

# **Animotion - Animation through Motion**

## **DIPLOMA THESIS**

verfasst im Rahmen der

**Reife- und Diplomprüfung**

an der

**Höheren Abteilung für Informatik**

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Leonding, April 2023

## **Declaration of Academic Honesty**

Hereby, I declare that I have composed the presented paper independently on my own and without any other resources than the ones indicated. All thoughts taken directly or indirectly from external sources are properly denoted as such. This paper has neither been previously submitted to another authority nor has it been published yet.

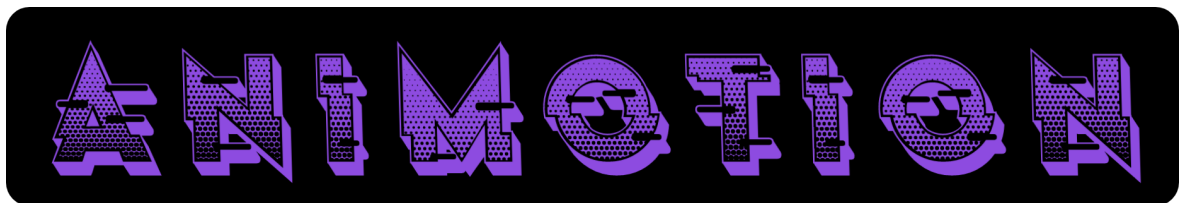
Leonding, April 2023

Romeo Bhuiyan & Christoph lasinger

# Abstract

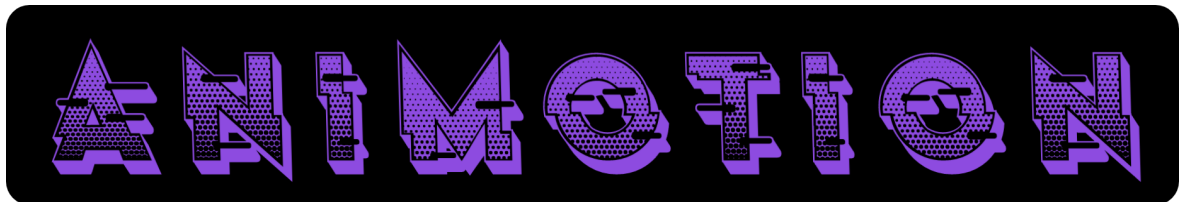
Animotion is a combination of the two words animation and motion, cramming the general idea behind it into as little information as possible. This general idea being a camera, for example that of a laptop, phone or an external one used in a computer setup, recording face and body gestures of the user and translating them onto a virtual reality model (VRM), thereby controlling it. This is done by using an artificial intelligence that calculates tracked gestures and puts them into a canvas that shows the default pose of the VRM and additional user input through the camera. The aforementioned model can be selected by the user out of an assortment of three possible choices on the main page of the website. The moving VRM can be recorded, either the browser window or the entire screen, and for example posted on social media for entertainment purposes. Another possible application would be using Animotion as a way of recording yourself for your own livestream (“V-Tubing”), where, for a variety of reasons, one chooses to not represent oneself with one’s own body but a virtual (“fictional”) one instead.

The frontend, i.e., the website was mainly implemented using a combination of the JavaScript framework Next.js and Sass, a stylesheet language similar to CSS used for the general design. For the web application Mediapipe, an open-source, cross-platform framework used to build machine learning solutions for streaming media, and Holistic, a gesture analysis and control library of Mediapipe that is cropped to augmented reality effects, were chosen in order to depict the VRM together with three.js, a JavaScript library used to create and display 3D computer graphics in a web browser.



# Zusammenfassung

Zusammenfassung unserer genialen Arbeit. Auf Deutsch. Das ist das einzige Mal, dass eine Grafik in den Textfluss eingebunden wird. Die gewählte Grafik soll irgendwie eure Arbeit repräsentieren. Das ist ungewöhnlich für eine wissenschaftliche Arbeit aber eine Anforderung der Obrigkeit. *Bitte auf keinen Fall mit der Zusammenfassung verwechseln, die den Abschluss der Arbeit bildet!*



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# 1 Introduction

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

## 2 AI

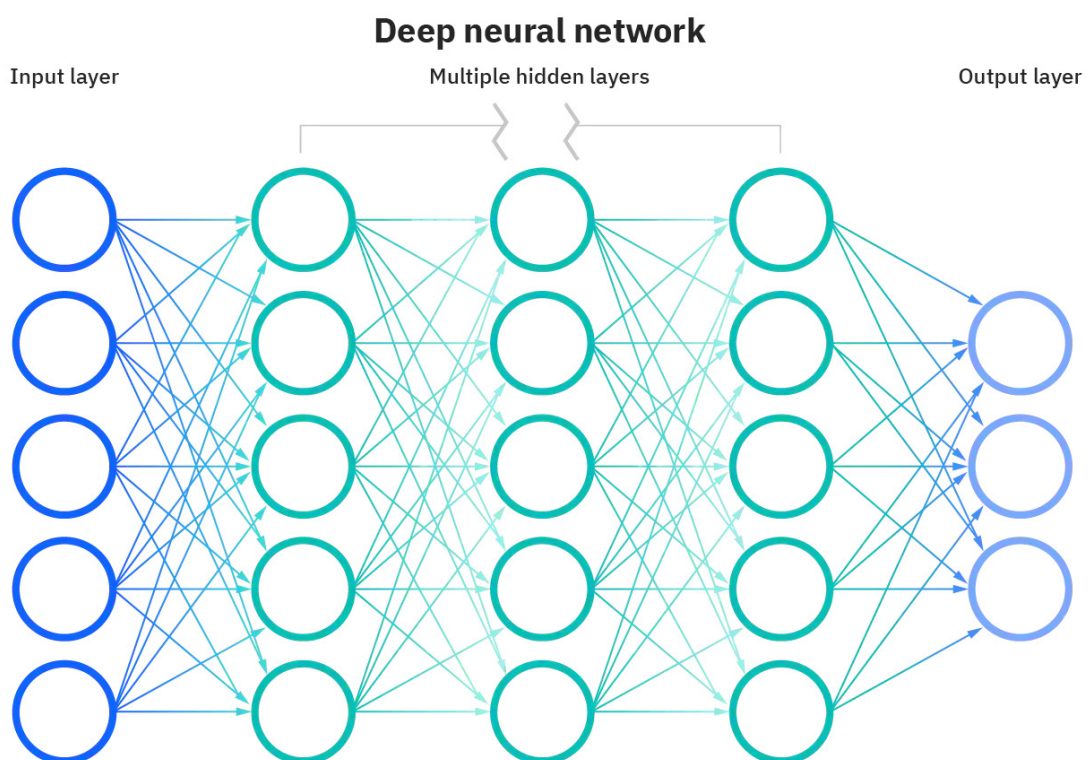
### 2.1 What is artificial intelligence?

### 2.2 Philosophy of artificial intelligence

### 2.3 How does a neural network work?

A neural network is a type of machine learning algorithm modeled after the structure and function of a human brain (neural linking). It is composed of many interconnected processing nodes, called neurons, which work together to process information.

Each neuron receives input from other neurons, processes that information, and produces an output. This output is then passed on to other neurons in the next layer of the network. In this way, information is passed through the network, from the input layer to the output layer, allowing the neural network to learn and make predictions based on the data it is given.



The specific details of how a neural network works can vary depending on its architecture and the type of problem it is being used to solve. But in general, a neural network is able to learn from data by adjusting the strength of the connections between its neurons, these connections being called weights, based on the input it receives. Over time, the network is able to improve its predictions by adjusting these weights in a way that minimizes errors between the network's output and the correct output.

### 2.3.1 Solving Methods

## 2.4 How does face tracking work?

Face tracking is a technology that allows a computer or device to identify and monitor the movements of a person's face in real time. This is typically done using a combination of computer vision algorithms and specialized hardware, such as a camera or depth sensor.

To track a face, the system first detects the face in the video feed from the camera or depth sensor. This is typically done using a machine learning algorithm trained to recognize faces in images. Once the face has been detected, the system then uses various techniques to track the movements of the face, such as tracking the position of key facial features (such as the eyes and mouth) over time. This allows the system to accurately follow the face as it moves within the frame, even if it turns or changes orientation.

The resulting data can be used for a variety of purposes, such as enabling facial recognition (to identify who the person is), animating virtual characters, or controlling a user interface.

## 2.5 How does body tracking work?

Body tracking is the process of using technology to track the movement of a person's body. This is typically done using sensors or cameras that capture the movement of the body and then use algorithms to interpret that movement and translate it into digital data that can be used for various purposes.

To track a body, the algorithm first detects the presence of a body in the video or data. It then uses various techniques to identify specific features of the body, such as the limbs, torso, or other distinctive features. This allows the algorithm to track the body as it moves over time.



In addition to tracking the location of the body, some algorithms can also track other features, such as body movements or gestures. This allows them to be used for a variety of applications, such as video surveillance, virtual reality, gaming, human-computer interaction, and fitness tracking.

## **2.6 The future of artificial intelligence**

## 3 System architecture

### 3.1 Foo

Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper, leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consetetuer.

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sapien aliquet odio. Integer vitae justo. Aliquam vestibulum fringilla lorem. Sed neque lectus, consectetur at, consectetur sed, eleifend ac, lectus. Nulla facilisi. Pellentesque eget lectus. Proin eu metus. Sed porttitor. In hac habitasse platea dictumst. Suspendisse eu lectus. Ut mi mi, lacinia sit amet, placerat et, mollis vitae, dui. Sed ante tellus, tristique ut, iaculis eu, malesuada ac, dui. Mauris nibh leo, facilisis non, adipiscing quis, ultrices a, dui.

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placerat. Fusce elementum convallis neque. Sed dolor orci, scelerisque ac, dapibus nec, ultricies ut, mi. Duis nec dui quis leo sagittis commodo.

## 3.2 Bar

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viverra gravida mauris. Cras tincidunt. Curabitur eros ligula, varius ut, pulvinar in, cursus faucibus, augue.

Nulla mattis luctus nulla. Duis commodo velit at leo. Aliquam vulputate magna et leo. Nam vestibulum ullamcorper leo. Vestibulum condimentum rutrum mauris. Donec id mauris. Morbi molestie justo et pede. Vivamus eget turpis sed nisl cursus tempor. Curabitur mollis sapien condimentum nunc. In wisi nisl, malesuada at, dignissim sit amet, lobortis in, odio. Aenean consequat arcu a ante. Pellentesque porta elit sit amet orci. Etiam at turpis nec elit ultricies imperdiet. Nulla facilisi. In hac habitasse platea dictumst. Suspendisse viverra aliquam risus. Nullam pede justo, molestie nonummy, scelerisque eu, facilisis vel, arcu.

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Donec et nisl at wisi luctus bibendum. Nam interdum tellus ac libero. Sed sem justo, laoreet vitae, fringilla at, adipiscing ut, nibh. Maecenas non sem quis tortor eleifend fermentum. Etiam id tortor ac mauris porta vulputate. Integer porta neque vitae massa. Maecenas tempus libero a libero posuere dictum. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Aenean quis mauris sed elit commodo placerat. Class aptent taciti sociosqu ad litora torquent per conubia nostra, per inceptos hymenaeos. Vivamus rhoncus tincidunt libero. Etiam elementum pretium justo. Vivamus est. Morbi a tellus eget pede tristique commodo. Nulla nisl. Vestibulum sed nisl eu sapien cursus rutrum.

### 3.2.1 Deeper

Nicht mehr im Inhaltsverzeichnis.

#### Deepest

Vermeide mich.

## 4 UI-Design

## 5 Umfeldanalyse

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Was ist eine GUID? Eine GUID kollidiert nicht gerne.

Kabellose Technologien sind in abgelegenen Gebieten wichtig [2].

## 6 Umsetzung

Siehe tolle Daten in Tab. 1.

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Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Donec odio elit, dictum in, hendrerit sit amet, egestas sed, leo. Praesent feugiat sapien aliquet odio. Integer vitae justo. Aliquam vestibulum fringilla lorem. Sed neque lectus, consectetur at, consectetur sed, eleifend ac, lectus. Nulla facilisi. Pellentesque eget lectus. Proin eu metus. Sed porttitor. In hac habitasse platea dictumst. Suspendisse eu lectus. Ut mi mi, lacinia sit amet, placerat et, mollis vitae, dui. Sed ante tellus, tristique ut, iaculis eu, malesuada ac, dui. Mauris nibh leo, facilisis non, adipiscing quis, ultrices a, dui.

|           | Regular Customers | Random Customers |
|-----------|-------------------|------------------|
| Age       | 20-40             | >60              |
| Education | university        | high school      |

Tabelle 1: Ein paar tabellarische Daten



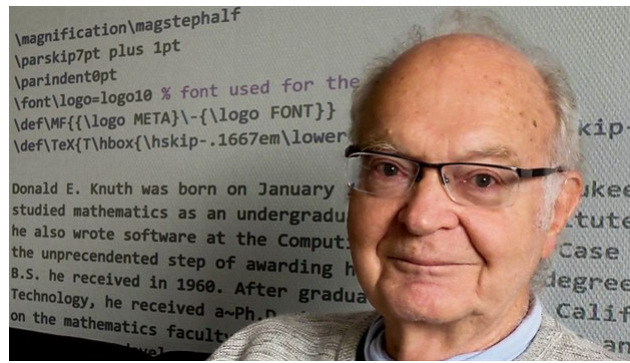


Abbildung 1: Don Knuth – CS Allfather

Morbi luctus, wisi viverra faucibus pretium, nibh est placerat odio, nec commodo wisi enim eget quam. Quisque libero justo, consectetur a, feugiat vitae, porttitor eu, libero. Suspendisse sed mauris vitae elit sollicitudin malesuada. Maecenas ultricies eros sit amet ante. Ut venenatis velit. Maecenas sed mi eget dui varius euismod. Phasellus aliquet volutpat odio. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Pellentesque sit amet pede ac sem eleifend consectetur. Nullam elementum, urna vel imperdiet sodales, elit ipsum pharetra ligula, ac pretium ante justo a nulla. Curabitur tristique arcu eu metus. Vestibulum lectus. Proin mauris. Proin eu nunc eu urna hendrerit faucibus. Aliquam auctor, pede consequat laoreet varius, eros tellus scelerisque quam, pellentesque hendrerit ipsum dolor sed augue. Nulla nec lacus. Dann betrachte den Code in Listing 1.

## Listing 1: Some code

```

1  # Program to find the sum of all numbers stored in a list (the not-Pythonic-way)
2
3  # List of numbers
4  numbers = [6, 5, 3, 8, 4, 2, 5, 4, 11]
5
6  # variable to store the sum
7  sum = 0
8
9  # iterate over the list
10 for val in numbers:
11     sum = sum+val
12
13 print("The sum is", sum)

```

# 7 Zusammenfassung

Aufzählungen:

- Itemize Level 1
  - Itemize Level 2
    - Itemize Level 3 (vermeiden)
- 1. Enumerate Level 1
  - a. Enumerate Level 2
    - i. Enumerate Level 3 (vermeiden)

**Desc** Level 1

**Desc** Level 2 (vermeiden)

**Desc** Level 3 (vermeiden)



# Literaturverzeichnis

- [1] P. Rechenberg, G. Pomberger *et al.*, *Informatik Handbuch*, 4. Aufl. München – Wien: Hanser Verlag, 2006.
- [2] Association for Progressive Communications, „Wireless technology is irreplaceable for providing access in remote and scarcely populated regions,” 2006, letzter Zugriff am 23.05.2021. Online verfügbar: <http://www.apc.org/en/news/strategic/world/wireless-technology-irreplaceable-providing-access>

# Abbildungsverzeichnis

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# Quellcodeverzeichnis

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# Anhang