# HEMA Training Simulator Progress Report

*Authors*: Eric Reesor | 100970401

Conlan LaFreniere | 100971291

*Supervisor*: Dr. Samuel Ajila

Department of Systems and Computer Engineering Faculty of Engineering  
Carleton University

December 3, 2017

*Abstract*

Table of Contents

1. – Introduction
   1. – Background
   2. – Motivation
   3. – Problem Statement
   4. – Proposed Solution
2. – Technical Information
   1. – Technical Background and Terminology
   2. – Project Technical Details
3. – Conclusion
4. – References
5. – Appendices

List of Figures

List of Tables

1.0 - **Introduction**

1.1 – *Project Background*

The goal of this project is to design and develop a reliable and accurate HEMA training simulator, which will allow the user to learn and practice the set of stances and actions which make up the art of the German longsword. More specifically, to teach and reinforce instinctual reactions one will require to spar and fight safely within the Liechtenauer school of fencing. This will be done though sequential drills and reaction based training. The user interacts with the system through a video output device (screen, VR headset, etc.) and an Arduino wand-style motion input device, to mimic holding a sword.

1.2 – *Motivation*

This project has a firm starting conditions in application and hardware development. It must contain an application, capable of communicating with the customized wand-style input device. It must also be capable of interpreting a player’s movements, and comparing those interpretations with valid HEMA form. All this information must then be processed and presented to the user in the simplest way possible, since any teaching tool must focus as much as possible on the subject matter, and not it’s “game” aspects.

1.3 – *Problem Statement*

In order to complete this project, there are several problems in need of a solution. The wand-style input device must communicate successfully with a PC in order to collect user inputs. There also needs to be an application front-end capable of displaying all necessary input information to the designer, or user. Once these are achieved, a standardized 3d movement input format can be created. This will allow the manual programming of different HEMA styles. After these are finished, there must also be real-time recognition software capable of comparing the user’s inputs to valid HEMA forms.

1.4 – *Proposed Solution*

The proposed solution to these problems is a Unity based application paired with an Arduino based movement capture device.

1.5 – *Accomplishments*

As of December 1, 2017, the following describes all completed and to be completed components of the project:

Complete

- Wand style input device

- Application frontend and 3d sword model

In Progress

- Conversion of input data to useable standardized format

- Fleshing out UI and system control to clarify usability

To Be Conpleted

- Program valid HEMA movements using standardized input format

- Design movement recognition software to determine HEMA validity

2.0 – **Technical Information**