakistan it is our responsibility to avail each and every opportunity to support and educate the special peoples.

There were three schools working for the special need at the time of Independence. Now with the mutual corporation Chief Minister there are 48 special schools. Deaf students are educated separately in Pakistan from the beginning in special schools. The system of educating deaf students separately is good as well as bad at the same time. As the deaf students are kept separate with limited contacts which make them feel isolate from the outside world. Due to this the deaf doesn't feel free to communicate with normal person or to share their thoughts openly because of shy. We are actually working to minimize this gap as much as possible.

## 1.2 Problem Statement

To overcome such above mentioned gap between the deaf and the normal person we have to work on a system that could provide information of possible sign of a word that one could use to learn and use in communication. Till now this job was handled by a human interpreter that used to listen from normal person and then perform signs to explain it to the deaf and vice versa. This was all due the limited resources. Unfortunately very less work is done of sign language to natural language translation for the deaf in Pakistan that

is on only one website ([www.PSL.org.pk](http://www.PSL.org.pk)). The words on this website are also not completely part of Pakistan sign language.

#### **1.2.1 Existing issues**

- The most of the sign of the words available are not part of Pakistan sign language.
- The videos stored on the website consumes more space as they are recorded on high resolution.
- These video requires lot of bandwidth to download.
- Difficult to manage and maintaining large amount of data.

#### **1.2.2 Effectuated groups**

- The Deaf or hard listener
- The normal person trying to communicate with a deaf person

## 2. CORPUS

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### 2.1 What is corpus

Corpus is derived from Latin word meaning body that refers to the text in the written or spoken form. Pakistan Sign Language Corpus is a dictionary of videos and words. Videos are made on deaf people performing signs of the words used in their daily routine. It also consists of sentences that they use. The information in corpus is very useful for the deaf school going children in their education and for the teachers who teach them. It allows the beginners to understand the PSL structure and its use. Interpreters could easily get through it. Signs used in the corpus are single handed and double handed.

#### 2.1.1 GRAMMER

PSL has its own grammar. It is different from the ordinary language grammar. Pakistan sign has three major aspects of the language that consists of:

1. Lexicon
2. Syntax
3. Spatial Grammar

##### 2.1.1.1 LEXICON:

It is the vocabulary of the language. It is the language inventory of lexemes.

##### 2.1.1.2 SYNTAX:

It is the arrangement of words to form a sentence in any language. Syntax consists of the principles and rules of any language.

##### 2.1.1.3 SPATIAL GRAMMAR:

In composition, *spatial* order is a method of organization in which details are presented as they are (or were) located in space—such as, from left to right or from top to bottom. It is also known as order of place or space structure

### 2.2 Why we need Corpus

Everything starts with language. It's fundamental to our thoughts, relationships, and civilizations. As before there is no such corpus for the help of deaf community in Pakistan. So we filled this gap by making corpus for the deaf community so that they could also progress in their life and do work as a common man does. Pakistan has almost 7.4% of deaf population it is rather not much but not least also they have to suffer a lot before but after this they will not be suffering more. Only 2% of deaf community children goes to school for education others suffer. Deaf could not explain any problem as they have no standard language to do so. Although PSL (Pakistan Sign Language) is available but it is not completely based on sign language used in Pakistan, it also consists of sign of words used in other countries such as India (ISL), America (ASL) etc. We are providing a complete platform to the deaf community where can go through it in other words we are giving them the tongue to speak and interact with the world. We are providing the standard form of the PSL.

## 2.3 How we made Corpus

We learned many things while making the corpus, which are very important for professional life. We worked in the form of a team. We managed the team and specified the duties of every member of the team. Making corpus was not easy because it was a task which involved many steps, described below.

There are several steps involved in making the corpus.

- ❖ Preparing list of words which is to be added in corpus.
  - Analyze the words which are used in daily life by deaf person to communicate with normal person or deaf.
  - Words often used in children's books and stories.
  - Verbs
  - Greeting sentences like
    - a. How are you?
    - b. Salam.
    - c. Welcome
    - d. Sit down.
- ❖ On the base of selected words the videos of sign of words were performed by the deaf in Deaf Center of University of Management and Technology.
- ❖ The instructor of deaf confirmed these videos.
- ❖ We the generated Sigml of the videos so that they can be understood by graphical avatar.
- ❖ We cannot use the actual videos because the size of data will increase and will require more resources such as storage and bandwidth.
- ❖ That's why we had to generate Sigml of the videos.
- ❖ Following are the steps to generate Sigml:
  - First make HamNoSys of the word (HamNoSys Hamberg Notation System)
  - Generate Sigml of word through hamnosys with online compiler.
- ❖ This step is repeated many times to maximize the accuracy of the HamNoSys so that deaf can understand the sign as there are some limitations in avatar which is a barrier in making 100% accuracy.

The first step is to analyze the words which are often used in our life, for this purpose we examined daily conversation and after that those words were separated which were very common. For the purpose to facilitate the deaf person and specially for the children we studied their books which are being taught to children in schools and the stories for the children just like thirsty crow, greedy fox etc.

This process required the team's full attention and dedication because the process involves some steps in which we were analyzing data, in some steps we

performed normal work like making videos and in some steps we are doing very critical task just like making HamNoSys.

We made some sentences and joined the Sigml of the words to create avatar sentence. Then we gave them a little quiz to deaf in which we showed them the sentences in avatar and they were given 4 choices and they had to choose right one. This step was very important because if the deaf cannot understand what we are making then this is total wastage of time. The quiz gave very positive result, more than 80% choices were correct and they understood the avatar sentences. The other 20%, which was resulted in failure is because of the limitation of avatar and Sigml and the other reason is that the deaf are not familiar with avatar it will take some time to be familiar with avatar and at that time the difference of 20% will be minimized. Most of the avatar signs are exact as original and some are roughly exact but the overall result is that it is the future of deaf.

## **2.4 Why only these words**

At the time of collection of perfect data set of words it was our goal to select the words which were more commonly used in daily life of a deaf person. For this purpose we visited various deaf centers, also the deaf center of UMT and interacted with the interpreters. We also went through the course through which the deaf students learn. Through this effort we got the perfect data set of words that could accommodate the deaf person in a better manner.

## **2.5 Methodology of corpus**

The selection of most frequently used words and then to verify those words by deaf was not an easy task. It took lots of time and effort to finalize a data set. For the selection of most frequently used words we had to visit various deaf centers and go through different books that the centers used to educate the special children. We also spent time in watching deaf communicate to each other with an interpreter to short list words.

The task doesn't end here, only finalizing the data set of most frequently used words doesn't make the job done, the signs of those words now has to be verified by the deaf community. For this purpose we prepared a small quiz to be performed by deaf in which we gave them six questions with four choices of answer each. We made them watch the sign of word performed by our graphical avatar and then choose the word from four choices. It helped us to know that either the sign performed by an avatar is recognizable by the deaf or not because it was no use if they couldn't recognize them. With the help of this survey we came through the conclusion that 80% of the signs were recognizable by the deaf and the rest 20% was remain due to the limitation of graphical avatar. This survey encouraged us a lot and increased our moral to further work for this cause.

## 2.6 Various Sign writing techniques

Sign writing was first developed by a dancer Valerie Sutton by the name Sutton Dance Writing to annotate dance movements. Then developed SW for gestures of sign language. SW was capable to handle manual as well as non manual features. Other sign writing techniques are described below

### 2.6.1 Stokoe

Stokoe was developed by William Stokoe in the year 1960. It was the first notation developed for sign language. Most of the other sign writing techniques e based on Stokoe as it introduced the concept of segmenting signs into phones and phonemes. Its technique consist the following features:

- Hand configuration
- Place of articulation
- Movement

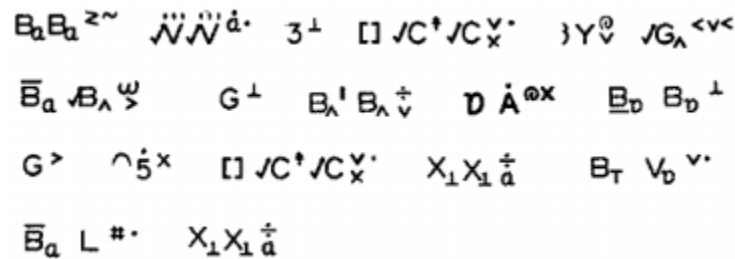


Figure 1: Example of Stokoe notation

Stokoe brought advancement in the field of sign writing but is now outdated. It is not considered as a good way of sign representation as it is not capable

### 2.6.2 Gloss

Gloss notation represents a sign using a word stem from a spoken language. With the help of gloss notation one can describe any degree of detail. It can handle non-manual features, emphasis, classifier predicates etc.

- (Gloss RH English) running hare
- (Gloss LH English) running hare
- (Head) n
- (Brows) f
- (Eye Aperture) s
- (Cheeks) p

Figure 2: Example of Gloss notation

### 2.6.3 Hamburg Notation System

Hamburg Notation System (HamNoSys) was developed by Siegmund Prillwitz in 1984. It was initially Hand written but was then made machine readable by a group of researchers from University of Hamburg. An XML encoding of the HamNoSys was made known as Sign Gesture Makeup Language (SiGML) which was developed by ViSiCast project by Richard Kennaway. Its include features of a gesture such as:

- Hand shape
- Orientation
- Location
- Movement

Those features also make HamNoSys Human understandable as one can see HamNoSys and easy guess the kind of gesture being performed in the sign.

" 𐀀𐀁𐀂𐀃𐀄𐀅𐀆𐀇𐀈𐀉𐀊𐀋𐀌𐀍𐀎𐀏𐀐𐀑𐀒𐀓𐀔𐀕𐀖𐀗𐀘𐀙𐀚𐀛𐀜𐀝𐀞𐀟𐀠𐀡𐀢𐀣𐀤𐀥𐀦𐀧𐀨𐀩𐀪𐀫𐀬𐀭𐀮𐀯𐀰𐀱𐀲𐀳𐀴𐀵𐀶𐀷𐀸𐀹𐀺𐀻𐀼𐀽𐀾𐀿𐁀𐁁𐁂𐁃𐁄𐁅𐁆𐁇𐁈𐁉𐁊𐁋𐁌𐁍𐁎𐁏𐁐𐁑𐁒𐁓𐁔𐁕𐁖𐁗𐁘𐁙𐁚𐁛𐁜𐁝𐁞𐁟𐁠𐁡𐁢𐁣𐁤𐁥𐁦𐁧𐁨𐁩𐁪𐁫𐁬𐁭𐁮𐁯𐁰𐁱𐁲𐁳𐁴𐁵𐁶𐁷𐁸𐁹𐁺𐁻𐁼𐁽𐁾𐁿𐂀𐂁𐂂𐂃𐂄𐂅𐂆𐂇𐂈𐂉𐂊𐂋𐂌𐂍𐂎𐂏𐂐𐂑𐂒𐂓𐂔𐂕𐂖𐂗𐂘𐂙𐂚𐂛𐂜𐂝𐂞𐂟𐂠𐂡𐂢𐂣𐂤𐂥𐂦𐂧𐂨𐂩𐂪𐂫𐂬𐂭𐂮𐂯𐂰𐂱𐂲𐂳𐂴𐂵𐂶𐂷𐂸𐂹𐂺𐂻𐂼𐂽𐂾𐂿𐃀𐃁𐃂𐃃𐃄𐃅𐃆𐃇𐃈𐃉𐃊𐃋𐃌𐃍𐃎𐃏𐃐𐃑𐃒𐃓𐃔𐃕𐃖𐃗𐃘𐃙𐃚𐃛𐃜𐃝𐃞𐃟𐃠𐃡𐃢𐃣𐃤𐃥𐃦𐃧𐃨𐃩𐃪𐃫𐃬𐃭𐃮𐃯𐃰𐃱𐃲𐃳𐃴𐃵𐃶𐃷𐃸𐃹𐃺𐃻𐃼𐃽𐃾𐃿𐄀𐄁𐄂𐄃𐄄𐄅𐄆𐄇𐄈𐄉𐄊𐄋𐄌𐄍𐄎𐄏𐄐𐄑𐄒𐄓𐄔𐄕𐄖𐄗𐄘𐄙𐄚𐄛𐄜𐄝𐄞𐄟𐄠𐄡𐄢𐄣𐄤𐄥𐄦𐄧𐄨𐄩𐄪𐄫𐄬𐄭𐄮𐄯𐄰𐄱𐄲𐄳𐄴𐄵𐄶𐄷𐄸𐄹𐄺𐄻𐄼𐄽𐄾𐄿𐅀𐅁𐅂𐅃𐅄𐅅𐅆𐅇𐅈𐅉𐅊𐅋𐅌𐅍𐅎𐅏𐅐𐅑𐅒𐅓𐅔𐅕𐅖𐅗𐅘𐅙𐅚𐅛𐅜𐅝𐅞𐅟𐅠𐅡𐅢𐅣𐅤𐅥𐅦𐅧𐅨𐅩𐅪𐅫𐅬𐅭𐅮𐅯𐅰𐅱𐅲𐅳𐅴𐅵𐅶𐅷𐅸𐅹𐅺𐅻𐅼𐅽𐅾𐅿𐆀𐆁𐆂𐆃𐆄𐆅𐆆𐆇𐆈𐆉𐆊𐆋𐆌𐆍𐆎𐆏𐆐𐆑𐆒𐆓𐆔𐆕𐆖𐆗𐆘𐆙𐆚𐆛𐆜𐆝𐆞𐆟𐆠𐆡𐆢𐆣𐆤𐆥𐆦𐆧𐆨𐆩𐆪𐆫𐆬𐆭𐆮𐆯𐆰𐆱𐆲𐆳𐆴𐆵𐆶𐆷𐆸𐆹𐆺𐆻𐆼𐆽𐆾𐆿𐇀𐇁𐇂𐇃𐇄𐇅𐇆𐇇𐇈𐇉𐇊𐇋𐇌𐇍𐇎𐇏𐇐𐇑𐇒𐇓𐇔𐇕𐇖𐇗𐇘𐇙𐇚𐇛𐇜𐇝𐇞𐇟𐇠𐇡𐇢𐇣𐇤𐇥𐇦𐇧𐇨𐇩𐇪𐇫𐇬𐇭𐇮𐇯𐇰𐇱𐇲𐇳𐇴𐇵𐇶𐇷𐇸𐇹𐇺𐇻𐇼𐇽𐇾𐇿𐈀𐈁𐈂𐈃𐈄𐈅𐈆𐈇𐈈𐈉𐈊𐈋𐈌𐈍𐈎𐈏𐈐𐈑𐈒𐈓𐈔𐈕𐈖𐈗𐈘𐈙𐈚𐈛𐈜𐈝𐈞𐈟𐈠𐈡𐈢𐈣𐈤𐈥𐈦𐈧𐈨𐈩𐈪𐈫𐈬𐈭𐈮𐈯𐈰𐈱𐈲𐈳𐈴𐈵𐈶𐈷𐈸𐈹𐈺𐈻𐈼𐈽𐈾𐈿𐉀𐉁𐉂𐉃𐉄𐉅𐉆𐉇𐉈𐉉𐉊𐉋𐉌𐉍𐉎𐉏𐉐𐉑𐉒𐉓𐉔𐉕𐉖𐉗𐉘𐉙𐉚𐉛𐉜𐉝𐉞𐉟𐉠𐉡𐉢𐉣𐉤𐉥𐉦𐉧𐉨𐉩𐉪𐉫𐉬𐉭𐉮𐉯𐉰𐉱𐉲𐉳𐉴𐉵𐉶𐉷𐉸𐉹𐉺𐉻𐉼𐉽𐉾𐉿𐊀𐊁𐊂𐊃𐊄𐊅𐊆𐊇𐊈𐊉𐊊𐊋𐊌𐊍𐊎𐊏𐊐𐊑𐊒𐊓𐊔𐊕𐊖𐊗𐊘𐊙𐊚𐊛𐊜𐊝𐊞𐊟𐊠𐊡𐊢𐊣𐊤𐊥𐊦𐊧𐊨𐊩𐊪𐊫𐊬𐊭𐊮𐊯𐊰𐊱𐊲𐊳𐊴𐊵𐊶𐊷𐊸𐊹𐊺𐊻𐊼𐊽𐊾𐊿𐋀𐋁𐋂𐋃𐋄𐋅𐋆𐋇𐋈𐋉𐋊𐋋𐋌𐋍𐋎𐋏𐋐𐋑𐋒𐋓𐋔𐋕𐋖𐋗𐋘𐋙𐋚𐋛𐋜𐋝𐋞𐋟𐋠𐋡𐋢𐋣𐋤𐋥𐋦𐋧𐋨𐋩𐋪𐋫𐋬𐋭𐋮𐋯𐋰𐋱𐋲𐋳𐋴𐋵𐋶𐋷𐋸𐋹𐋺𐋻𐋼𐋽𐋾𐋿𐌀𐌁𐌂𐌃𐌄𐌅𐌆𐌇𐌈𐌉𐌊𐌋𐌌𐌍𐌎𐌏𐌐𐌑𐌒𐌓𐌔𐌕𐌖𐌗𐌘𐌙𐌚𐌛𐌜𐌝𐌞𐌟𐌠𐌡𐌢𐌣𐌤𐌥𐌦𐌧𐌨𐌩𐌪𐌫𐌬𐌭𐌮𐌯𐌰𐌱𐌲𐌳𐌴𐌵𐌶𐌷𐌸𐌹𐌺𐌻𐌼𐌽𐌾𐌿𐍀𐍁𐍂𐍃𐍄𐍅𐍆𐍇𐍈𐍉𐍊𐍋𐍌𐍍𐍎𐍏𐍐𐍑𐍒𐍓𐍔𐍕𐍖𐍗𐍘𐍙𐍚𐍛𐍜𐍝𐍞𐍟𐍠𐍡𐍢𐍣𐍤𐍥𐍦𐍧𐍨𐍩𐍪𐍫𐍬𐍭𐍮𐍯𐍰𐍱𐍲𐍳𐍴𐍵𐍶𐍷𐍸𐍹𐍺𐍻𐍼𐍽𐍾𐍿𐎀𐎁𐎂𐎃𐎄𐎅𐎆𐎇𐎈𐎉𐎊𐎋𐎌𐎍𐎎𐎏𐎐𐎑𐎒𐎓𐎔𐎕𐎖𐎗𐎘𐎙𐎚𐎛𐎜𐎝𐎞𐎟𐎠𐎡𐎢𐎣𐎤𐎥𐎦𐎧𐎨𐎩𐎪𐎫𐎬𐎭𐎮𐎯𐎰𐎱𐎲𐎳𐎴𐎵𐎶𐎷𐎸𐎹𐎺𐎻𐎼𐎽𐎾𐎿𐏀𐏁𐏂𐏃𐏄𐏅𐏆𐏇𐏈𐏉𐏊𐏋𐏌𐏍𐏎𐏏𐏐𐏑𐏒𐏓𐏔𐏕𐏖𐏗𐏘𐏙𐏚𐏛𐏜𐏝𐏞𐏟𐏠𐏡𐏢𐏣𐏤𐏥𐏦𐏧𐏨𐏩𐏪𐏫𐏬𐏭𐏮𐏯𐏰𐏱𐏲𐏳𐏴𐏵𐏶𐏷𐏸𐏹𐏺𐏻𐏼𐏽𐏾𐏿𐐀𐐁𐐂𐐃𐐄𐐅𐐆𐐇𐐈𐐉𐐊𐐋𐐌𐐍𐐎𐐏𐐐𐐑𐐒𐐓𐐔𐐕𐐖𐐗𐐘𐐙𐐚𐐛𐐜𐐝𐐞𐐟𐐠𐐡𐐢𐐣𐐤𐐥𐐦𐐧𐐨𐐩𐐪𐐫𐐬𐐭𐐮𐐯𐐰𐐱𐐲𐐳𐐴𐐵𐐶𐐷𐐸𐐹𐐺𐐻𐐼𐐽𐐾𐐿𐑀𐑁𐑂𐑃𐑄𐑅𐑆𐑇𐑈𐑉𐑊𐑋𐑌𐑍𐑎𐑏𐑐𐑑𐑒𐑓𐑔𐑕𐑖𐑗𐑘𐑙𐑚𐑛𐑜𐑝𐑞𐑟𐑠𐑡𐑢𐑣𐑤𐑥𐑦𐑧𐑨𐑩𐑪𐑫𐑬𐑭𐑮𐑯𐑰𐑱𐑲𐑳𐑴𐑵𐑶𐑷𐑸𐑹𐑺𐑻𐑼𐑽𐑾𐑿𐒀𐒁𐒂𐒃𐒄𐒅𐒆𐒇𐒈𐒉𐒊𐒋𐒌𐒍𐒎𐒏𐒐𐒑𐒒𐒓𐒔𐒕𐒖𐒗𐒘𐒙𐒚𐒛𐒜𐒝𐒞𐒟𐒠𐒡𐒢𐒣𐒤𐒥𐒦𐒧𐒨𐒩𐒪𐒫𐒬𐒭𐒮𐒯𐒰𐒱𐒲𐒳𐒴𐒵𐒶𐒷𐒸𐒹𐒺𐒻𐒼𐒽𐒾𐒿𐓀𐓁𐓂𐓃𐓄𐓅𐓆𐓇𐓈𐓉𐓊𐓋𐓌𐓍𐓎𐓏𐓐𐓑𐓒𐓓𐓔𐓕𐓖𐓗𐓘𐓙𐓚𐓛𐓜𐓝𐓞𐓟𐓠𐓡𐓢𐓣𐓤𐓥𐓦𐓧𐓨𐓩𐓪𐓫𐓬𐓭𐓮𐓯𐓰𐓱𐓲𐓳𐓴𐓵𐓶𐓷𐓸𐓹𐓺𐓻𐓼𐓽𐓾𐓿𐔀𐔁𐔂𐔃𐔄𐔅𐔆𐔇𐔈𐔉𐔊𐔋𐔌𐔍𐔎𐔏𐔐𐔑𐔒𐔓𐔔𐔕𐔖𐔗𐔘𐔙𐔚𐔛𐔜𐔝𐔞𐔟𐔠𐔡𐔢𐔣𐔤𐔥𐔦𐔧𐔨𐔩𐔪𐔫𐔬𐔭𐔮𐔯𐔰𐔱𐔲𐔳𐔴𐔵𐔶𐔷𐔸𐔹𐔺𐔻𐔼𐔽𐔾𐔿𐕀𐕁𐕂𐕃𐕄𐕅𐕆𐕇𐕈𐕉𐕊𐕋𐕌𐕍𐕎𐕏𐕐𐕑𐕒𐕓𐕔𐕕𐕖𐕗𐕘𐕙𐕚𐕛𐕜𐕝𐕞𐕟𐕠𐕡𐕢𐕣𐕤𐕥𐕦𐕧𐕨𐕩𐕪𐕫𐕬𐕭𐕮𐕯𐕰𐕱𐕲𐕳𐕴𐕵𐕶𐕷𐕸𐕹𐕺𐕻𐕼𐕽𐕾𐕿𐖀𐖁𐖂𐖃𐖄𐖅𐖆𐖇𐖈𐖉𐖊𐖋𐖌𐖍𐖎𐖏𐖐𐖑𐖒𐖓𐖔𐖕𐖖𐖗𐖘𐖙𐖚𐖛𐖜𐖝𐖞𐖟𐖠𐖡𐖢𐖣𐖤𐖥𐖦𐖧𐖨𐖩𐖪𐖫𐖬𐖭𐖮𐖯𐖰𐖱𐖲𐖳𐖴𐖵𐖶𐖷𐖸𐖹𐖺𐖻𐖼𐖽𐖾𐖿𐗀𐗁𐗂𐗃𐗄𐗅𐗆𐗇𐗈𐗉𐗊𐗋𐗌𐗍𐗎𐗏𐗐𐗑𐗒𐗓𐗔𐗕𐗖𐗗𐗘𐗙𐗚𐗛𐗜𐗝𐗞𐗟𐗠𐗡𐗢𐗣𐗤𐗥𐗦𐗧𐗨𐗩𐗪𐗫𐗬𐗭𐗮𐗯𐗰𐗱𐗲𐗳𐗴𐗵𐗶𐗷𐗸𐗹𐗺𐗻𐗼𐗽𐗾𐗿𐘀𐘁𐘂𐘃𐘄𐘅𐘆𐘇𐘈𐘉𐘊𐘋𐘌𐘍𐘎𐘏𐘐𐘑𐘒𐘓𐘔𐘕𐘖𐘗𐘘𐘙𐘚𐘛𐘜𐘝𐘞𐘟𐘠𐘡𐘢𐘣𐘤𐘥𐘦𐘧𐘨𐘩𐘪𐘫𐘬𐘭𐘮𐘯𐘰𐘱𐘲𐘳𐘴𐘵𐘶𐘷𐘸𐘹𐘺𐘻𐘼𐘽𐘾𐘿𐙀𐙁𐙂𐙃𐙄𐙅𐙆𐙇𐙈𐙉𐙊𐙋𐙌𐙍𐙎𐙏𐙐𐙑𐙒𐙓𐙔𐙕𐙖𐙗𐙘𐙙𐙚𐙛𐙜𐙝𐙞𐙟𐙠𐙡𐙢𐙣𐙤𐙥𐙦𐙧𐙨𐙩𐙪𐙫𐙬𐙭𐙮𐙯𐙰𐙱𐙲𐙳𐙴𐙵𐙶𐙷𐙸𐙹𐙺𐙻𐙼𐙽𐙾𐙿𐚀𐚁𐚂𐚃𐚄𐚅𐚆𐚇𐚈𐚉𐚊𐚋𐚌𐚍𐚎𐚏𐚐𐚑𐚒𐚓𐚔𐚕𐚖𐚗𐚘𐚙𐚚𐚛𐚜𐚝𐚞𐚟𐚠𐚡𐚢𐚣𐚤𐚥𐚦𐚧𐚨𐚩𐚪𐚫𐚬𐚭𐚮𐚯𐚰𐚱𐚲𐚳𐚴𐚵𐚶𐚷𐚸𐚹𐚺𐚻𐚼𐚽𐚾𐚿𐛀𐛁𐛂𐛃𐛄𐛅𐛆𐛇𐛈𐛉𐛊𐛋𐛌𐛍𐛎𐛏𐛐𐛑𐛒𐛓𐛔𐛕𐛖𐛗𐛘𐛙𐛚𐛛𐛜𐛝𐛞𐛟𐛠𐛡𐛢𐛣𐛤𐛥𐛦𐛧𐛨𐛩𐛪𐛫𐛬𐛭𐛮𐛯𐛰𐛱𐛲𐛳𐛴𐛵𐛶𐛷𐛸𐛹𐛺𐛻𐛼𐛽𐛾𐛿𐜀𐜁𐜂𐜃𐜄𐜅𐜆𐜇𐜈𐜉𐜊𐜋𐜌𐜍𐜎𐜏𐜐𐜑𐜒𐜓𐜔𐜕𐜖𐜗𐜘𐜙𐜚𐜛𐜜𐜝𐜞𐜟𐜠𐜡𐜢𐜣𐜤𐜥𐜦𐜧𐜨𐜩𐜪𐜫𐜬𐜭𐜮𐜯𐜰𐜱𐜲𐜳𐜴𐜵𐜶𐜷𐜸𐜹𐜺𐜻𐜼𐜽𐜾𐜿𐝀𐝁𐝂𐝃𐝄𐝅𐝆𐝇𐝈𐝉𐝊𐝋𐝌𐝍𐝎𐝏𐝐𐝑𐝒𐝓𐝔𐝕𐝖𐝗𐝘𐝙𐝚𐝛𐝜𐝝𐝞𐝟𐝠𐝡𐝢𐝣𐝤𐝥𐝦𐝧𐝨𐝩𐝪𐝫𐝬𐝭𐝮𐝯𐝰𐝱𐝲𐝳𐝴𐝵𐝶𐝷𐝸𐝹𐝺𐝻𐝼𐝽𐝾𐝿𐞀𐞁𐞂𐞃𐞄𐞅𐞆𐞇𐞈𐞉𐞊𐞋𐞌𐞍𐞎𐞏𐞐𐞑𐞒𐞓𐞔𐞕𐞖𐞗𐞘𐞙𐞚𐞛𐞜𐞝𐞞𐞟𐞠𐞡𐞢𐞣𐞤𐞥𐞦𐞧𐞨𐞩𐞪𐞫𐞬𐞭𐞮𐞯𐞰𐞱𐞲𐞳𐞴𐞵𐞶𐞷𐞸𐞹𐞺𐞻𐞼𐞽𐞾𐞿𐟀𐟁𐟂𐟃𐟄𐟅𐟆𐟇𐟈𐟉𐟊𐟋𐟌𐟍𐟎𐟏𐟐𐟑𐟒𐟓𐟔𐟕𐟖𐟗𐟘𐟙𐟚𐟛𐟜𐟝𐟞𐟟𐟠𐟡𐟢𐟣𐟤𐟥𐟦𐟧𐟨𐟩𐟪𐟫𐟬𐟭𐟮𐟯𐟰𐟱𐟲𐟳𐟴𐟵𐟶𐟷𐟸𐟹𐟺𐟻𐟼𐟽𐟾𐟿𐠀𐠁𐠂𐠃𐠄𐠅𐠆𐠇𐠈𐠉𐠊𐠋𐠌𐠍𐠎𐠏𐠐𐠑𐠒𐠓𐠔𐠕𐠖𐠗𐠘𐠙𐠚𐠛𐠜𐠝𐠞𐠟𐠠𐠡𐠢𐠣𐠤𐠥𐠦𐠧𐠨𐠩𐠪𐠫𐠬𐠭𐠮𐠯𐠰𐠱𐠲𐠳𐠴𐠵𐠶𐠷𐠸𐠹𐠺𐠻𐠼𐠽𐠾𐠿𐡀𐡁𐡂𐡃𐡄𐡅𐡆𐡇𐡈𐡉𐡊𐡋𐡌𐡍𐡎𐡏𐡐𐡑𐡒𐡓𐡔𐡕𐡖𐡗𐡘𐡙𐡚𐡛𐡜𐡝𐡞𐡟𐡠𐡡𐡢𐡣𐡤𐡥𐡦𐡧𐡨𐡩𐡪𐡫𐡬𐡭𐡮𐡯𐡰𐡱𐡲𐡳𐡴𐡵𐡶𐡷𐡸𐡹𐡺𐡻𐡼𐡽𐡾𐡿𐢀𐢁𐢂𐢃𐢄𐢅𐢆𐢇𐢈𐢉𐢊𐢋𐢌𐢍𐢎𐢏𐢐𐢑𐢒𐢓𐢔𐢕𐢖𐢗𐢘𐢙𐢚𐢛𐢜𐢝𐢞𐢟𐢠𐢡𐢢𐢣𐢤𐢥𐢦𐢧𐢨𐢩𐢪𐢫𐢬𐢭𐢮𐢯𐢰𐢱𐢲𐢳𐢴𐢵𐢶𐢷𐢸𐢹𐢺𐢻𐢼𐢽𐢾𐢿𐣀𐣁𐣂𐣃𐣄𐣅𐣆𐣇𐣈𐣉𐣊𐣋𐣌𐣍𐣎𐣏𐣐𐣑𐣒𐣓𐣔𐣕𐣖𐣗𐣘𐣙𐣚𐣛𐣜𐣝𐣞𐣟𐣠𐣡𐣢𐣣𐣤𐣥𐣦𐣧𐣨𐣩𐣪𐣫𐣬𐣭𐣮𐣯𐣰𐣱𐣲𐣳𐣴𐣵𐣶𐣷𐣸𐣹𐣺𐣻𐣼𐣽𐣾𐣿𐤀𐤁𐤂𐤃𐤄𐤅𐤆𐤇𐤈𐤉𐤊𐤋𐤌𐤍𐤎𐤏𐤐𐤑𐤒𐤓𐤔𐤕𐤖𐤗𐤘𐤙𐤚𐤛𐤜𐤝𐤞𐤟𐤠𐤡𐤢𐤣𐤤𐤥𐤦𐤧𐤨𐤩𐤪𐤫𐤬𐤭𐤮𐤯𐤰𐤱𐤲𐤳𐤴𐤵𐤶𐤷𐤸𐤹𐤺𐤻𐤼𐤽𐤾𐤿𐥀𐥁𐥂𐥃𐥄𐥅𐥆𐥇𐥈𐥉𐥊𐥋𐥌𐥍𐥎𐥏𐥐𐥑𐥒𐥓𐥔𐥕𐥖𐥗𐥘𐥙𐥚𐥛𐥜𐥝𐥞𐥟𐥠𐥡𐥢𐥣𐥤𐥥𐥦𐥧𐥨𐥩𐥪𐥫𐥬𐥭𐥮𐥯𐥰𐥱𐥲𐥳𐥴𐥵𐥶𐥷𐥸𐥹𐥺𐥻𐥼𐥽𐥾𐥿𐦀𐦁𐦂𐦃𐦄𐦅𐦆𐦇𐦈𐦉𐦊𐦋𐦌𐦍𐦎𐦏𐦐𐦑𐦒𐦓𐦔𐦕𐦖𐦗𐦘𐦙𐦚𐦛𐦜𐦝𐦞𐦟𐦠𐦡𐦢𐦣𐦤𐦥𐦦𐦧𐦨𐦩𐦪𐦫𐦬𐦭𐦮𐦯𐦰𐦱𐦲𐦳𐦴𐦵𐦶𐦷𐦸𐦹𐦺𐦻𐦼𐦽𐦾𐦿𐧀𐧁𐧂𐧃𐧄𐧅𐧆𐧇𐧈𐧉𐧊𐧋𐧌𐧍𐧎𐧏𐧐𐧑𐧒𐧓𐧔𐧕𐧖𐧗𐧘𐧙𐧚𐧛𐧜𐧝𐧞𐧟𐧠𐧡𐧢𐧣𐧤𐧥𐧦𐧧𐧨𐧩𐧪𐧫𐧬𐧭𐧮𐧯𐧰𐧱𐧲𐧳𐧴𐧵𐧶𐧷𐧸𐧹𐧺𐧻𐧼𐧽𐧾𐧿𐨀𐨁𐨂𐨃𐨄𐨅𐨆𐨇𐨈𐨉𐨊𐨋𐨌𐨍𐨎𐨏𐨐𐨑𐨒𐨓𐨔𐨕𐨖𐨗𐨘𐨙𐨚𐨛𐨜𐨝𐨞𐨟𐨠𐨡𐨢𐨣𐨤𐨥𐨦𐨧𐨨𐨩𐨪𐨫𐨬𐨭𐨮𐨯𐨰𐨱𐨲𐨳𐨴𐨵𐨶𐨷𐨹𐨺𐨸𐨻𐨼𐨽𐨾𐨿𐩀𐩁𐩂𐩃𐩄𐩅𐩆𐩇𐩈𐩉𐩊𐩋𐩌𐩍𐩎𐩏𐩐𐩑𐩒𐩓𐩔𐩕𐩖𐩗𐩘𐩙𐩚𐩛𐩜𐩝𐩞𐩟𐩠𐩡𐩢𐩣𐩤𐩥𐩦𐩧𐩨𐩩𐩪𐩫𐩬𐩭𐩮𐩯𐩰𐩱𐩲𐩳𐩴𐩵𐩶𐩷𐩸𐩹𐩺𐩻𐩼𐩽𐩾𐩿𐪀𐪁𐪂𐪃𐪄𐪅𐪆𐪇𐪈𐪉𐪊𐪋𐪌𐪍𐪎𐪏𐪐𐪑𐪒𐪓𐪔𐪕𐪖𐪗𐪘𐪙𐪚𐪛𐪜𐪝𐪞𐪟𐪠𐪡𐪢𐪣𐪤𐪥𐪦𐪧𐪨𐪩𐪪𐪫𐪬𐪭𐪮𐪯𐪰𐪱𐪲𐪳𐪴𐪵𐪶𐪷𐪸𐪹𐪺𐪻𐪼𐪽𐪾𐪿𐫀𐫁𐫂𐫃𐫄𐫅𐫆𐫇𐫈𐫉𐫊𐫋𐫌𐫍𐫎𐫏𐫐𐫑𐫒𐫓𐫔𐫕𐫖𐫗𐫘𐫙𐫚𐫛𐫜𐫝𐫞𐫟𐫠𐫡𐫢𐫣𐫤𐫦𐫥𐫧𐫨𐫩𐫪𐫫𐫬𐫭𐫮𐫯𐫰𐫱𐫲𐫳𐫴𐫵𐫶𐫷𐫸𐫹𐫺𐫻𐫼𐫽𐫾𐫿𐬀𐬁𐬂𐬃𐬄𐬅𐬆𐬇𐬈𐬉𐬊𐬋𐬌𐬍𐬎𐬏𐬐𐬑𐬒𐬓𐬔𐬕𐬖𐬗𐬘𐬙𐬚𐬛𐬜𐬝𐬞𐬟𐬠𐬡𐬢𐬣𐬤𐬥𐬦𐬧𐬨𐬩𐬪𐬫𐬬𐬭𐬮𐬯𐬰𐬱𐬲𐬳𐬴𐬵𐬶𐬷𐬸𐬹𐬺𐬻𐬼𐬽𐬾𐬿𐭀𐭁𐭂𐭃𐭄𐭅𐭆𐭇𐭈𐭉𐭊𐭋𐭌𐭍𐭎𐭏𐭐𐭑𐭒𐭓𐭔𐭕𐭖𐭗𐭘𐭙𐭚𐭛𐭜𐭝𐭞𐭟𐭠𐭡𐭢𐭣𐭤𐭥𐭦𐭧𐭨𐭩𐭪𐭫𐭬𐭭𐭮𐭯𐭰𐭱𐭲𐭳𐭴𐭵𐭶𐭷𐭸𐭹𐭺𐭻𐭼𐭽𐭾𐭿𐮀𐮁𐮂𐮃𐮄𐮅𐮆𐮇𐮈𐮉𐮊𐮋𐮌𐮍𐮎𐮏𐮐𐮑𐮒𐮓𐮔𐮕𐮖𐮗𐮘𐮙𐮚𐮛𐮜𐮝𐮞𐮟𐮠𐮡𐮢𐮣𐮤𐮥𐮦𐮧𐮨𐮩𐮪𐮫𐮬𐮭𐮮𐮯𐮰𐮱𐮲𐮳𐮴𐮵𐮶𐮷𐮸𐮹𐮺𐮻𐮼𐮽
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## 3. HAMNOSYS

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### 3.1 What is Hamnosys

The word HamNoSys stands for “Hamburg Notation System”. It was designed by a group of researchers consisting of both hearing and deaf so as to create a scientific/research tool. This work was started in the year 1985 in the University of Hamburg. It was publically introduced in the year 1989. They developed a system for writing sign language. It started becoming popular for academic purposes and has undergone four revisions. It was designed to not only fulfill the need of their research but also to be applicable to any sign language in the world. It consists of about 200 symbols that cover the parameter of hand shape, hand orientation, location and movement. To make it easy they designed the symbols in such a way that they can easily be recognized and utilized for defining words. The pattern of writing these symbols within a string is fixed but still there are different ways to write one and the same sign in different ways. Sign language consists of words having manual and non-manual features. HamNoSys completely support for manual features where as it support slightly for the non-manual features that consist of signs like rising eyebrow, chin raise, head shake, mouthing, tongue out etc. It is not intended to write a full sentence. HamNoSys are still being improved with time as the need arises.

### 3.2 Why we need HamNoSys

Sign language consists of various gestures that combine to form a single word. A single gesture includes certain features such as hand shape, orientation, location and movement. Previously these gestures were performed by deaf person and were recorded through cameras so as to store in corpus. This way of storing data consumes high storage as well as requires high bandwidth to download, buffer or upload the video. With the help of HamNoSys we can enable a graphical avatar to perform sign against a word. The size of those video are in kilobytes due to which the above mentioned issues of resources is resolved.

## 4. DOMAIN ANALYSIS

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### 4.1 Customer

This is a contribution by our team for all the deaf persons and to the normal person who face difficulty while communicating with deaf person.

### 4.2 Stakeholders

<i>Stakeholder</i>	<i>Role in System</i>
<i>Prof. Adnan Abid (Advisor)</i>	<i>Supervised the work as per done on weekly bases and advised further improvements and additions.</i>
<i>Aamina (Data Collection 1)</i>	<i>Finalized the words that has to be used in our database(Most frequently used words).</i>
<i>Aamina (Data Collection 2)</i>	<i>Captured the videos of the words finalized in "Data Collection 2".</i>
<i>Aamina (Data Conversion)</i>	<i>All the videos were then automated using Sign Imitator Avatar and HamNoSys of those signs were created.</i>
<i>Aamina (Design &amp; Development)</i>	<i>Finalized a design and done the development.</i>

**Table 2: list of stakeholder**

### 4.3 Affected Groups with social or economic impact

Affected Groups are:

- Deaf Person
- Normal Person (One communicating with deaf)

### 4.4 Dependencies/ External Systems

#### 4.4.1 Constraints:

This Website doesn't contain any compatibility issue as it can run on any browser from anywhere. Only the administrator has the right to add or remove data and functionalities in website

### 4.5 Reference Documents

#### 4.5.1 Related Projects

To Design our Pakistan Sign Language (Corpus) we went through the following similar systems:

1. ASL (American Sign Language)
2. PSL (Pakistan Sign Language)

#### 4.5.2 Feature Comparison

<i>Sr No.</i>	<i>Comparison Feature</i>	<i>ASL</i>	<i>PSL</i>	<i>Pakistan Sign Language (Corpus)</i>	<i>remarks</i>
<i>1</i>	<i>Database storage issue</i>	<i>They have stored normal videos which are of bigger size</i>	<i>They have stored normal videos which are of bigger size</i>	<i>We have created avatar videos with the help of HamNoSys they are recorded in (Kilo bytes)</i>	<i>By using the animated imitator (avatar) the storage issue is resolved</i>

## 5. REQUIREMENTS ANALYSIS

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### 5.1 Requirements

#### 5.1.1 Function Requirement:

Following are the functionalities that a user would be able to perform:

- View Categories
- View Words
- View Videos & Further Details
- View Projects

#### 5.1.2 Hardware interface:

- Personal Computer

#### 5.1.3 Software interface:

- All Browsers

### 5.2 List of Actors

**User:**He will be the one using our website for finding a sign of a word.

**Admin:**He is the one having the main role to add or remove data as well as various functionalities from the website.

### 5.3 List of use cases

- View Categories
- View Words
- View Videos & Further Details
- View Projects
- Login
- Add & Delete Category
- Add and Delete words & videos in categories
- Add & remove a project & its team
- Add & remove members
- Add& Modify Publication

## 5.4 System use case diagram

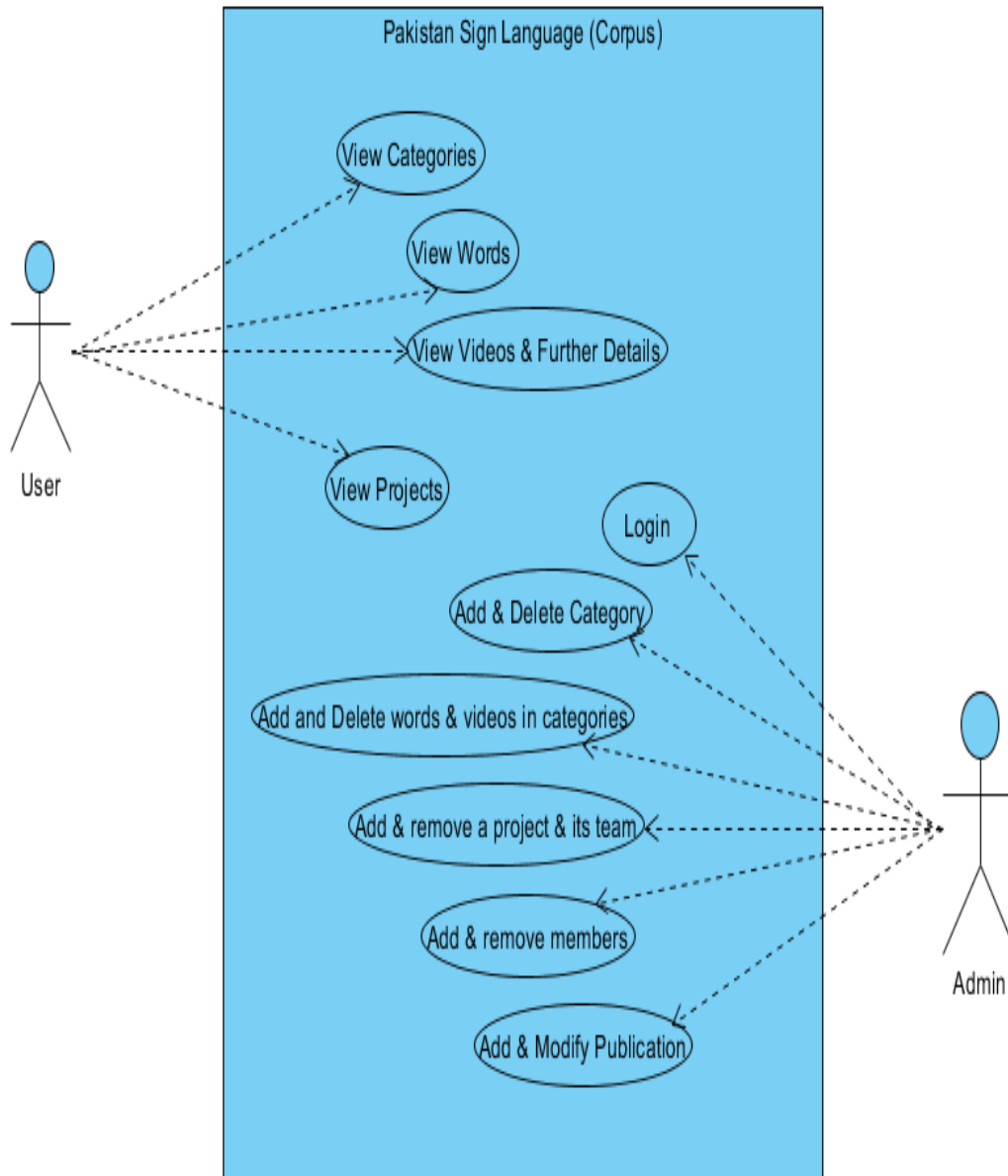


Figure 4: Use case diagram

## 5.5 Extended use cases

### 5.5.1 Use Case 1

<b>Use Case ID:</b>	1		
<b>Use Case Name:</b>	View Categories		
<b>Created By:</b>	<i>Aamina</i>	<b>Last Updated By:</b>	<i>Aamina</i>
<b>Date Created:</b>	10Feb 2017	<b>Last Revision Date:</b>	15 Feb 2017
<b>Actors:</b>	User		
<b>Description:</b>	This will allow the user to view Various Categories		
<b>Preconditions:</b>	No user login is required		
<b>Post conditions:</b>	User is allowed to view all Categories		
<b>Normal Flow:</b>	User click on “Dictionary“ tab and from there he is allowed to explore the categories		
<b>Frequency of Use:</b>	On demand		

**Table 3: Use Case 1**

### 5.5.2 Use Case 2

<b>Use Case ID:</b>	2		
<b>Use Case Name:</b>	View Words		
<b>Created By:</b>	<i>Aamina</i>	<b>Last Updated By:</b>	<i>Aamina</i>
<b>Date Created:</b>	18 Feb 2017	<b>Last Revision Date:</b>	28 Feb 2017
<b>Actors:</b>	User		
<b>Description:</b>	It allows User to view all the words that include in a specific category he has selected along with its province and city		
<b>Preconditions:</b>	Click on a specific category		
<b>Post conditions:</b>	All words of a category is shown		
<b>Normal Flow:</b>	The words appear after the user has selected a specific category from the “Dictionary” tab		
<b>Exceptions:</b>	Search bar is included in the words list and if the requested word is not available in the database then it gives an exception		

<b>Frequency of Use:</b>	On Demand
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**Table 4: Use Case 2**

**5.5.3 Use Case 3**

<b>Use Case ID:</b>	3		
<b>Use Case Name:</b>	View Videos & Further Details		
<b>Created By:</b>	<i>Aamina</i>	<b>Last Updated By:</b>	<i>Aamina</i>
<b>Date Created:</b>	4 March 2017	<b>Last Revision Date:</b>	15 March 2017
<b>Actors:</b>	User		
<b>Description:</b>	User here can view the video of sign of the specific word on which he has clicked		
<b>Preconditions:</b>	User first has to click on a specific word		
<b>Post conditions:</b>	The video of the specific word id shown along with the details such as province& city etc to which the sign belong.		
<b>Normal Flow:</b>	User will have to click on “View words” tab to view its video.		
<b>Frequency of Use:</b>	On Demand		

**Table 5: Use Case 3**

**5.5.4 Use Case 4**

<b>Use Case ID:</b>	4		
<b>Use Case Name:</b>	View Projects		
<b>Created By:</b>	<i>Aamina</i>	<b>Last Updated By:</b>	<i>Aamina</i>
<b>Date Created:</b>	17 March 2017	<b>Last Revision Date:</b>	28 March 2017
<b>Actors:</b>	User		
<b>Description:</b>	User can here view all the projects with its description and the members that are involved in the project.		
<b>Preconditions:</b>	User has to enter into projects		
<b>Post conditions:</b>	The Projects details are shown to the user and the user can also view the members of each projects by clicking on the specific projects		

<b>Normal Flow:</b>	User has to click on to the “Projects” tab in the Navigation Bar
<b>Frequency of Use:</b>	On demand

**Table 6: Use Case 4**

### 5.5.5 Use Case 5

<b>Use Case ID:</b>	5		
<b>Use Case Name:</b>	Login		
<b>Created By:</b>	<i>Aamina</i>	<b>Last Updated By:</b>	<i>Aamina</i>
<b>Date Created:</b>	1 April 2017	<b>Last Revision Date:</b>	10 April 2017
<b>Actors:</b>	Admin		
<b>Description:</b>	Log in for the administration mode		
<b>Preconditions:</b>	Must have an administrative username		
<b>Post conditions:</b>	All right to make changes will be given		
<b>Normal Flow:</b>	Have to visit the site “localhost/psl/admin_page.php”		
<b>Exceptions:</b>	If the username is incorrect it won’t allow to sign in		
<b>Frequency of Use:</b>	On demand		

**Table 7: Use Case 5**

### 5.5.6 Use Case 6

<b>Use Case ID:</b>	6		
<b>Use Case Name:</b>	Add and Delete Category		
<b>Created By:</b>	<i>Aamina</i>	<b>Last Updated By:</b>	<i>Aamina</i>
<b>Date Created:</b>	12 April 2017	<b>Last Revision Date:</b>	20 April 2017
<b>Actors:</b>	Admin		

<b>Description:</b>	Admin can here add a new category or delete a category from database
<b>Preconditions:</b>	Have to be logged in
<b>Post conditions:</b>	Will be allowed to add and remove categories
<b>Normal Flow:</b>	<ol style="list-style-type: none"> <li>1. Login</li> <li>2. Click On “Categories” Tab</li> </ol>
<b>Frequency of Use:</b>	On demand

**Table 8: Use Case 6**

**5.5.7 Use Case 7**

<b>Use Case ID:</b>	7		
<b>Use Case Name:</b>	Add and Delete words & videos in categories		
<b>Created By:</b>	<i>Aamina</i>	<b>Last Updated By:</b>	<i>Aamina</i>
<b>Date Created:</b>	21 April 2017	<b>Last Revision Date:</b>	29 April 2017
<b>Actors:</b>	Admin		
<b>Description:</b>	Admin can here add and remove a word from a category and can also change the category of a word		
<b>Preconditions:</b>	Have to be logged in		
<b>Post conditions:</b>	Will be allowed to add & remove a word with its video and other details. Also change the category of a word		
<b>Normal Flow:</b>	<ol style="list-style-type: none"> <li>1. Log in</li> <li>2. Click on “Words” Tab</li> </ol>		
<b>Frequency of Use:</b>	On demand		

**Table 9: Use Case 7**

**5.5.8 Use Case 8**

<b>Use Case ID:</b>	8		
<b>Use Case Name:</b>	Add & remove a project & its team		
<b>Created By:</b>	<i>Aamina</i>	<b>Last Updated By:</b>	<i>Aamina</i>
<b>Date Created:</b>	1 May 2017	<b>Last Revision Date:</b>	10 May 2017

<b>Actors:</b>	Admin
<b>Description:</b>	Admin is here allowed to add and remove a project and also to add a new member in the project
<b>Preconditions:</b>	Have to be logged in
<b>Post conditions:</b>	Allowed to add and remove a project and also to add a member in the project
<b>Normal Flow:</b>	<ol style="list-style-type: none"> <li>1. Log in</li> <li>2. Click on the "Projects"</li> </ol>
<b>Frequency of Use:</b>	On demand

**Table 10: Use Case 8**

### 5.5.9 Use Case 9

<b>Use Case ID:</b>	9		
<b>Use Case Name:</b>	Add & remove members		
<b>Created By:</b>	<i>Aamina</i>	<b>Last Updated By:</b>	<i>Aamina</i>
<b>Date Created:</b>	12 May 2017	<b>Last Revision Date:</b>	22 May 2017
<b>Actors:</b>	Admin		
<b>Description:</b>	Admin is here allowed to add and remove a member		
<b>Preconditions:</b>	Have to be logged in		
<b>Post conditions:</b>	Here admin can add and delete a member		
<b>Normal Flow:</b>	<ol style="list-style-type: none"> <li>1. Login</li> <li>2. Click on "Members" tab</li> </ol>		
<b>Frequency of Use:</b>	On demand		

**Table 11: Use Case 9**

### 5.5.10 Use Case 10

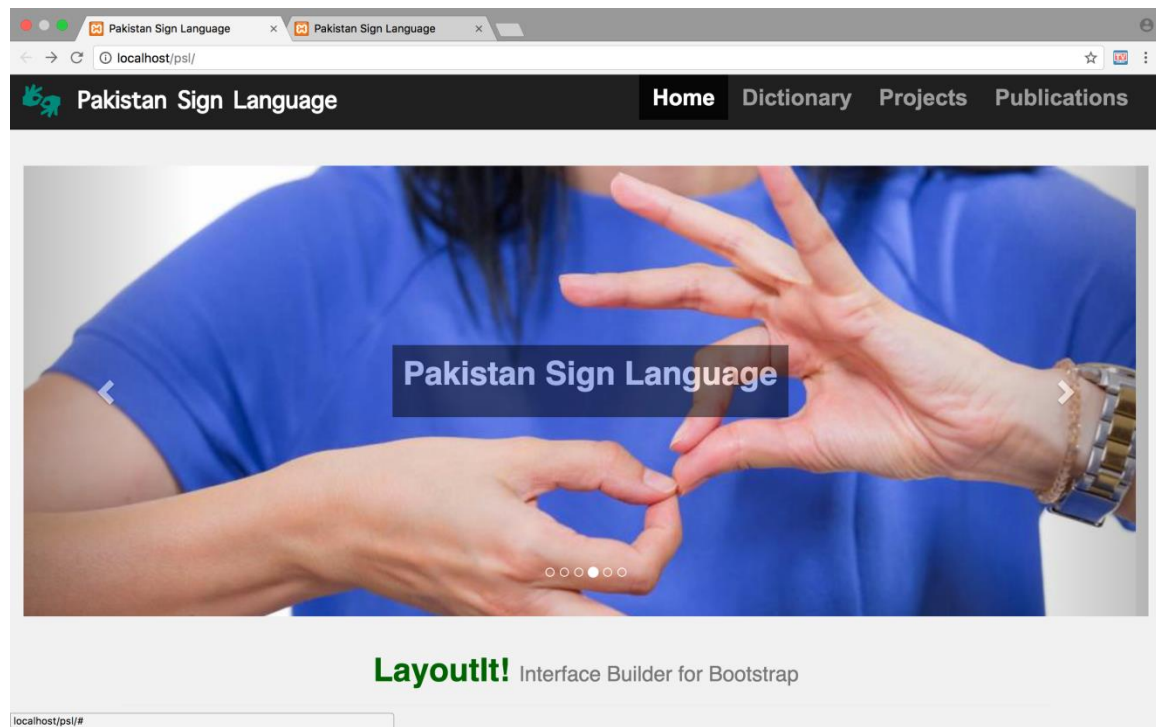
<b>Use Case ID:</b>	10		
<b>Use Case Name:</b>	Add & Modify Publication		
<b>Created By:</b>	<i>Aamina</i>	<b>Last Updated By:</b>	<i>Aamina</i>

<b>Date Created:</b>	25 May 2017	<b>Last Revision Date:</b>	5 June 2017
<b>Actors:</b>	Admin		
<b>Description:</b>	Admin is here allowed to add a new publication or to edit an existing one		
<b>Preconditions:</b>	Have to be logged in		
<b>Post conditions:</b>	Here admin can add and modify publications		
<b>Normal Flow:</b>	<ol style="list-style-type: none"> <li>1. Login</li> <li>2. Click on the “Publications” tab</li> </ol>		
<b>Frequency of Use:</b>	On demand		

**Table 12: Use Case 10**

## 5.6 User interfaces (mock screens)

### 5.6.1 Main Page



## 5.6.2 All Categories

**CATEGORIES**

- Alphabets(English)
- Alphabets(Urdu)
- Animals
- Body Parts
- Colors
- Days
- Dress and Accessories
- Greeting
- Home
- Language Rules

Alphabets(English)	Alphabets(Urdu)	Animals
Body Parts	Colors	Days
Dress and Accessories	Greeting	Home
Language Rules	Month	Numbers

## 5.6.3 View Words

#	Name	Province	City	
1	Black	Punjab	Lahore	<a href="#">View Word</a>
2	Blue	Punjab	Lahore	<a href="#">View Word</a>
3	Brown	Punjab	Lahore	<a href="#">View Word</a>
4	Color	Punjab	Lahore	<a href="#">View Word</a>
5	Golden	Punjab	Lahore	<a href="#">View Word</a>
6	Green	Punjab	Lahore	<a href="#">View Word</a>
7	Grey	Punjab	Lahore	<a href="#">View Word</a>
8	Orange	Punjab	Lahore	<a href="#">View Word</a>
9	Pink	Punjab	Lahore	<a href="#">View Word</a>
10	Red	Punjab	Lahore	<a href="#">View Word</a>

## 5.6.4 View Projects

**Projects**

test  
test description

**test**

test description  
test content

Team

**Qasim**  
Desg: Assistant Professor  
Dpt: Computer Science

**shoab**  
Desg: Assistant Professor  
Dpt: Computer Science

**usman**  
Desg: Assistant Professor  
Dpt: Computer Science

## 5.6.5 Add Categories (Admin Panel)

Home Change Password | Logout

**Categories**

Words  
Projects  
Members  
Publications

Add new Category

Show 10 entries Search:

NO	Name	Add Word	Delete Category
1	Alphabets(English)	<input type="button" value="add"/>	<input type="button" value="delete"/>
2	Alphabets(Urdu)	<input type="button" value="add"/>	<input type="button" value="delete"/>
3	Animals	<input type="button" value="add"/>	<input type="button" value="delete"/>
4	Body Parts	<input type="button" value="add"/>	<input type="button" value="delete"/>
5	Colors	<input type="button" value="add"/>	<input type="button" value="delete"/>
6	Days	<input type="button" value="add"/>	<input type="button" value="delete"/>
7	Dress and Accessories	<input type="button" value="add"/>	<input type="button" value="delete"/>
8	Greeting	<input type="button" value="add"/>	<input type="button" value="delete"/>
9	Home	<input type="button" value="add"/>	<input type="button" value="delete"/>
10	Language Rules	<input type="button" value="add"/>	<input type="button" value="delete"/>
11	Month	<input type="button" value="add"/>	<input type="button" value="delete"/>

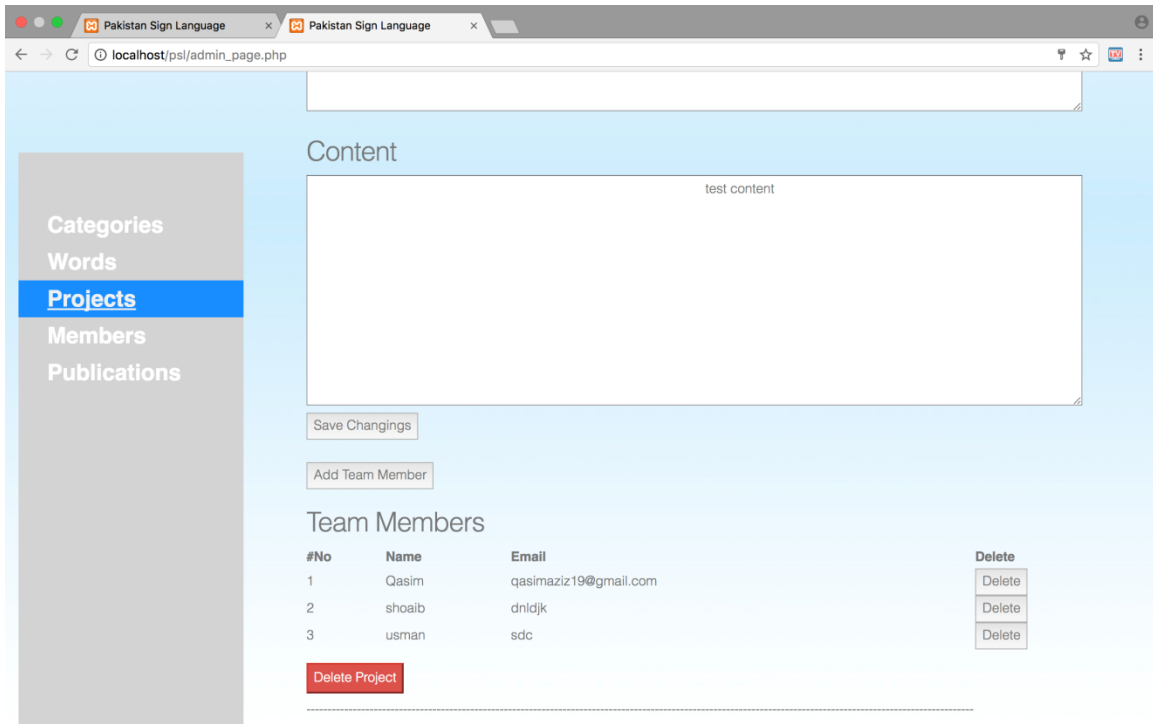
### 5.6.6 Edit Word (Admin Panel)

The screenshot shows a web browser window with two tabs for 'Pakistan Sign Language'. The address bar shows 'localhost/psl/admin\_page.php'. The page has a sidebar with 'Home', 'Categories', 'Words', 'Projects', 'Members', and 'Publications'. The 'Words' section is active. At the top right, there are 'Change Password' and 'Logout' buttons. Below the sidebar, there is a 'Show 10 entries' dropdown and a search box. The main content is a table with 12 rows of words. Each row has a 'NO' column, a 'Name' column, a 'Category' column, a 'Change Category' button, and a 'Delete' button.

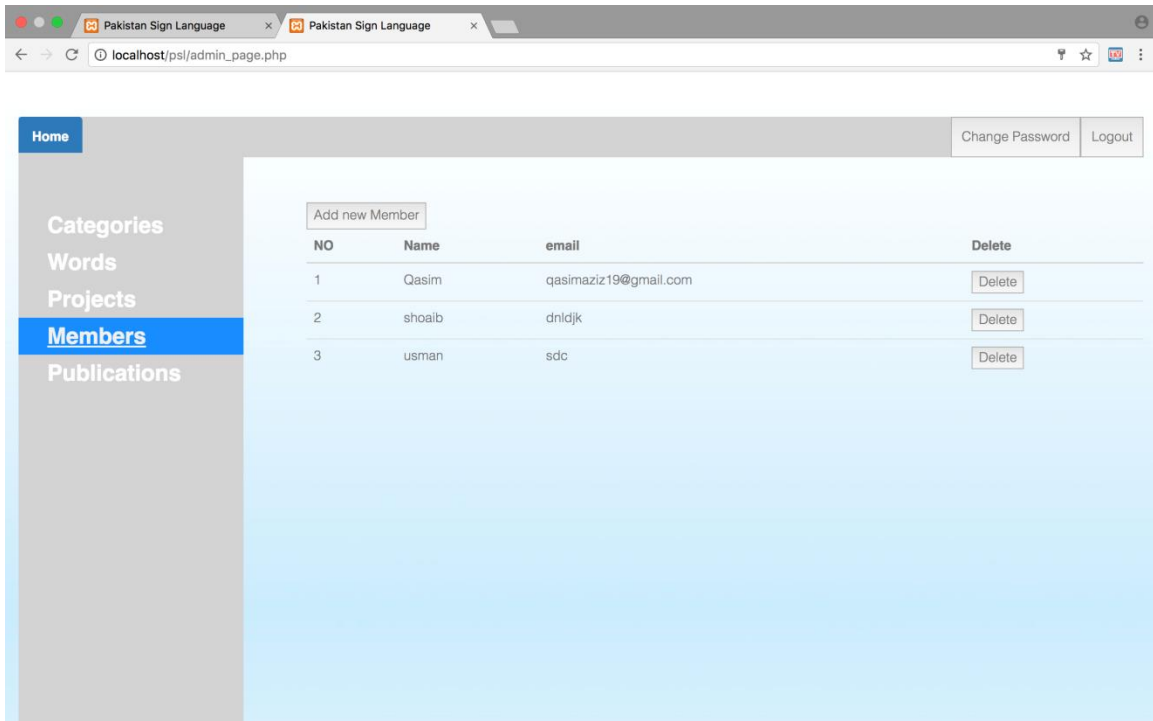
NO	Name	Category	Change Category	Delete
1	A	Alphabets(English)	<input type="button" value="Change"/>	<input type="button" value="delete"/>
2	Above	Language Rules	<input type="button" value="Change"/>	<input type="button" value="delete"/>
3	Absent	School	<input type="button" value="Change"/>	<input type="button" value="delete"/>
4	Aeroplane	Transport	<input type="button" value="Change"/>	<input type="button" value="delete"/>
5	Afternoon	Time	<input type="button" value="Change"/>	<input type="button" value="delete"/>
6	Air_condition	Transport	<input type="button" value="Change"/>	<input type="button" value="delete"/>
7	Alif	Alphabets(Urdu)	<input type="button" value="Change"/>	<input type="button" value="delete"/>
8	Alive	Language Rules	<input type="button" value="Change"/>	<input type="button" value="delete"/>
9	Almari	Home	<input type="button" value="Change"/>	<input type="button" value="delete"/>
10	And	Language Rules	<input type="button" value="Change"/>	<input type="button" value="delete"/>
11	April	Month	<input type="button" value="Change"/>	<input type="button" value="delete"/>
12	Artist	Profession	<input type="button" value="Change"/>	<input type="button" value="delete"/>

### 5.6.7 Add Projects (Admin Panel)

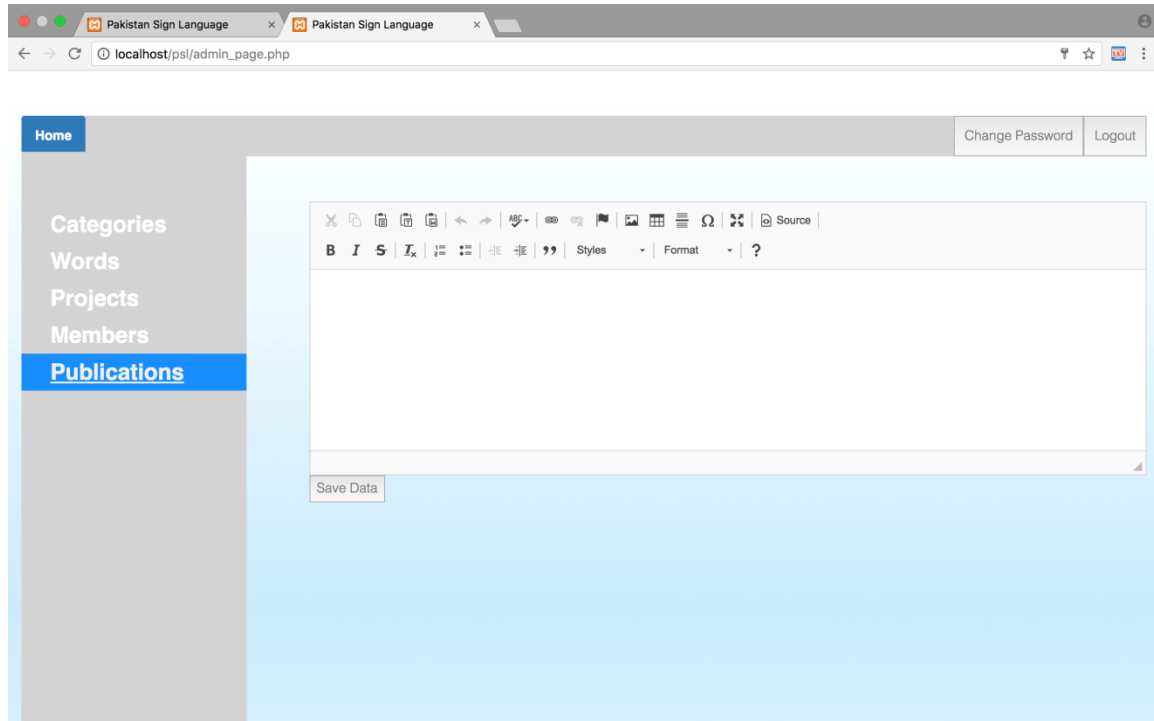
The screenshot shows the 'Add Projects' admin panel. It has the same sidebar and top navigation as the previous page. The 'Projects' section is active. At the top right, there are 'Change Password' and 'Logout' buttons. Below the sidebar, there is an 'Add new Project' button. The form contains three main sections: 'Title' with a text input field containing 'test'; 'Description' with a larger text area containing 'test description'; and 'Content' with another larger text area containing 'test content'.



### 5.6.8 Add Members (Admin Panel)



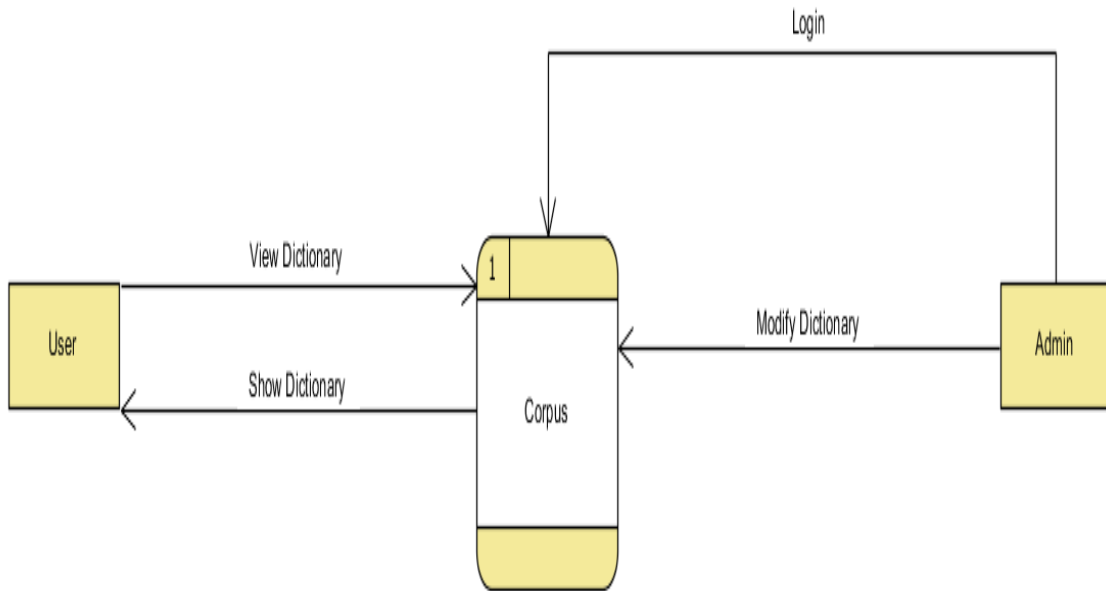
## 5.6.9 Add Publications (Admin Panel)



## 6. DATA FLOW DIAGRAM (OPTIONAL)

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### 6.1 Data Flow Diagram Level 0



**Figure 5: Data Flow Diagram (level-1)**

## 6.2 Data Flow Diagram Level 1

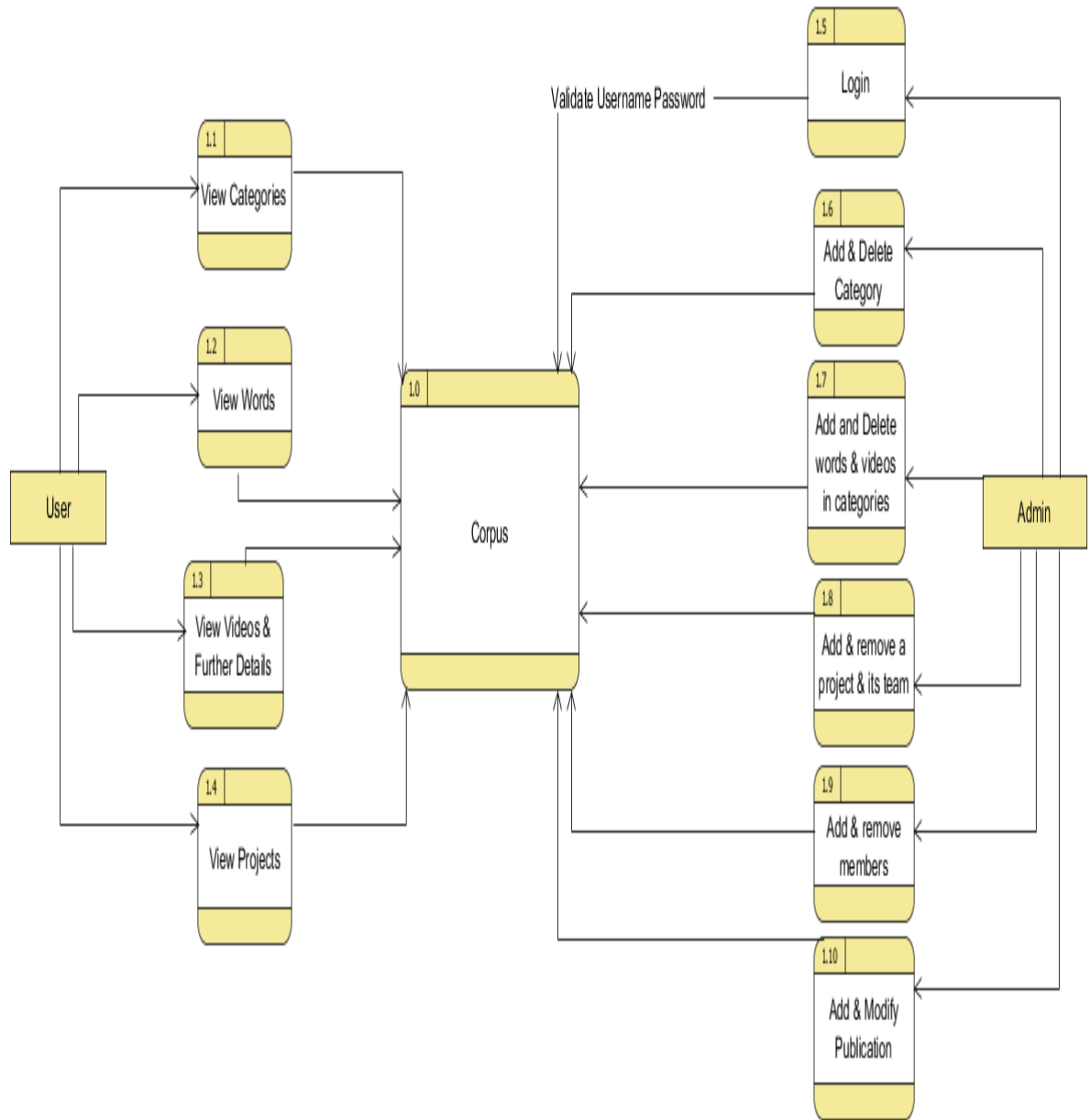
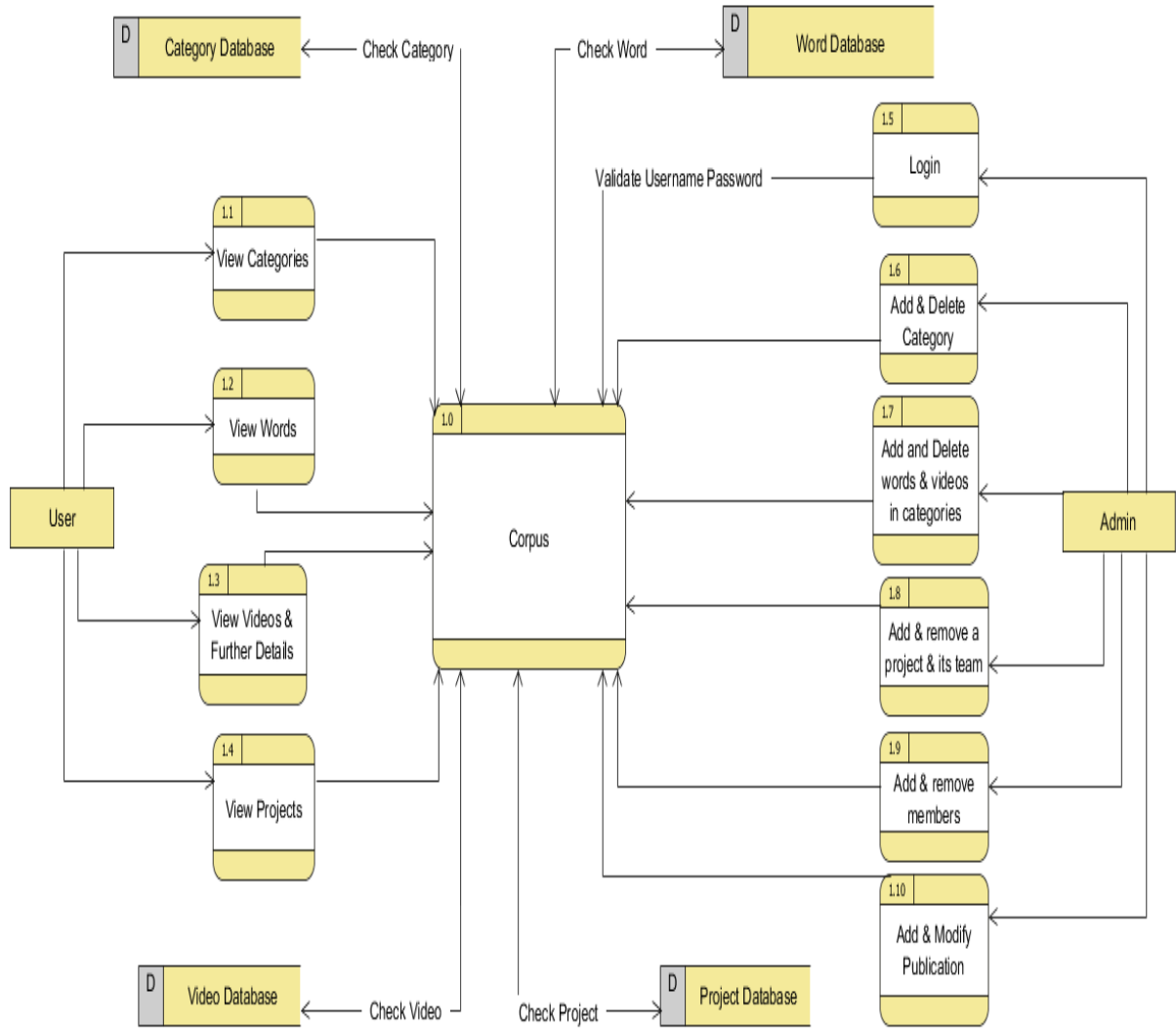


Figure 6: Data Flow Diagram (level-2)

### 6.3 Data Flow Diagram Level 2

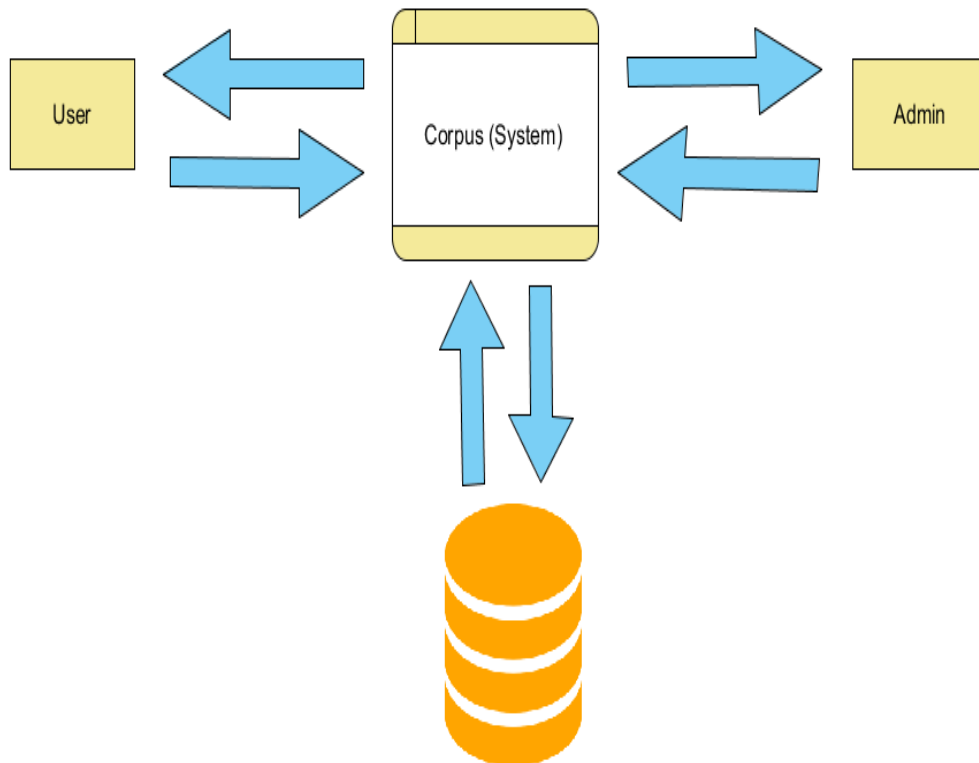


**Figure 7: Data Flow Diagram (level-3)**

## 7. SYSTEM DESIGN

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### 7.1 System Architecture Diagram



**Figure 8: System Architecture Diagram**

## 7.2 Sequence Diagrams

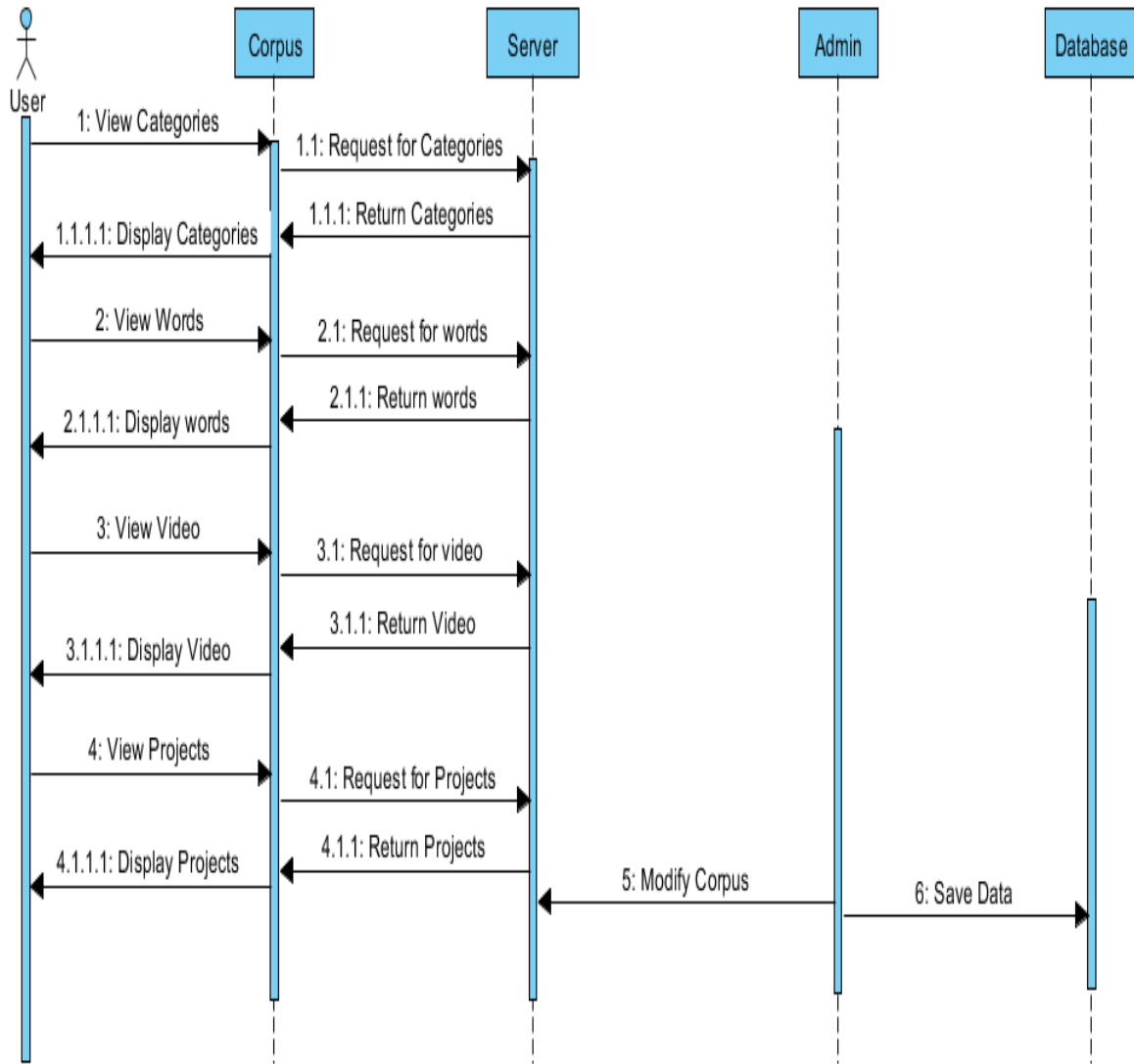


Figure 10: Sequence Diagram

### 7.3 Other UMLs

### 7.4 Activity Diagram

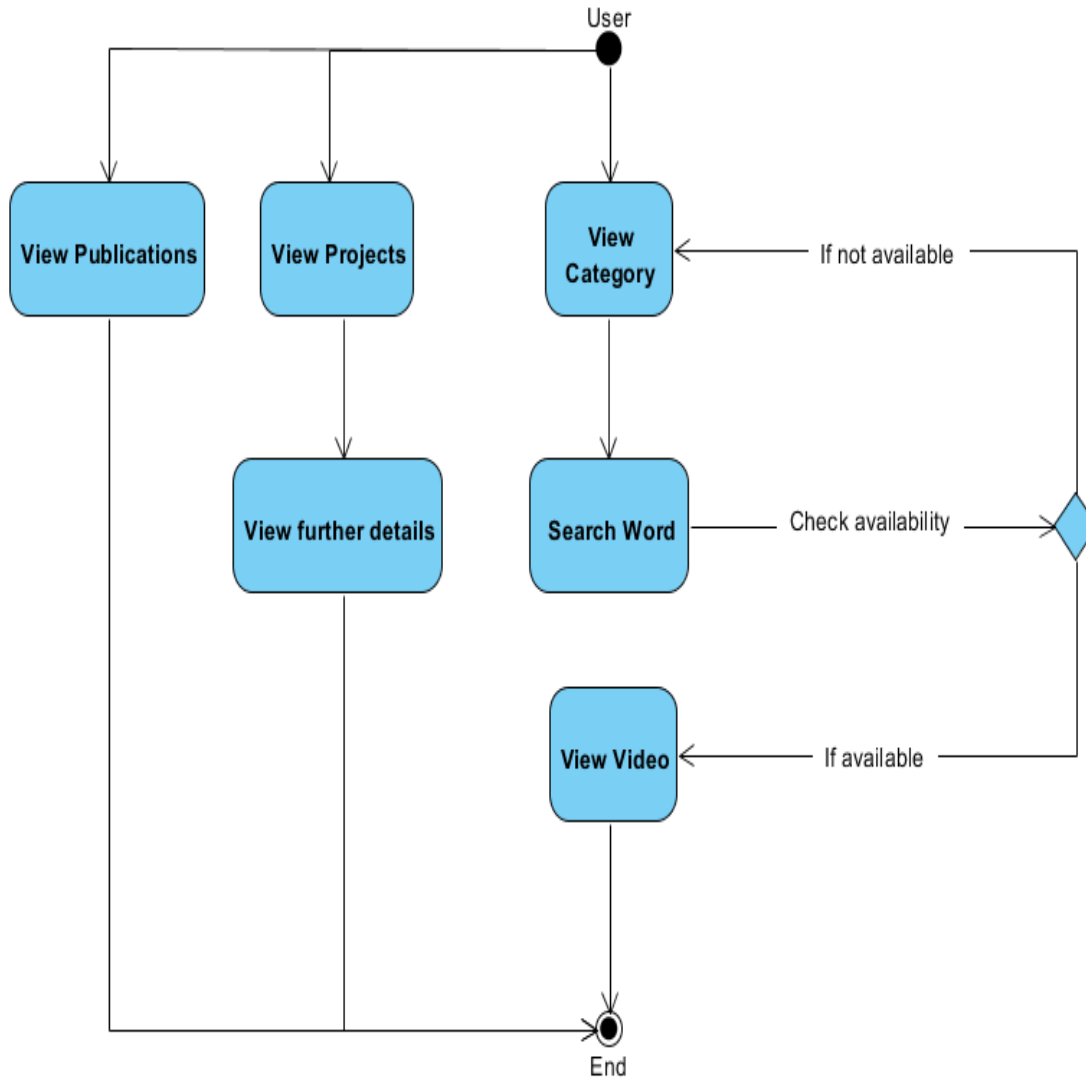


Figure 11: Activity Diagram

## 8. IMPLEMENTATION DETAILS

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### 8.1 Development Setup

#### 8.1.1 Tools

- Visual Paradigm
- PHP Storm

#### 8.1.2 Technology

- PHP for developing the back end coding
- HTML for the front end code of interface
- HamNoSys keyboard for creating hamnosys of Signs

### 8.2 Deployment setup

#### 8.2.1 Platform

Our website can easily be accessed from anywhere through any browser

### 8.3 Constraints

#### 8.3.1 Assumptions

- We assume that our user have a system with basic specifications.
- He have a working browser on it
- He can read and understand English

#### 8.3.2 System constraints

This website is compatible with:

- All web browsers

#### 8.3.3 Limitations

- User can view single video at a time

## 9. TESTING

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### 9.1 Extended Test Cases

#### 9.1.1 Test Case 1:

<b>Test case</b>	1	<b>Date Reported</b>	3 June 2017
<b>Project</b>	Corpus	<b>Module</b>	View Categories
<b>Severity</b>	Major	<b>Test Engineer</b>	<i>Aamina</i>
<b>Description</b>	View Categories		
<b>Actual Results</b>	Show list of categories		
<b>Test Procedures</b>	<b>Expected Results</b>		
Step 1: Open Main Page Step 2: Click on Dictionary	List of all categories are displayed		

Table 13: Test Case 1

#### 9.1.2 Test Case 2:

<b>Test case</b>	2	<b>Date Reported</b>	10 June 2017
<b>Project</b>	Corpus	<b>Module</b>	View Words
<b>Severity</b>	Major	<b>Test Engineer</b>	<i>Aamina</i>
<b>Description</b>	View Words		
<b>Actual Results</b>	Show list of all words of a specific category		
<b>Test Procedures</b>	<b>Expected Results</b>		
Step 1: Open Main Page Step 2: Click on Dictionary Step 3: Click on a specific category	List of all words of a category is displayed		

Table 14: Test Case 2

### 9.1.3 Test Case 3:

<b>Test case</b>	3	<b>Date Reported</b>	15 June 2017
<b>Project</b>	Corpus	<b>Module</b>	View videos & details
<b>Severity</b>	Major	<b>Test Engineer</b>	M Abbas
<b>Description</b>		View videos & further details	
<b>Actual Results</b>		Show video of the selected word and its detail	
<b>Test Procedures</b>		<b>Expected Results</b>	
Step 1: Open Main Page Step 2: Click on Dictionary Step 3: Click on a specific category Step 4: Click on a word		List of all words of a category is displayed	

**Table 15: Test Case 13**

### 9.1.4 Test Case 4:

<b>Test case</b>	4	<b>Date Reported</b>	20 June 2017
<b>Project</b>	Corpus	<b>Module</b>	View Projects
<b>Severity</b>	Major	<b>Test Engineer</b>	<i>Aamina</i>
<b>Description</b>		View Projects and its details	
<b>Actual Results</b>		List of all Projects, its description and members is shown	
<b>Test Procedures</b>		<b>Expected Results</b>	
Step 1: Open Main Page Step 2: Click on Projects Step 3: Click on a specific Project		List of all members of a Project and its description is displayed	

**Table 16: Test Case 4****9.1.5 Test Case 5:**

<b>Test case</b>	5	<b>Date Reported</b>	25 June 2017
<b>Project</b>	Corpus	<b>Module</b>	Login (Admin)
<b>Severity</b>	Major	<b>Test Engineer</b>	<i>Aamina</i>
<b>Description</b>		Login	
<b>Actual Results</b>		Admin will get login into the admin panel	
<b>Test Procedures</b>		<b>Expected Results</b>	
Step 1: Open “admin_page.php” Step 2: Enter Username Step 3: Enter Password Step 4: Click on login		If the username and password is available in our database then it will be considered as administrator and will be given all rights to modify our website.  Else it will give an exception and will as for admin username and password again.	

**Table 17: Test Case 5****9.1.6 Test Case 6:**

<b>Test case</b>	6	<b>Date Reported</b>	30 June 2017
<b>Project</b>	Corpus	<b>Module</b>	Add & delete categories
<b>Severity</b>	Major	<b>Test Engineer</b>	Hassan Nagra
<b>Description</b>		Add & delete categories	
<b>Actual Results</b>		Admin can add and modify category	
<b>Test Procedures</b>		<b>Expected Results</b>	
Step 1: Open “admin_page.php” Step 2: Click on Categories Step 3: click on add new category Step 4: Enter information of new category		Category will be added if other category with same name is not available in the database.	

**Table 18: Test Case 6**

### 9.1.7 Test Case 7:

<b>Test case</b>	7	<b>Date Reported</b>	5 July 2017
<b>Project</b>	Corpus	<b>Module</b>	Add & delete words & videos in categories
<b>Severity</b>	Major	<b>Test Engineer</b>	M Abbas
<b>Description</b>		Add & delete words & videos in categories	
<b>Actual Results</b>		Admin can add and delete word	
<b>Test Procedures</b>		<b>Expected Results</b>	
Step 1: Open “admin_page.php” Step 2: Click on Words Step 3: click on delete		The word will be deleted	

**Table 19: Test Case 7**

### 9.1.8 Test Case 8:

<b>Test case</b>	8	<b>Date Reported</b>	10 July 2017
<b>Project</b>	Corpus	<b>Module</b>	Add and remove projects and its team
<b>Severity</b>	Major	<b>Test Engineer</b>	<i>Aamina</i>
<b>Description</b>		Add & delete projects & its team	
<b>Actual Results</b>		Admin can add and delete project and its members	
<b>Test Procedures</b>		<b>Expected Results</b>	
Step 1: Open “admin_page.php” Step 2: Click on Projects Step 3: Click on Add new Project Step 4: Add information in the form		The Project will be added	

**Table 20: Test Case 8**

## 9.2 Code snippet

### 9.2.1 Add new user

```
1 <?php
2
3 require_once '../inc/initDb.php';
4
5 if (isset($_POST['name'])) {
6
7     $name      = $_POST['name'];
8     $email     = $_POST['email'];
9     $contact   = $_POST['contact'];
10    $add       = $_POST['address'];
11    $des       = $_POST['designation'];
12    $dpt       = $_POST['department'];
13    // $img     = $_FILES[''];
14    $url       = $_POST['url'];
15
16
17
18    $sourcePath = $_FILES['file']['name'] ;
19    $targetPath = "member-images/".$_FILES['file']['name'];
20
21
22    move_uploaded_file($_FILES["file"]["tmp_name"], "../member-images/".$_FILES['file']['name']);
23
24    DB::queryFirstRow("select id from users where email = '$email'");
25
26    if (DB::count() > 0)
27    {
28        echo json_encode("Member already exists");
29    }
30
31    else
32    {
33        DB::insert('users', array(
34            'name'      => $name,
35            'email'     => $email,
36            'contact'   => $contact,
37            'address'   => $add,
38            'designation' => $des,
39            'department' => $dpt,
40            'image_url' => $targetPath,
41            'url'       => $url
42        ));
43        echo json_encode("Member added successfully");
44    }
```

### 9.2.2 Get words

```
1 <?php
2
3 require_once '../inc/initDb.php';
4
5
6
7
8 if (isset($_POST['hello'])) {
9
10     $id = $_POST['id'];
11
12     // $words = DB::query("select w.*, province_name, city_name from words as w INNER JOIN area on w.area_
13
14     $words = DB::query("select w.*, area.province_name, area.city_name from words as w INNER JOIN area on
15
16     if (DB::count() > 0 )
17
18     {
19         echo json_encode($words);
20     }
21
22
23 }
24
25
26
27
28
29
30
31
32
```

### 9.2.3 Delete Projects

```
1 <?php
2
3 require_once '../inc/initDb.php';
4
5 if (isset($_POST['id'])) {
6
7
8     $id = $_POST['id'];
9
10     $team_id = DB::queryFirstRow("select team_id from projects where id = '$id'");
11
12     DB::delete('team_members', "team_id = %i", $team_id['team_id']);
13
14     DB::delete('team', "id = %i", $team_id['team_id']);
15
16     DB::delete('projects', "id = %i", $id);
17
18     $temp['flag'] = true;
19
20     echo json_encode($temp);
21
22 }
23 else
24 {
25     $temp['flag'] = false;
26
27     echo json_encode($temp);
28 }
29
```

## 10. RESULTS/OUTPUT/STATISTICS

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### 10.1 Completion

- Our user can use all its features and all his requirements are fulfilled
- Our website is deployed and complete

### 10.2 Accuracy

All our defined use cases are fulfilling the requirements.

## 11. CONCLUSION

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Our contribution of Pakistan Sign Language (Corpus) to the Special people will help them in various field of life and they will surely take advantage from it for communication. It will accommodate the normal person who will be trying to communicate to the deaf person.

## 12. FUTURE WORK

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We will be adding some new features in our website that would allow user to view multiple videos and related videos to his search. Also we will add a feature where the user would be able to fill a form and add a video of a sign into our data base so that we would have all possible sign of a word.

## 13. REFERENCES

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1. <https://www.psl.org.pk/>
2. <https://deafreach.com/project/psl/>
3. <https://www.sciencedirect.com/science/article/pii/S235234092100305>
4. <https://www.connecthear.org/learn-sign-language>