



Sign Mobiles: An Android App for Specially Able People

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Abstract— *Speech-to-sign technology and VRS enables audible language translation on smart phones with signing and Outfit7 application has characters feature in mobile without dialling number, and mimix uses a technology that translates spoken and written words into sign language with a3D character. Why have these three technologies not mashed up to solve the problem of mobile sign language translation in daily life activities? Deaf people could gesture sign language into smart phone by using VRS which would produce audible and textual output. Mobile gesture recognition might enable the deaf to converse with the hearing, remotely and intermediated by a human interpreter. This position paper advocates a path toward such technology.*

Keywords— *Assistivity technology, Speech-to-sign technology, Video Relay service, mimix application, Outfit-7 Application, Mobile Communication.*

I. INTRODUCTION

Before SMS/MMS, deaf people rarely used mobile phones. Now texting allows deaf people remotely to communicate with both deaf and hearing parties. Mobile video chat may one day replace texting, but only for conversations between deaf callers, not for those between deaf and hearing callers.

Outfit-7 application for our mobile phone, with an image movement who will repeat everything we say in a high-pitched voice. Without dialling number we can use this application.

i. Deaf-Hearing Communication

Though not all deaf Americans use sign language, for ease of exposition, we define the term “deaf” broadly, to include any person who communicates primarily using American Sign Language (ASL). Similarly, we follow Gallaudet University’s Editorial Stylebook; we do not capitalize the word, “deaf”. Though some hearing people use both audible and sign languages, we use the term “hearing” to suggest a person who speaks in audible language and does not sign. One exception when referring to a paid professional who intermediates Communication between deaf and hearing parties, we use the term, “interpreter.” Technical literature uses the term “translation” in favour of “interpretation,” so we follow that standard for that reason.

ii. Sign Language Interpreter

Sign language interpreter is responsible for helping deaf or hearing impaired individuals understand what is being said in a variety of situations. An interpreter must understand the subject matter so he or she can accurately translate what is being spoken into sign language. Whenever an audience will be in need of sign language interpretation, a sign language interpreter is needed, such as during an office meeting, in a court room or at a presidential speech. Interpreters may also be used in one-on-one situations; they might use technology to provide services from a remote location.

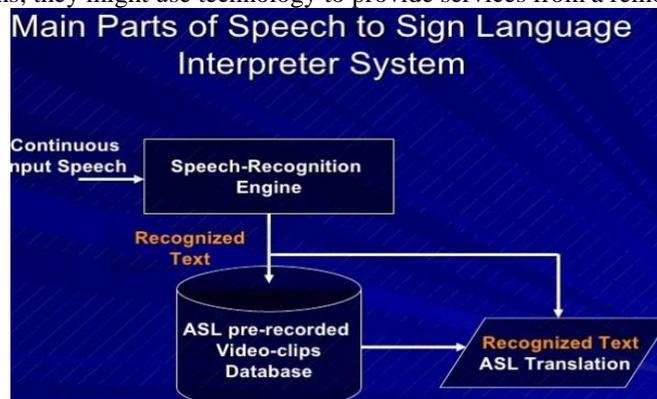


Fig 1.1 ASL interpreter

There are mainly three parts

- Speech-Recognition Engine
- Database
- Recognized Text

SR system clustered according to three categories:

- Isolated vs. continuous
- Speaker dependent vs. Speaker independent
- Smaller vs. larger vocabulary

iii. Video-Relay Service

It allows deaf, hard-of-hearing and speech impaired individuals to communicate over video or other technology with hearing people in real-time, via a sign language interpreter.

In this we use video remote interpreting service that uses video remote interpret ring service that uses devices such as web-cameras to provide sign language. This equipment must provide “video and audio connectivity” or a separate telephone lines can be used for audio. The video interpreter facilitates communication between the participants who are located together at the other site.

In the case of sign language interpretation the interpreter hears the voices of the hearing people through the telephone and renders the message thin to sign language, via a video camera which the deaf person views on his or her video display.

In turn when the deaf participants sign to the camera, interpreter views this from their screen and speak the aural interpretation into a telephone for the hearing people.



Fig1.1 Communication using VRS

Americans with Disabilities Act (ADA) requires telecommunications companies to provide services for people who are deaf, hard of hearing and speech impaired. In the 1990s, this involved text-only Teletypewriter (TTY) machines connecting like fax machine across telephone lines, and required both parties to have TTY machines. Today Video Relay Service (VRS) integrates televisions and cameras with human interpreters and telephones to achieve communication. Deaf callers can also contact hearing parties through interpreters using mobile video chat through smart phones, tablet PCs, or iPods with Wi-Fi connection, but these solutions still require human interpreters.

iv. Human Interpreters

For lengthy, sophisticated conversations it is difficult to imagine a workable computer system that would improve over human interpreters. The ability of human interpreters to perform language translation may always exceed a computer’s ability. From courtrooms to churches, the role of human sign language interpreters likely would not change with or without the existence of mobile ASL2TXT. Still, human translation or relay services may sometimes take more time to establish than a given communication is worth. For example, at the checkout line in a grocery store, a deaf customer may want to ask if the price of eggs is correct, or if there is a holiday sale next week. At a family reunion, a deaf attendee may want to ask where a second cousin went to high school. Either question may not warrant the time necessary to establish a relay. In some situations, mobile ASL2TXT translation may be more convenient than a relay or even a handwritten note. Like texting, we envision ASL2TXT as an enhancement to smart phones and other mobile devices, not as a replacement for human interpreters.

v. Mobile Phones and Texting

SMS/MMS enables signers to communicate with both deaf and hearing parties. Video chat technology continues to improve and one day may be the preferred means of mobile communication among the deaf. Researchers at the University of Washington are developing Mobile ASL to improve video chat capabilities on smart phones. This image compression research clarifies video, improving small-screen mobile communication among the deaf. It does not address communication between deaf and hearing callers.

vi. Related Work

We are aware of no research whose aim is un-intermediated mobile communication between deaf and hearing people, each conversing using their own natural languages. However, research abounds in related areas.

A. Speech-to-Text Translation

Computers already translate audible languages. Google Translate allows users to type text in their native tongues and receive textual and audible translations in several vernaculars. Dragon Dictation types what the user vocalizes into text messages, Face book and Twitter. Talk to Me translates input text or speech back and forth between 40+ audible languages, outputting text and/or speech.

B. ASL Dictionaries (TXT2ASL)

Video of ASL is available at various websites, such as ASL Pro Michigan State University’s ASL Browser and Signing Savvy. Users access video by typing their text-string identifiers. ASL2TXT requires a **reverse ASLDictionary**, one which allows users to gesture signs, then read text translations, or listens to audio translations.

C. Sign Language Recognition

While mobile ASL has not specifically been attempted, in 2011 alone, sign language recognition as a computer vision problem has been tested on at least six (6) different sign languages, each using different algorithms for pattern recognition. Boston University researchers ran experiments using Bayesian networks and supervised learning to improve hand shape recognition algorithms. Taiwanese researchers experimented with hand motion paths of Australian Sign Language. Their use of Kernel Principal Component Analysis (KPCA) and Nonparametric Discriminate Analysis (NDA) improve accuracy but processing speed continues to constrain likely real world application. A MATLAB model processed a spectrum of Indian Sign Language gestures, unique for each expression, called a “motion print.” The system requires a training set which may need to be established person-by-person, like some speech recognition programs may require training by an individual user’s voice.

Researchers tested techniques on just the numbers of Persian Sign Language (PSL) using thinning and cleaning of segmented images. While computationally efficient, it was not applied to a wide range of gestured expressions.

Brazilian researchers presented a new approach but similar findings using Brazilian Sign Language examples. Researchers examined Chinese sign language and concluded that experimentation shows that a linear kernel function is suitable for sign language recognition, but this was only applied to a small subset of the Chinese Language.

II. EXISTING SYSTEM

There are two existing systems that is

- Communicate through cell (while dialling number)
- Face to face communication (without dialling number).

i. Communicate through cell (while dialing number)

How might a deaf person communicate with a hearing person without a human interpreter? Consider Figure 2.1

- A deaf person signs.
- Software translates signs into text (and voice), and the hearing person reads it (and hears it).
- The hearing person speaks into microphone.
- Software translates voice into text (and ASL). The deaf person reads it (and sees ASL video).



Fig 2.1.1 existing mobile interpret

A. Storage and Speed Issues

A mobile search system may sometimes require a database larger than the capacity of a given mobile device. It may be preferable at times to go to the cloud for image search, analysis and translation into text/voice, depending on the processing power of the mobile devices, the resolution of the images and the size of the vocabulary database. However, satisfactory results have already been reported. As stated in “Mobile visual search is ready for Prim time.”



Fig 2.1.2: existing system accessing internet

B. Experimentation and Application

System development must begin by testing image processing algorithms and pattern recognition methods against a broad set of images from a library of digital sign language gestures. This must be performed not only in laboratory conditions but in real-world environments under various lighting conditions. The evolution of the proposed system proceeds with translating finger-spelling the alphabet and continues through ever more complicated ASL gestures. While in the short term we may not achieve a full-fledged dictionary, the initial tool may be useful in situations that utilize only character sets (finger-spelling) or small sets of input words, such as a GPS system in an automobile.

C. Limitations of Existing System

- It can be used only between the caller and Callie.
- For communication between deaf and hearing person we must dial the number.
- For daily activities that are for normal face to face communication we cannot use this application.

ii. Mimix Application

Face to face communication (without dialling number).

How easy is it for a deaf and hard hearing person to communicate with others? Today a new option is available for them and for you to enjoy a conversation with each other it's a new app called Mimix. Anything a person will say is immediately translated to sign language through Mimix making it easier to have a clear, two-way communication with a deaf without having to know sign language. It works based on recorder.

Limitations in MIMIX Application

In this Mimix application the limitation is to convert the normal language into sign we first record the sentence the by clicking convertor button it convert to sign language.

- For every sentence the recording is necessary to record the sentence.
- By cause of this it takes time.

Hence to overcome this we must access the application without recording that is nothing but to access directly.

III. PROPOSED SYSTEM

Our proposed system includes a variety of technologies. It consist two main parts hardware and software. In hardware parts we required phone, speaker. In software we mainly consist outfit-7 (which is used in tomcat application) and Video Relay Service(VSR). All these parts can be brought together in an integrated system. In this system we implement outfit-7 in VSR application.

i. Outfit-7 application

It is an application for our mobile phone, with an image movement who will repeat everything we say in a high-pitched voice. Without dialling number we can use this application.

Talking Friends is a series of mobile applications created by the Slovenian startup company "Outfit7" for Samos Login. The app series allows users to touch the character and speak to it, to make the based 3D character imitating it.

ii. Origin

"Outfit7" is the creator of the series, which was founded on October, 2009. They created the first mobile app and the very first app of the Talking Friends series "Talking Tom", a 3D cat, on June 26, 2010.



Fig 3.1 Outfit-7 application

iii. Process flow

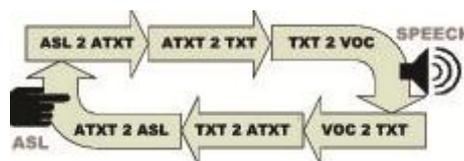


Fig 3.2 Process flow

A. ASL2ATXT

First, mobile search functionality must recognize video images. Storing and processing this information might begin with the following procedure Press record button. Gesture sign language. Press stop button. Press translate button. Output perhaps would be a text string, which may not be meaningful in English, but would correlate with the gesture. Call this identifier "ASL text" (ATXT), distinct from English text (TXT). ATXT may be analogous to verbal contractions of audible languages, as "did not" is sometimes pronounced, "didn't." Video images and their corresponding ATXT may be stored in a database which may reside on the smart phone, or tablet PC, or on the web. Alternatively, feature descriptors other than ATXT may be used.

B. ATXT2TXT

Second, ATXT must be translated into TXT. This process will require continuing enhancement as similar gestures have quite different meanings. For example, the ASL gesture for "Friday" is the same as the letter "F," except that the former moves in a circle for a brief time while the latter is relatively still and may be almost instantaneous. Video processing will analyse multiple images, not only for the content of the image but also for its relationship to previous image. Volga and Golden stein exposit many of the issues involved in this process. The output of this process would be text which could be translated to speech.

C. *TXT2VOC*

Third, display to the hearing person the English text (TXT) and play the audible vocalization (VOC). This is accomplished with existing text-to-speech technology. These first three steps complete one direction of a conversation, from gestured ASL to audible speech. Together they comprise a **reverse ASL dictionary**, as described in 3.3. A system consisting only of ASL2ATXT, ATXT2TXT and TXT2VOC may provide a useful standalone system for looking up the meanings of gestures. The next three steps comprise the responding direction of the conversation. A primitive system for converting from audible speech to ASL gestures would have two parts, speech-to-text followed by text-to-ASL.

D. *VOC2TXT*

The hearing person could reply vocally or textually. To convert VOC to TXT, the computer would use speech recognition, i.e., speech-to-text.

E. *TXT2ATXT*

Then translate TXT into ATXT. This step presents substantially the same challenges.

F. *ATXT2ASL*

Finally, display sign language gestures captioned along with the ATXT and/or TXT. This is the same ASL dictionary discussed in. IBM in 2007 accomplished this with Sis (Say It Sign It), an application that converts audio into sign language and plays the result visually using an avatar.

iv. **The American Sign Language (ASL) Alphabet**

- All letters are signed using only the right hand which is raised with the palm facing the viewer so a straight finger is will normally point upwards.
- When fingers are folded they point down across the palm.
- When the thumb is folded it crosses the palm towards the little finger.
- In these descriptions left and right are from the position of the viewer.
- In the case where the hand is turned or tilted the positions of the fingers is described first for an upright hand and the turn or tilt is added.



Fig 3.3 ASL Alphabet

v. **Signed English (SE)**

- SE is a reasonable manual parallel to English.
- The idea behind SE and other signing system parallel to English is the deaf people will learn English better if they are exposed. Visually through signs, to the grammatical feature of English.
- SE uses two kinds of gesture
 - ✓ Sign Words
 - ✓ Sign Markers.
- Each Sign word stands for a separate entry in a Standard English dictionary.
- The sign words are signed in the same order as words appear in an English sentence. Sign words are presented in singular, non-past form.
- Sign Marker is added to these basic signs to show. For example that you are taking about more than one thing or that something has happened in the past.
- When this does not represent the word in mind, the manual alphabet can be used to finger spell the word.
- Most of signs in SE are taken from ASL. But these signs are now used in the same order as English words and with the same meaning.



Fig 3.4 example of SE

vi. Combination of Outfit-7 and VRS

Instead of tomcat in this we take an avatar image through which a hard of hearing person can easily understand. In this step if we combine both Mimix and outfit with VRS service then the process time is reduce it does not require any recorder at each time it convert into sign directly without recorder. The process flow is shown in below fig.

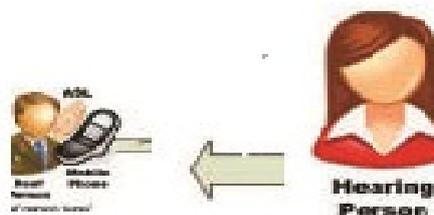


Fig 3.6.1 Proposed system communication

It repeats everything which we say without dialling number. Following fig shows the overall view how might a deaf person can communicate with hearing person without dialling number(that is face to face communication) by mashing VSR and Outfit-7 applications then it is very helpful to deaf people.

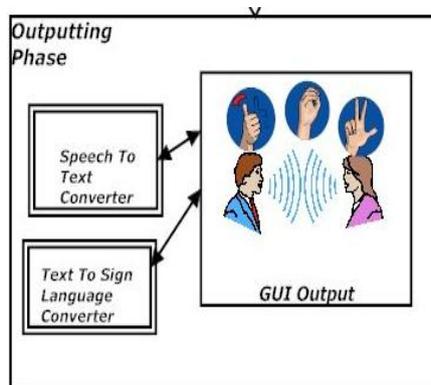


Fig 3.5.1: Outfit-7+VRS

When a person say hello then VSR converted it into speech to sign format and outfit-7 take this sign and convert it into speech to sign without connection. Instead of tomcat we take a human animation.

vii. Advantages

- It does not require opening recorder each time like Mimix.
- Without dialing number we can communicate to other like face to face communication.
- Record any sound and play it back with a filter. The sound is recorded and erased after the play back.
- It does not require large amount of storage.
- Record a short video and then send it as a text message (SMS), Facebook message, Kakao Talk message etc.
- We can also share our video by posting it on Facebook or Twitter.
- This app is perfect for sending messages you would otherwise be too shy to say in person, like apologize to someone, profess love or sing a song... You can even create your own funny video story.
- Tom's Messenger is by far the easiest and fastest way to send a message... You don't even need to type.

viii. Feature Description

In future important journals include Mimix, outfit-7 and VRS on speech and audio processing, Computer Speech and language. It involves both speech recognition and translation components.

By using this application deaf person can easily interact with normal person anywhere.

- Automatic translation
- Automotive speech recognition
- Speech-to-sign transmission

IV. CONCLUSION

Short-term, ASL2TXT might enable sign language finger-spelling communication in narrowly defined environments. A simplistic system, which used SEE (Signing Exact English) instead of ASL, might take text then find and display video as described. While primitive, such a system may yield functionality at least on par with Stephen Hawkins's cheek-twitch controlled, IR-sensor driven voice box. Medium-term, ASL2TXT may facilitate brief mobile communication between deaf and hearing parties. This would represent a giant leap forward in deaf-hearing communication. Long-term, ASL2TXT, augmented by speech-to-text, might enable both hearing and deaf callers to intercommunicate using their natural languages. It is difficult to estimate the effect of such a tool in terms of integrating deaf and hearing people into one society.

By using this application deaf person can easily interact with normal person anywhere, and he can also use this application for mobile sign translation using VSR and by using UTF-7 he can communicate in daily activities without dialling number.

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