# User Manual

Tim Visée & Nathan Bakhuijzen

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# 1 Goal

The purpose of this manual is twofold:

- To inform research how to use the platform to execute experiments and conduct research
- To inform future developers how to continue developing the platform

# 2 Problem Definition

*What physical motions are natural, effortless and easy, in order to control a computer or other digital device?*

Questions of this nature can be answered using the *Can't Touch This* platform. *Can't Touch This* aims to be a platform for researchers that would like to conduct research in the field of touchless computer systems. We believe that our platform allows researchers to build a strong foundation for the future of touchless control. Giving researchers the opportunity to conduct research improves the chance for touchless control of computers only seen in futuristic movies and tv shows.

## 2.1 Motivation

At the start of the KB-80 minor, students were given a choice in the subject of the research. Mister Al-Ers introduced us to a series of subjects, of which the LeapMotion project was the most interesting. The idea behind the LeapMotion project was to create or extend existing software to enable people to control a computer without touching any peripherals, like keyboards and mice.

## 2.2 Background information

Research in the field of touchless computer systems is motivated by the desire for comparable systems in sterile environments. For example, surgeons often make use of computer systems to aid them during their surgeries by providing crucial information such as CT, MRI and X-ray scans. This is where touchless computer systems may offer a solution. Touchless computer systems allows surgeons to control a system without the need for physical peripherals.

# 3 Installation Guide

## 3.1 Requirements

- A computer with the Windows (7+), OSX (10.7+, Lion+) or Linux (kernel 2.6.18+) operating system
- An installation of the LeapMotion SDK
- An installation of the Rust programming language
- The physical LeapMotion device itself
- The *Can't Touch This* platform

## 3.2 Software Dependencies

The *Can't Touch This* platform is written using the Rust programming language. This means that the operating system that the platform will run on must also support the Rust programming language. Fortunately, Rust runs on all popular operating systems today, shown above in the list of requirements. An up-to-date list of all supported versions can be found on the Rust website. Additonally, the *Can't Touch This* platform requires the LeapMotion SDK to provide all necessary sensor data. Just like the Rust programming language, the LeapMotion SDK can be installed on all platforms.

## 3.3 External resources

No additonal resources are required to run the *Can't Touch This* platform.

## 3.4 External development tools

In order to continue development of the *Can't Touch This* platform, developers will need to install:

- All of the required items shows above
- A text editor or an IDE
- An installation of Rust nightly

# 4 User Instructions

This chapter gives users instructions on how to use the *Can't Touch This* platform. It assumes that the user has followed the instructions found in the *Installation* chapter. The following instructions will detail how to setup the platform so that you can conduct the *experiments* found later in this manual.

## 4.1 Installation

- Download the following software for your specific platform and install the software using the provided installers:
  - The LeapMotion SDK
  - The Rust programming language
  - Can't Touch This

## 4.2 Usage

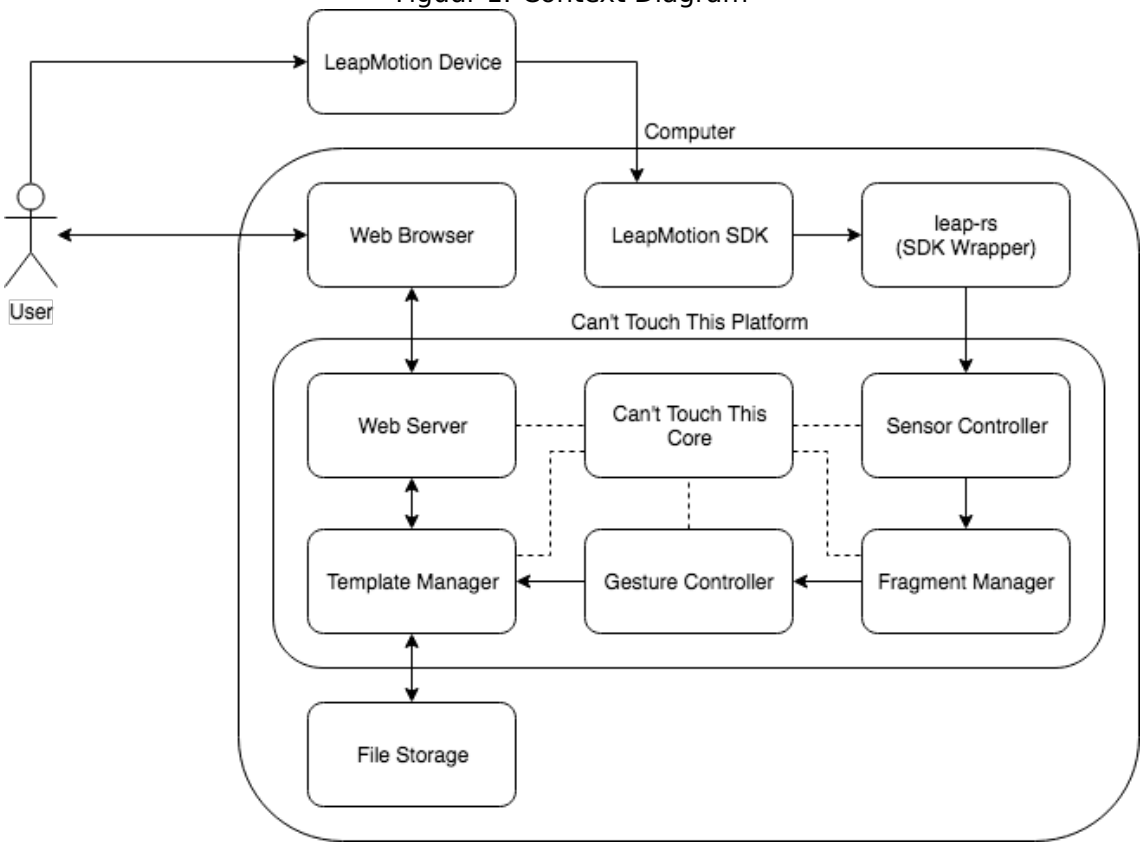
- Attach the LeapMotion device using it's provided USB cable
- Start the LeapMotion tracking program provided by the LeapMotion SDK
- Start the *Can't Touch This* platform
- Start up an internetbrowser (Chrome, Firefox, Safari, etc.)
- Navigate to `http://localhost:8000`
- Click the *Start Recording* button
- Move your physical hand above the LeapMotion device to make a desired gesture
- Once you are done making the gesture, click on *Stop Recording*
- The recorded gesture you've just made should be visibly represented on the canvas
- Save the gesture using the *Save Recording* button and bind the gesture to a predefined action
- Click on the *Recognition Mode* button and make one of the gestures you've made beforehand
- Watch as the computer will execute the action you've bound your gesture to

# 5 Requirements

The requirements for the *Can't Touch This* platform differ from the other research projects. It is for this reason that the only requirement for this platform is the following: *Can't Touch This must be a platform that allows researchers to conduct experiments. These experiments must contain relevant research*.

# 6 Architecture Diagrams

Figuur 1: Context Diagram




In this diagram, the *Can't Touch This* platform displayed globally. It Shows three main objects:

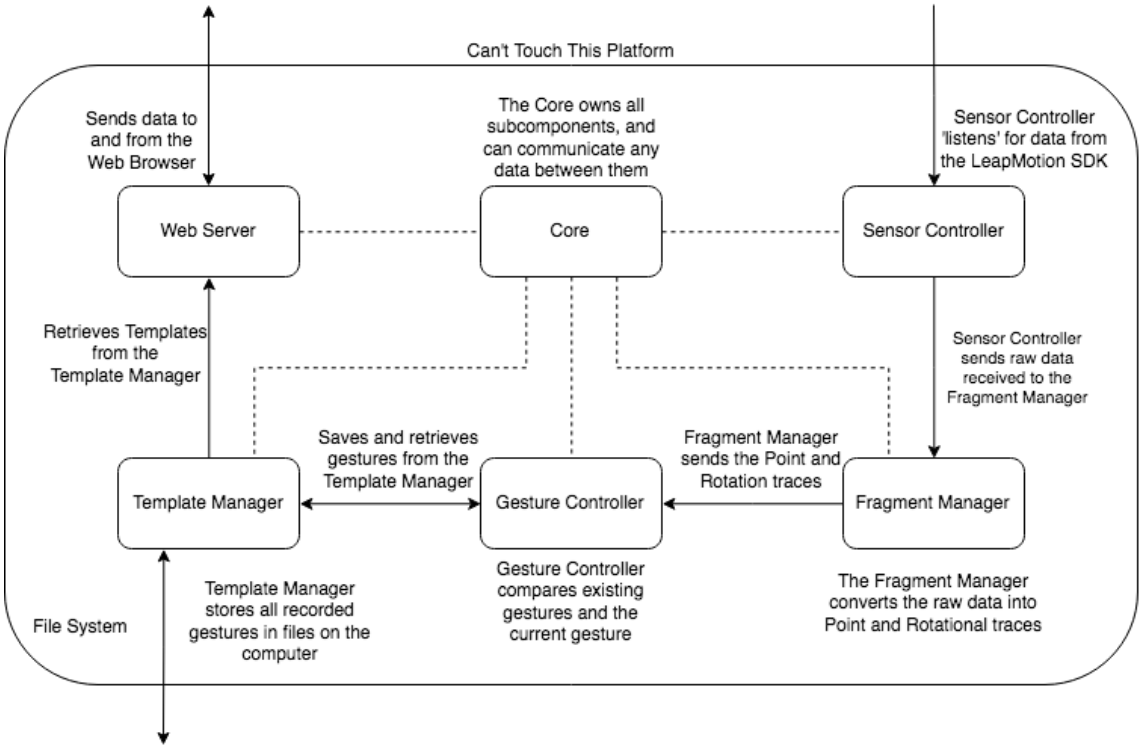
- The user
- The LeapMotion device
- The Can't Touch This platform

The user attaches the LeapMotion device to the computer, installs the platform and moves it's hand above the sensor to conduct an experiment. The LeapMotion device captures the data of the hand, and passes it on through the LeapMotion SDK, to the leap-rs wrapper. This leap-rs wrapper maps all functions made available through the LeapMotion SDK to the Rust programming language. Normally, a platform like *Can't Touch This* would have to be programmed using the C programming language, as this is the language the SDK is written in.

The leap-rs wrapper enables the SDK functionality in our platform, which we use in the Sensor Controller. The Sensor controller is our gateway of information, of our bits, bytes and coordinates of the hand scanned by the LeapMotion device. The Sensor controller then passes this data on to the Fragment Manager, which records all data and converts it into Points, Rotational Points (known as RotPoints,) and Traces of both kind. It even improves the recorded points in the trace through a method called sampling. Sampling is the act of ...

After this conversion, the Gesture Controller receives the transformed data and compares the existing gestures, stored in the Template Manager, with the current gesture.

Figuur 2: Context Diagram



# 7 Test Report

The quality of the code of the *Can't Touch This* platform is very high. Made possible by the Rust programming language, *Can't Touch This* is a platform of quality unparalelled by other languages.

## 7.1 Code Quality

## 7.2 Existing Tests

## 7.3 Known Bugs

- *Can't Touch This* may crash upon running the release version of the exectable
- On macOS, the LeapMotion device may never give data to begin with
- On macOS, the LeapMotion device may stop recording data randomly
- On macOS, the application may not run well when minimalizing the backend application