



Animated Sign Synthesis of Indian Sign Language

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Abstract— Sign language is a root level communication language for deaf people or those who are hearing impaired, so they found difficulty to communicate with the outer world. Hearing impaired people also had less reading skills, than the average educated person [5] so they cannot understand or gain information from outer world such as from Banks, Railways, and many more sector, they lack basic communication with others. To reduce this communication gap and made them available more information, we propose a system (model) which synthesizes signs from sign text to Indian sign language (ISL). For representing sign we use an animated human model which displays the selected text as input to the corresponding animation by using multimedia techniques.

Keywords— ISL, sign synthesis, text-to-sign, Web3D, American Sign Language, sign model, Blender tool.

I. INTRODUCTION

A. SIGN LANGUAGE

The language developed by deaf community which includes deaf people and their family, which uses signs to communicate with each other. And the language used by them to convey thoughts and meaning by using visual gesture of sign which include hand, face gesture and arms is known as sign language. Sign language has their own grammar and syntax, which is not universal. The most interesting thing about sign language is that each every country has their own language which is different from another country in syntax and grammar. Such as the sign language which is used in America is called as American Sign Language, whereas the language which is used by Japanese is known as Japanese Sign Language. Similarly the sign language which is used in India is known as Indian sign language.

Sign language includes two expressions that are finger spelling and gesture. Finger spelling is basically used to express letters of the English alphabet and numbers. And gesture is used to express the whole meaning of a word or phrase by using hand motions, shape, location and number of hands. But facial expression is also used to express the feeling or intention of the signer.

B. Indian sign language (ISL)

The sign language used by the Indian deaf community is known as Indian sign language (ISL). ISL has their own grammar and syntax which is different from other countries sign language. ISL is also used by the deaf community of Sri Lanka, Nepal, and Bangladesh and in some region of Pakistan [3]. ISL has dialects in various part of the India, but they use same grammar. In Indian sign language, uses both hands for representing signs [3]. Indian sign language is categorized into three different [1] categories that shown by figure 1.

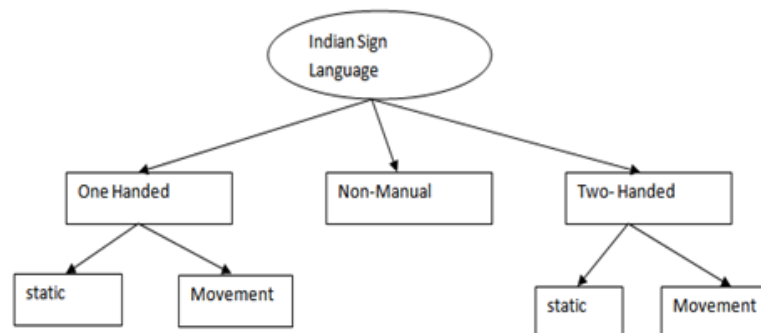


Figure 1

One handed

In one handed sign synthesis use one dominates hand to represent the signs. These signs may be either static or movement related. The sign which is represented by one handed uses some manual and non-manual signs for the representation of signs.

Non manual

Non-manual signs are those signs which are used to represent the intention of the signs of the signer by using facial gesture. Non manual sign are different type of facial expression used in different emotional conditions such as angry, happy, normal, and sad.

Two handed

In two handed sing synthesis the signer uses their both hands in which one is dominate hand and supporting hand which help to complete the signs. This is basically used to represent complex signs which not possible to represented by one hand. Two handed sign use manual and non manual sign in combination to express the complete meaning of signs.

Sign Synthesis

Sign Synthesis is a process in which we synthesis the sign from English text. There are many machines which are developed for synthesis of sign, every machine uses different technique some are speech to sign synthesis and text to sign synthesis. But more success is gained by text to sign synthesis. Here we are developing a machine to represent the sign by using an animated avatar, which is discussed in related work section.

II. RELATED WORK

In this section we discuss about the previous paper works, their technique what they have done and which provide us a scope from which we can make a road map and precede our work.

Speech synthesis is the older cousin of sign synthesis [4] so we should study that, which provide us concept to develop sign synthesis (text to sign synthesis) Project. Speech Synthesis technique is very much similar to text to sign synthesis. Below shows the basic architecture of speech synthesis discussed by Angus B.Grieve-Smith, Which is developed by klatt

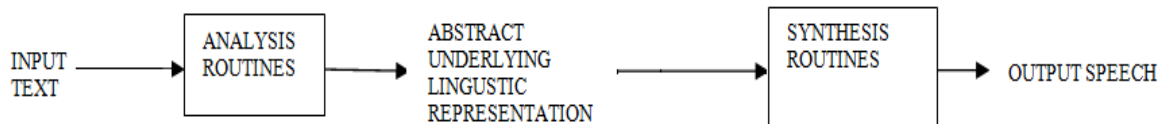


Figure 2.Architecture of speech synthesis

The architecture is subdivided into too many sections as input text, analysis routines, synthesis routines and output speech.

In many areas were sign synthesis shows promise deals with how we record and represent sign language. We can record sign language in many ways, such as

1. Written form
2. Picture frame
3. Video form

In which the most common way we store spoken word is to write, but sign language isn't in written form for Indian sign language. When many researchers do not able to write the sign language, then they record the sign in video format, in which a signer make sign in front of camera. Each video contains a particular sign. But this brought two problem first one is storing problem and one is bandwidth problem. Another method is storing pictures of the signs, this method overcome the limitation of storage and bandwidth problem, but put one problem the fluid motion of the sign is not achieved by using picture method.

Who is doing what	
Analog Synthesis	Salk (Loomis et al. 1983)
Gloss-Based/Concatenative	VCom3D (Wideman 1999) Simon the Signer (Elliot et al. 2000) Hitachi (Ohki et al. 1994)
Articulatory	Sister Mary O'Net (Messing and Stern 1997) SignSynth ViSiCAST (Elliot et al. 2000)

III. IMPLEMENTATION

With the advancement of technology many things which are not possible, become possible, basically in the field of computer science. Because of which complex and good quality animation can be made with ease. And a good animation requires more memory and processing power for rendering. Because of which animation is becoming possible.

To make the system more interactive and user friendly with the user, an animated human torso is being used to represent the signs. For making sign we make avatar which is made of many joint, by using freely available open source tool i.e. [16] blender. This provide us many feature which made easy to make animation the avatar in a batter way. As shown in below figure we don't use the foot portion because it is not used from making sign.

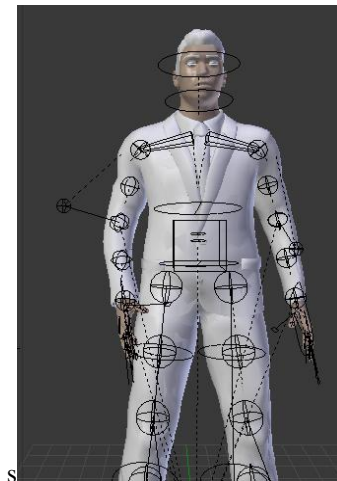


Figure 3

A. Architecture

Following figure 4 shows the architecture of our system.

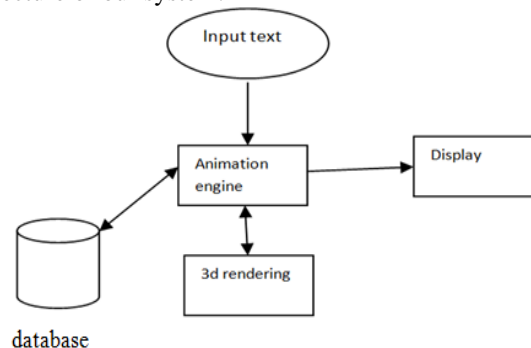


Figure 3

Above architecture is divided into different parts as input text, animation engine, database, display.

In this we input the text which goes to animation engine which take the sign articulation details from a database and then displayed. The sign is represented by an avatar, for making avatar (animated human) we open source tool such as blender, make human, and for rendering use instant real player which display the avatar and also display in web browser.

IV. RESULT

In this section we discuss about sign which are represented by animated avatar. And up to what extent the sign are represented efficiently to user, for that we analyse the sign by considering two basic parameters upon which result is being analysed. The two parameters are

- Articulation position
- No. Of frame per sign

In making sign the above two factors are very much important to make sign understandable and meaning. The first factor is the articulatory position which decides the at that for particular sign a specific position is fixed which define the meaning of the sign. A sign may include one or more position. And the second factor is the number of frames which decide the size of the sign generated how fast it will change the position and how much time a particular sign will take. We have shown some signs below which shows different position of the sign.

Sign for good afternoon



Figure 4

Figure 3 shows starting position for every sign making. For making every sign a particular target is selected and position which is very important. With position of the target, sequence of articulation position and direction is the deciding factor.



Figure 5

Such in the above figure the hand must go to position as shown in figure and little shake toward the head which shown the sign of afternoon.

V. CONCLUSION

Deaf people or people who take birth in deaf families learn sign language as their first language. Written language becomes their second priority. These people prefer to access information in form of sign language only. Providing information in form of video clips is very expensive so sign animation is a promising approach. But main aim is on making Indian sign language how it is made and technique are been used. For generating sign animation, sign language generation system for ISL language proposed a prototype system.

Further improvements can be made to the procedural animation controller, as we can only perform sign language visualization from a complete key frame animation that represents a whole sign language gesture in video format of ISL. A procedural animation controller can be developed that uses more avatar Action Actuators in Blender to separate body, hand and facial animation control. And try to integrate the X3D and WebGL library to get more control over the avatar and which can also run on web with full animation feature.

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