Configuration Manual

MSc Research Project
MSc in Cyber Security

Nikita Phadol
Student ID: X21116741

School of Computing
National College of Ireland

Supervisor: Dr. Imran Khan

National College of Ireland

MSc Project Submission Sheet

School of Computing

Student Name:	Nikita Baban Phadol
Student ID:	X21116741
Programme:	MSc in Cyber Security **Year:** 2021-2022
Module:	Academic Internship
Lecturer:	Dr. Imran Khan
Submission Due Date:	19/09/2022
Project Title:	Keystroke Dynamics for User Authentication using SCM
Word Count:	786 **Page Count:** 5

I hereby certify that the information contained in this (my submission) is information pertaining to research I conducted for this project. All information other than my own contribution will be fully referenced and listed in the relevant bibliography section at the rear of the project.

ALL internet material must be referenced in the bibliography section. Students are required to use the Referencing Standard specified in the report template. To use other author's written or electronic work is illegal (plagiarism) and may result in disciplinary action.

Signature:	Nikita Baban Phadol
Date:	19/09/2022

PLEASE READ THE FOLLOWING INSTRUCTIONS AND CHECKLIST

Attach a completed copy of this sheet to each project (including multiple copies)	□
Attach a Moodle submission receipt of the online project submission, to each project (including multiple copies).	□
You must ensure that you retain a HARD COPY of the project, both for your own reference and in case a project is lost or mislaid. It is not sufficient to keep a copy on computer.	□

Assignments that are submitted to the Programme Coordinator Office must be placed into the assignment box located outside the office.

Office Use Only	
Signature:	
Date:	
Penalty Applied (if applicable):	

Configuration Manual: Keystroke Dynamics for User Authentication using SCM

Nikita Baban Phadol
Student ID: X21116741

1   Introduction

This manual contains detailed information on all the hardware and software settings required to build a complete system from the ground up. Manual configuration helps to repeat the research in a more strategic way. The success of the system is measured by its user interface. (That is how the user interacts with the system in the user interface of the system).

2   Environmental setup

2.1   Hardware Requirements

- 8GB RAM.
- 1 TB HDD.
- 2.38 GHz AMD Ryzen 5 4500U with Radeon Graphics

2.2   Software Requirements

- Windows 10/11
- Python 3.6.12 / Python 3.9

2.3   Programming Prerequisites

- Python (Version 3.6.12 / 3.9)
- anaconda

2.4   Python Environment setup

The project was implemented using python language using the anaconda so that the programming setup can be done.

3   Libraries used

- PyHook- library for keystroke
- Pandas- import pandas as pd
- Sklearn- import sklearn as sk
- Scipy- import scipy as sc
- Numpy- import numpy as np

PyHook: In Windows, the pyHook package provides callbacks for global mouse and keyboard events. Applications written in Python configure the keyboard and/or mouse hook and register event handlers for user input events like left mouse down, left mouse up, key down, etc. The underlying C library records details such as the event's timing, the name of the window it happened in, its value, any keyboard modifiers, etc.

Pandas: Python's Pandas library is free and open source. It offers high-performance data structures and data analysis tools that are ready for use. On top of the NumPy library, this library was developed. Pandas is quick and offers users high performance & productivity.

Sklearn: The most effective and reliable Python machine learning package is called Skearn (Skit-Learn). It offers a variety of effective methods for statistical modelling and machine learning, including dimensionality reduction, classification, clustering, and regression, all through a Python interface. This Python-based library is based on NumPy, SciPy, and Matplotlib.

Scipy: An open-source Python library called SciPy is used to address issues in mathematics, scientific, engineering, and technologies. With the help of a variety of advanced Python commands, users may manipulate and visualise the data. Built on the Python NumPy extension is SciPy.

Numpy: A Python library for working with arrays is called NumPy. Additionally, it contains matrices, fourier transform, and functions for working in the area of linear algebra. In the year 2005, Travis Oliphant developed NumPy. You can use it for free because it is an open-source project. Numerical Python is referred to as NumPy.

4 Data set

For this research, both dataset sets are utilised. Both have their origins in universities.
The first is the Buffalo dataset, which is derived from the University at Buffalo and is constructed using two forms. First, utilising transcriptions, then free-form text tying.

The significant distinction between the second dataset and its source, Clarkson University, is that the latter was produced by setting up a desktop environment to gather keyboard data from participating participants (people). The number of people that took part in this experiment was roughly 39, and it lasted for eleven months. Additionally, text files were used to record the dataset.
The datasets can be found here (Alsultan, Warwick, and Wei, 2017).

- H (Hold)
- DD (Down-Down)
- UD (Up-Down)

	subject	sessionIndex	rep	H.period	DD.period.t	UD.period.t	H.t	DD.t.i	UD.t.i	H.i	...	H.a	DD.a.n	UD.a.n	H.n	DD.n.l	UD.n.l	H.l	DD.l.Return	UD.l.Retur
0	s002	1	1	0.1491	0.3979	0.2488	0.1069	0.1674	0.0605	0.1169	...	0.1349	0.1484	0.0135	0.0932	0.3515	0.2583	0.1338	0.3509	0.217
1	s002	1	2	0.1111	0.3451	0.2340	0.0694	0.1283	0.0589	0.0908	...	0.1412	0.2558	0.1146	0.1146	0.2642	0.1496	0.0839	0.2756	0.191
2	s002	1	3	0.1328	0.2072	0.0744	0.0731	0.1291	0.0560	0.0821	...	0.1621	0.2332	0.0711	0.1172	0.2705	0.1533	0.1085	0.2847	0.176
3	s002	1	4	0.1291	0.2515	0.1224	0.1059	0.2495	0.1436	0.1040	...	0.1457	0.1629	0.0172	0.0866	0.2341	0.1475	0.0845	0.3232	0.238
4	s002	1	5	0.1249	0.2317	0.1068	0.0895	0.1676	0.0781	0.0903	...	0.1312	0.1582	0.0270	0.0884	0.2517	0.1633	0.0903	0.2517	0.161

References

1. A., R. and L., A. (2018). Keystroke Dynamics for User Authentication and Identification by using Typing Rhythm. International Journal of Computer Applications, 144(9), pp.27–33. doi:10.5120/ijca2016910432.
2. Abo-alian, A., Badr, N.L. and Tolba, M.F. (2016). Keystroke dynamics-based user authentication service for cloud computing. Concurrency and Computation: Practice and Experience, 28(9), pp.2567–2585. doi:10.1002/cpe.3718.
3. Akinsowon, O. (2021). Keystroke Dynamics for User-Authentication on Mobile Devices using Ensemble Method. Communications on Applied Electronics, 7(36), pp.33–38. doi:10.5120/cae2021652885.
4. Alsultan, A., Warwick, K. and Wei, H. (2017). Non-conventional keystroke dynamics for user authentication. Pattern Recognition Letters, 89, pp.53–59. doi:10.1016/j.patrec.2017.02.010.
5. Andrean, A., Jayabalan, M. and Thiruchelvam, V. (2020). Keystroke Dynamics Based User Authentication using Deep Multilayer Perceptron. International Journal of Machine Learning and Computing, 10(1), pp.134–139. doi:10.18178/ijmlc.2020.10.1.910.
6. Baynath, P., Soyjaudah, S. and Khan, M. (2018). Feature Selection and Representation of Evolutionary Algorithm on Keystroke Dynamics. Intelligent Automation and Soft Computing, p.-1--1. doi:10.31209/2018.100000060.
7. Boakye Osei, M., Opanin Gyamfi, E. and Okoe Alhassan, M. (2020). Keystroke Dynamics Algorithm for Securing Web-based Password Driven Systems. Asian Journal of Research in Computer Science, pp.1–26. doi:10.9734/ajrcos/2019/v4i430119.
8. Campisi, P., Maiorana, E., Lo Bosco, M. and Neri, A. (2017). User authentication using keystroke dynamics for cellular phones. IET Signal Processing, 3(4), p.333. doi:10.1049/iet-spr.2008.0171.
9. Chandranegara, D.R., Wibowo, H. and Minarno, A.E. (2020). Combined scaled manhattan distance and mean of horner's rules for keystroke dynamic authentication. TELKOMNIKA (Telecommunication Computing Electronics and Control), 18(2), p.770. doi:10.12928/telkomnika.v18i2.14815.