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Korsan Yazılım

Literature Review

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# Literature Review

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# 1 *Introduction*

When we decided to implement Turkish Sign Language (TSL) in our graduate project, first we had to make a study, especially on its basic structure and feasibility to be modeled.

During this study, it was figured out that there are nor valuable resources or deep researches about TSL. Therefore, it will not be reasonable to expect any products serving for TSL education. Another interesting point encountered is that; sign language training was stopped in Turkey at 1953 in order to promote oral communication<sup>1</sup>. However, nowadays people including some academicians in Koç University tend to restart it and have already made some researches about TSL.

As a first impression, sign language sounds appropriate to be simulated in a 3D virtual environment, mainly for the following reasons that are stated below:

- Facial expressions are not densely used
- Actions of signs are quite slow
- Structure of statements are simple such that; you do not have to use possession suffixes for nouns or actions
- Conjunctions are not used
- There are some fixed signs for some widely used suffixes such as *-cı*, *-ci*, *-cu*, *-cü* (the suffixes that we use to indicate occupations, e.g. *ayakkabıcı*)

After all, we decided to analyze the software products available related to sign language education and communication in order to see what the capabilities, difficulties and deficiencies are.

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<sup>1</sup><http://turkisaret dili.ku.edu.tr/en/tid.aspx>

## 2 *Products*

### 2.1 *Vsign*<sup>2</sup>

- It is a 3D animation tool created by EMMA (European Media Masters of Art)
- No extra hardware is needed to model
- Vsign is implemented in Macromedia Shockwave
- Consists of two parts
  1. Vsign Builder
    - Beginning, end and intermediate states of a gesture are set.
    - Modeling is separate for hand shapes, body and arms
    - Speed can be adjusted.
    - A player animates the designed signs.
    - The recorded animation is stored as a simple text file.
  2. Vsign Player
    - Animation is loaded from the text file
    - Camera and zoom options are available
    - There is a feature allowing focusing on a single hand and head.

#### ***Remarks:***

Vsign is a good example for our project since it contains the 3D capability, the main aspect of our project.

The properties which are nice about Vsign are: no extra hardware requirement, ease of modeling gestures, detailed modeling, simple file format to process, sign language independence (since it only an animation modeling and playing tool).

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<sup>2</sup><http://www.vsign.nl>

The shortcomings of the program can be stated as follows.

- It doesn't have an education aspect. Only models the animations and plays it. In this format it looks like an animation studio rather than a sign language tool.
- There are some problems in 3D. For instance Hands shapes do not seem realistic. There are also some problems in motions especially when the motion speed is slow.
- The interface is not user friendly.

## 2.2 *The DePaul Univ. American Sign Language Project* <sup>3</sup>

- An academic 3D project
- Aims to translate English to American Sign Language(ASL).
- Projects involves a direct translator which is also an aim of our project
- Emphasizes on shadows and naturalness which can be summarized as follows.
  - Shadows and Lightings: In their opinion, without shadows and lightings, the gestures are hard to understand. Hands seem to fly in the space. To solve this problem, they added light sources to make the animations realistic.
  - Naturalness: Although the motion can be accurate, it may not seem realistic enough. The movements are sharp and too clear. To overcome this, they used motion blur techniques, repeating the movement many times and taking the average.
- To achieve successful fingerspelling, the transitions from every letter to other are stored as AVI files, then the collision cases are determined and fixed
- They added mimics to the although it was included in the in early versions of the project.

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<sup>3</sup><http://asl.cs.depaul.edu/>

**Remarks:**

This project is more academic and professional than others. There is a large staff and publications behind the project. They make effort to succeed advanced issues mentioned above: shadows, naturalness, collisions etc. The animations produced seem elaborated and realistic.

However there were only some sample animations in the website which did not give a concrete idea about the educational aspect and user interface of the project.

### 2.3 *Reading Power* <sup>4</sup>

- Reading Power is a K-8 educational software product for native signers focused on literacy and reading comprehension. The software includes story-telling, interactive *conversation*, and tools to build comprehension and vocabulary.
- Reading Power uses 3D signing characters to unlock the power of reading and make learning fun. Reading Power uses the language the students know best to help them read and understand.
- Reading Power's Signing Avatar characters provide students with vocabulary help; comprehension (main idea, sequence, details, title, etc.); and fluency. It is provided in a unique engaging manner.
- Reading Power also includes teacher support materials, activities, a starter dictionary and ideas for integrating technology into learning.

**Remarks:**

Actually, Reading Power is very close to what we are planning to develop. For this reason its feature set will guide us during the analysis process. Reading Power uses 3D signing characters which neglect the disadvantages of video based applications. To give a case in point, with 3D signing characters you save from space because you do not need to store video files for each word. Also with 3D signing characters it is much easier to add new words to your database and then distribute the updated database. Although Reading Power has a big plus with its 3D virtual environment, it has some

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<sup>4</sup><http://www.vcom3d.com/ReadingPower.htm>

shortcomings that need to be improved. In our project we will develop a direct text to sign language translator which is a missing feature in Reading Power. It is for sure that with such a feature, daily dialogs will be easily translated into sign language. Also, there is the lack of lip simulation in Reading Power, which will again be a feature of our product.

## 2.4 *SignGenius*<sup>5</sup>

- A fast, interactive and cost effective software package to learn Sign Language
- Developed by Moving Hand Enterprises
- Accredited by DEAFSA (South African National Council for the Deaf)
- Uses video clips to demonstrate sign language
- Composed of six sections
  1. Tips
    - Gives a good overview of the basic hand shapes and movements that a user may need to know in order to use sign language correctly.
  2. Tutor
    - Contains 2197 video clips grouped into 65 categories.
  3. Test
    - Use the monkey-puzzle style test feature to see if you can associate the video clips with the correct words
    - Test yourself one category at a time
  4. Score
    - For parents and teachers to accurately measure progress
    - For kids to prove that they really did get all the answers right
    - For you to keep track of your own "high scores" and improve
  5. Info
    - Interesting facts about deaf culture, interpreter services etc.
    - Contains a comprehensive list of addresses of Deaf organizations, support groups etc.

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<sup>5</sup><http://www.signgenius.com>

## 6. Hangman

- Built-in game that also tests your Sign Language skills and helps improve your spelling

### ***Remarks:***

Even though SignGenius is not a derivative of what we are trying to do, it has some inspirable features. Advanced search function, user friendly interface, good categorization for tutor and tips parts are the features of which SignGenius has successful implementations.

However, SignGenius should be considered twice because of below shortcomings:

- Video clips quality is not satisfactory. Moreover, some sign demonstrations are not easily comprehensible.
- No lessons aimed to teach sign language to users.
- Entertainment is restricted by only a simple game.

## 2.5 *Personal Communicator* <sup>6</sup>

- A Tool for Learning and Communicating in American Sign Language (ASL)
- Developed in 1994-1996 by Comm Tech Lab in Michigan State University
- Uses digital video and compression technology for presenting sign language features
- Originally created using Hypercard technology of Apple
- Made up of four components
  1. Word Processor
    - Converts typed English text into American Sign Language signs and Speech
  2. The English-ASL Dictionary

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<sup>6</sup><http://commtechlab.msu.edu>



- Allows users to look up word meanings and signs
- 3. The ASL Playroom
  - For users to not only learn new signs, but have fun along the way
  - Included clickable objects that react to the user with audio and video feedback in the playroom
  - Gives the sign for the object that user selected
- 4. The ASL Browser
  - Provides a straightforward interface to accessing over 2500 signs

***Remarks:***

Personal Communicator is a complete tool for sign language education and communication. However, this tool is digital video oriented and not a good example for a project based on 3D environment. By the way, we can use some of its educational properties.

At a first glance; Personal Communicators properties like low system requirements, high-quality of its learning materials, incentive features for learning (such as classroom and futuristic screen backgrounds) stand out.

Unfortunately, these positive attributes are offset by notable shortcomings

- No information is given to explain what the various sections of the program do
- The video clips are small and dark with visible shadows making it difficult to clearly discern the signers hands and face and thus to see what is being signed
- The user may find it difficult to identify which objects will animate as many of them are clustered close together in the Playroom.
- Failure to extend beyond isolated words

## 2.6 *eSIGN* <sup>7</sup>

- 3d animations and videos are mixed
- Some real BBC news are animated
- Friendly user interface
- Details of the hands can not be caught on easily (Avatars are small)
- A free text analyzer is included
- An *Intelligent* Sign Language Editor is used to simulate new actions

### **Remarks:**

The eSIGN project aims to provide sign language on websites with small software installed to clients; since it is not ready to download yet, I can not estimate any hardware requirement, CPU or memory usage of that software. On the other hand, eSIGN is a good example of an education tool, especially animating real BBC news simultaneously with the video near our cute avatar is a valuable idea.

One of the most important things about the animations is that; they are based on motion-captured data and so they are more realistic than synthetic ones.

## 2.7 *Ready Set Sign* <sup>8</sup>

- Ready Set Sign(RSS) is a online portal for teaching sign language but the main products are published and sold via CDs.
- The portal (and disks) has many lessons and many video clips for each lesson.
- The courses are orginazed as if it is teaching a foreign language. The site is sincere and it is easily understandable. Iconic explanations are widely used in videos which is helpful for reminding the words.

### **Remarks:**

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<sup>7</sup><http://www.sign-lang.uni-hamburg.de/eSIGN/>

<sup>8</sup><http://www.readysetsign.com>

The site and the product uses video clips for showing motions and icons but as the quality increases it would be harder to process and store those videos. Moreover storing these motions via video clips can cause problems when new entries or courses want to added. The portal has many lessons but the range is not wide, however the site is educationally well organized. These games and sincere lessons can help people learn and enjoy simultaneously.

## 2.8 *Tessa*<sup>9</sup>

- Tessa is a prototype for VisiCast, that is a project for translating the teletext into sign language. Tessa is used in post offices for preventing the deaf people from facing problems.
- A speech recognition tool, converts the sound into text and if desired it outputs the text on the screen. The text found can also be translated into British Sign Language (BSL).
- This application can give very realistic animations because it will be simulating a real human. Unless there are no previews available, this is still a prediction.

### ***Remarks:***

Furthermore, adding new BSL words could be suffering when this kind of an approach is used. The sensors movements could change from person to person. Additionally an insertion into BSL database can be exhaustive for a speaker and costly for the project. Likely, maintainance and publishing new versions are going to be the bottlenecks of the project.

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<sup>9</sup><http://www.visicast.co.uk/news/Tessa.html>