Arabic Sign Language Simulator

Made Using Three.Js

Table of Contents

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Introduction

The Arabic Sign Language Simulator is a three.js-based program. Its purpose is to introduce people to the signs of the Arabic alphabet in Arabic Sign Language (ArSL). A sign language is a system of communication using visual hand gestures and signs, and it was created to ease socializing with deaf people or people who are hard of hearing.

This program displays a hand that signs a letter based on the user's input. Which, in the case of this project, is either through the physical keyboard, or through the virtual one added to the screen. Additionally, it shows the letter chosen next to the hand as well as plays the sound of the letter's pronunciation.

The Arabic Sign Language Simulator was initially created for this course's (Computer Graphics I) project topic; however, we aim to develop it in the future to make it more interactive and accessible for everyone to help spread awareness about the basics of sign language.

Below is a brief explanation of how the project met the requirements alongside with a manual to how to use it.

Project Requirements

3D Drawing

The 3D drawing is the hand. The palm is a large cube, and the fingers are made of 3 small cubes placed above of each other.

3D Motion

The 3D Motion is the hand rotation. When the user clicks on a letter, the hand signs the letter and keeps rotating around itself. (Animation)

User Input

User input can be done using two ways:

- Keyboard Input (physical keyboard)
- Mouse Input (the virtual keyboard)

Textures

Textures are used in:

- the scene's background, (MeshBasicMaterial)

- the hand, (MeshBasicMaterial, MeshPhongMaterial, and MeshLambertMaterial)

- the letter displayed next to the hand. (SpriteMaterial)

It is worth noting that although the virtual keyboard appears to be picture-based, it is not a texture. It is merely a bunch of JavaScript buttons with a background.

Lighting

The MeshPhongMaterial and the MeshLambertMaterial were added simply to give an example of using lighting. The light used is AmbientLight.

Splines Camera Movement

There was unfortunately no use for splines in this program since it does not really rely on camera movement. The only camera movement that can be seen is by moving the hand using the mouse, which is why Orbit Controls were added.

Project Manual

User Guide

This is a very straightforward program. As soon as the file is opened, the hand and the keyboard will be displayed, then the used can choose whichever letters they would like to see.

Letters can be switched-between smoothly if the user pressed on any button on the physical keyboard. Nonetheless, this is not the case with the virtual keyboard. The user can only click on one letter and if they want to change to another one, they will have to reload the page (an issue that we could not fix).

As for the sounds used, they had to be converted from mp3 to ogg for Three.Js to be able to read and play it.

Figure 1

Figure one shows the whole scene before any user input. The hand is currently static and there is no letter shown next to it.
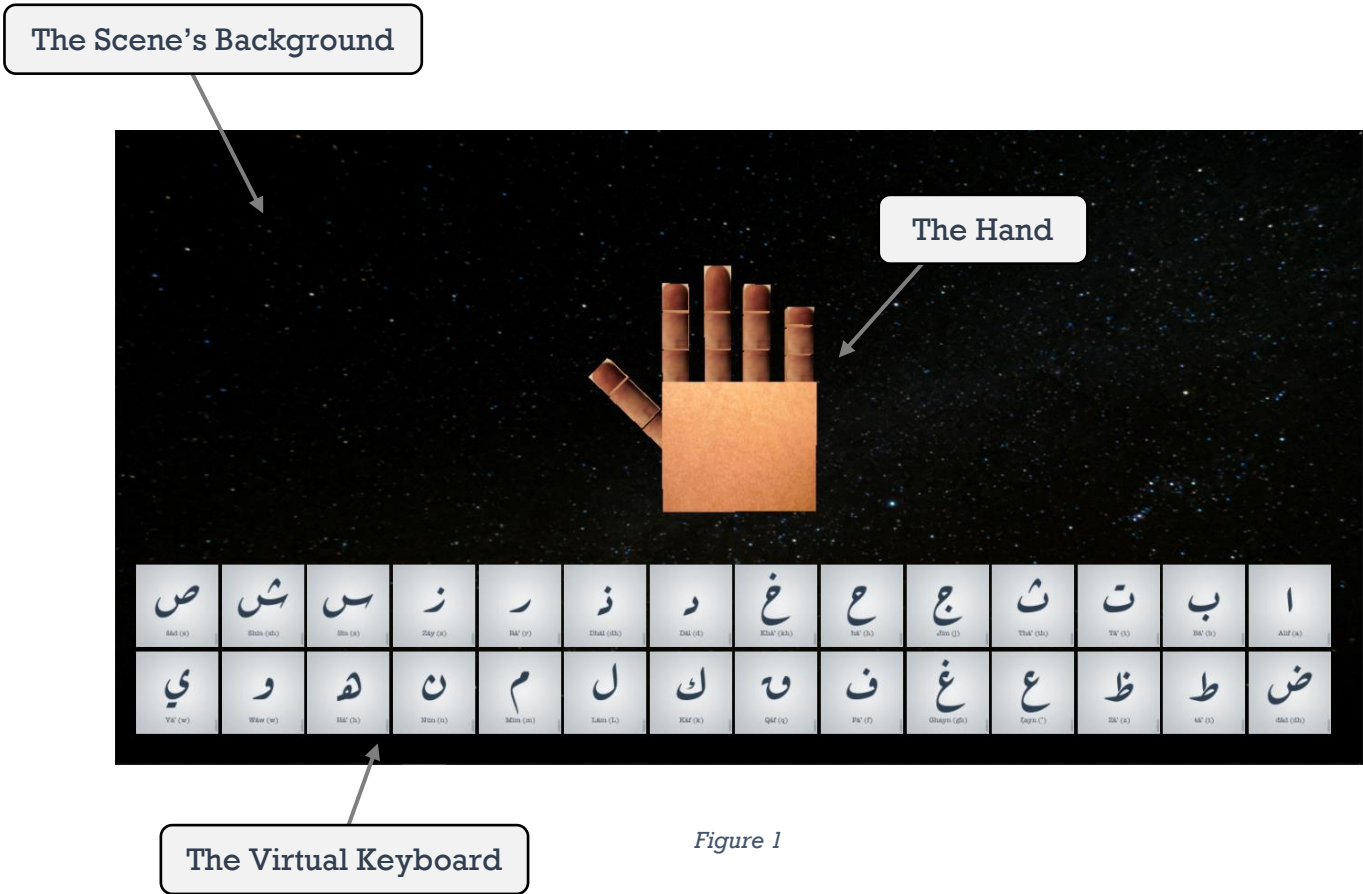
The Scene's Background

The Hand

The Virtual Keyboard

Figure 1

Figure 2

This figure shows an example of what the display would be upon user's input. The hand sign and the letter displayed next to it will differ based on the input.

Figure 2

Signs Reference:

Sources

- Arabic Sign Language reference picture:

  https://www.ai-media.tv/sign-language-alphabets-from-around-the-world/

- Letters' pictures:

  https://www.nihad.me/arabic-alphabet/

- Alphabets' pronunciation:

  https://islamcan.com/learn-arabic/arabic-alphabets.shtml

Github Link:

https://github.com/yaraamrsalah/Arabic-Sign-Language-Simulator

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