

THE UNIVERSITY OF HUDDERSFIELD

School of Computing and Engineering

ASSIGNMENT SPECIFICATION

Module details	
Module Code	CIS2201
Module Title	Cyber Security
Course Title/s	MComp/BSc(Hons) Computing MSci/BSc(Hons) Computing Science (including with variants) MEng/BSc(Hons) Software Engineering BSc(Hons) Web Programming (including with variants) BSc(Hons) Web Design

Assessment weighting, type and contact details		
Title	Assignment 1	
Weighting	50%	
Mode of working for assessment task	Individual Note : if the assessment task is to be completed on an individual basis there should be no collusion or collaboration whilst working on and subsequently submitting this assignment.	
Module Leader	Simon Parkinson	Contact details: s.parkinson@hud.ac.uk
Module Tutor/s	Simon Parkinson	

Submission and feedback details	
Hand-out date	09/10/2020
How to submit your work.	Brightspace Turnitin electronic submission
Submission date/s and times	18/12/2020, midnight deadline
Expected amount of independent time you should allocate to complete this assessment	20 hours
Submission type and format	Formal report
Date by which your grade and feedback will be returned	18/01/2021

Additional guidance information	
Your responsibility	<p>It is your responsibility to read and understand the University regulations regarding conduct in assessment.</p> <p>Please pay special attention to the assessment regulations (section 4) on Academic Misconduct.</p> <p>In brief: ensure that you;</p> <ol style="list-style-type: none"> 1. DO NOT use the work of another student - this includes students from previous years and other institutions, as well as current students on the module. 2. DO NOT make your work available or leave insecure, for other students to view or use. 3. Any examples provided by the module tutor should be appropriately referenced, as should examples from external sources. <p>Further guidance can be found in the SCEN Academic Skills Resource and UoH Academic Integrity Resource module in Brightspace.</p> <p>If you experience difficulties with this assessment or with time management, please speak to the module tutor/s, your Personal Academic Tutor, or the School's Guidance Team. (sce.guidance@hud.ac.uk).</p>
Requesting a Late Submission	<p>You are reminded to 'back-up' your work as late submission requests will not be given for lost work, which includes work lost due to hardware and software failure/s.</p> <p>Late submission requests will only be approved if you can demonstrate genuine, unexpected circumstances along with independent supporting evidence (e.g. medical certificate) that may prevent you submitting an assessment on time.</p> <p>Submit your request for Late Submission via MyHud/MyStudies within 2 working days of the due date.</p> <p>Late submission requests, up to a maximum of 10 working days, but typically 1-5 working days, will be considered provided that there is appropriate evidence which clearly indicates reasons for the request.</p> <p>You will have 5 working days after submitting a request to provide the evidence. Failure to submit evidence will result in the request being rejected and your work being marked as a late submission (see below).</p> <p>If you are unable to submit work within the maximum late submission period of 10 days, contact the School's Guidance Team. (sce.guidance@hud.ac.uk), as you may need to submit a claim for Extenuating Circumstances (ECs).</p>

Additional guidance information	
Extenuating Circumstances (ECs)	<p>An EC claim is appropriate in exceptional circumstances, when an extension is not sufficient due to the nature of the request, or it concerns an examination or In-Class Test (ICT).</p> <p>You can access the EC claim form on the Registry website; where you can also find out more about the process.</p> <p>You will need to submit independent, verifiable evidence for your claim to be considered.</p> <p>Once your EC claim has been reviewed you will get an EC outcome email from Registry. If you are unsure what it means or what you need to do next, please speak to the Student Support Office – Room SJ1/01</p> <p>An approved EC will extend the submission date to the next assessment period (e.g July resit period).</p>
Late Submission (No ECs approved)	<p>Late submission, up to 5 working days, of the assessment submission deadline, will result in your grade being capped to a maximum of a pass mark.</p> <p>Submission after this period, without an approved extension, will result in a 0% grade for this assessment component.</p>
Tutor Referral available	NO
Resources	<ul style="list-style-type: none"> Please note: you can access free Office365 software and you have 1 Tb of free storage space available on Microsoft's OneDrive – Guidance on downloading Office 365.

Key Press Biometrics

1. Assignment Aims

In this assessment you are required to investigate and develop a working proof-of-concept behavioural key-stroke biometric system utilising data acquired during tutorial sessions. You are free to explore different ways to analyse the data and develop a proof-of-concept; however, the underpinning principles of a robust biometric security solutions must be considered and discussed.

2. Learning Outcomes:

6. Design, develop and implement security in software.
7. Identify weaknesses within a networked computer environment, and suggest corrective action.
8. Apply intrusion and anomaly detection techniques to identify vulnerabilities in different domains.
9. Develop trustworthy software through identifying and mitigating risks, such as preventing unauthorised access to systems.
10. Identify potential legal and ethical implications of their work.

3. Assessment Brief

Key Stroke Behavioural Biometrics

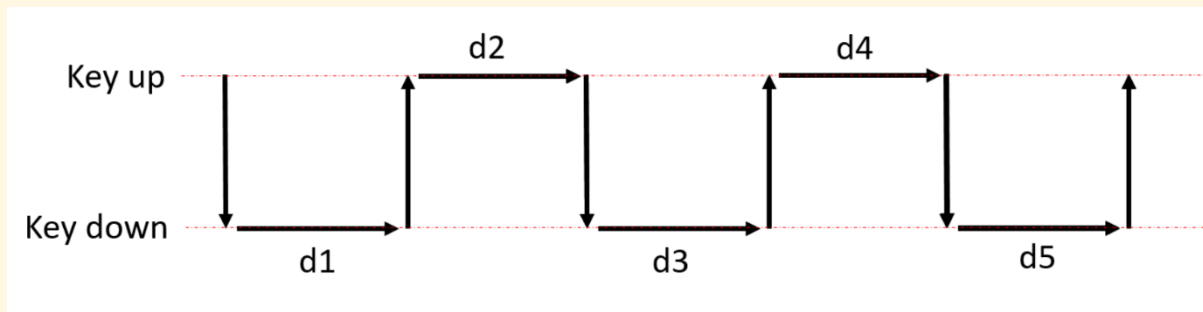
As you have learnt in this module, authentication mechanisms are inherently challenging. On one side there is a need to implement rigorous security mechanisms to protect the system (i.e., a complex password). Yet on the other side users will look to circumvent security controls if they have poor usability characteristics (i.e., hard to remember). As such, security researchers and developers are constantly seeking solutions which satisfy both security and usability properties. Biometric solutions provide solutions which are good in terms of usability; however, as you have also learnt in this module, biometric solutions often suffer from poor accuracy and thus have reduced security properties.

Combining multiple authentication mechanisms creates potential to utilise systems in a complementary manner, with one system's weakness being filled by another's strength. There are many successful implementations of using multiple authentication mechanisms (often referred to as two-factor), providing strong security mechanisms with good usability properties. For example, coupling a simple password policy with a code received through text message. These mechanisms are robust as they utilise static knowledge. Researchers have been exploring the use of behavioural data sources in authentication mechanisms; however, they face significant challenges in terms of identifying data sources that demonstrate sufficient uniqueness and are repeatable

In this assignment, you will explore the potential of developing a two-factor authentication mechanism using a password and the behavioural key press timing information. The principle of key press dynamic/biometrics has been around for a long time and in summary aims to measure the following two times:

1. The duration that the user holds a key down for when pressing a key; and
2. The duration between a single key and the next one.

The following image provides a graphical illustration, where each d_n is a timing value.



For eight weeks (weeks 1-8), you will utilise some software to record anonymous key timing information for a series of passwords for each student. In total 8 datasets will be collected through Brightspace. The data will then be processed by the module team and uploaded as a complete data set to Brightspace by Friday 20th November. Using this data you are to:

- Perform experimental analysis to determine if it is possible to identify patterns of behaviour that are unique to each participant. Analysis software and examples of how to do this will be provided in the module.
- Consider the possibility of processing these individual features into higher-level features. For example, characters typed per second for a participant, etc. There is no limit to how many features you could invent based on the primitive data.
- Design a testing methodology to establish accuracy values for a chosen feature set.
- Provide a robust evaluation of the methodology and chosen approach, ensuring limitations are discussed.

You are required to submit:

- A report detailing your investigation, providing figures and tables to evidence your experimental analysis.

Before you start, please refer to the marking criteria on the following page.

4. Marking Scheme

Assessment Criterion	Marks Available
Participation in data collection Must have: provide a full series of timings week by week. Measured: Completeness	10
Analysis of data features, demonstrating suitability as a biometric Must have: Performing a systematic analysis of the data to determine differences between subjects, demonstrating its suitability as a biometric Measured: Detail and completeness	20
Accuracy analysis Must have: Presentation of accuracy results in a standardised manner, such as a confusion matrix Measured: Detail and completeness	20
Evaluation and Reflective analysis Must have: Reflective evaluation of at minimum 500 words in length Measured: Detail, completeness and degree of reflection	20
Discussion of limitations Must have: Discussion of the limitations of the both (1) data, (2) your approach. Expected to be at minimum 500 words in length Measured: Detail, completeness and degree of reflection	10
Report completeness and quality Must have: Front cover, title page, table of contents, references Measured: Detail, completeness grammar and presentation style	10
Beyond requirements 10% of the marks are reserved for students going beyond the requirements on this assignment, demonstrating their understanding, knowledge, and expertise in cyber security.	10

5. Grading Rubric

	Marks Available							
Criterion	0 to 29%	30-39%	40-49%	50 - 59%	60 - 69%	70 - 79%	80-89%	≥ 90%
Participation in data collection	Awarded % depends on % of data samples provided and are usable.							
Analysis of data features, demonstrating suitability as a biometric	Severely flawed, does not function, or non-submission	Minimal implementation, falling short of the requirement	Adequately implementation with significant room for improvement	Good attempt at implementation, meeting criteria fairly well with room for improvement	Very good attempt at implementation, meeting criteria	Excellent implementation, meeting all criteria to a high standard	Outstanding implementation, meeting all criteria to a professional standard	A high degree of originality
Accuracy analysis	Severely flawed, does not function, or non-submission	Minimal implementation, falling short of the requirement	Adequately implementation with significant room for improvement	Good attempt at implementation, meeting criteria fairly well with room for improvement	Very good attempt at implementation, meeting criteria	Excellent implementation, meeting all criteria to a high standard	Outstanding implementation, meeting all criteria to a professional standard	A high degree of originality
Evaluation and Reflective analysis	Little to no reflection or non-submission	Disorganised, incoherent, and very little reflection	Shows some attempt to evaluate	Clear reflective analysis, with room for improvement	Clear reflective analysis, considering weak points and suggestions for further development	Good reflective analysis, considering weak points and suggestions for further development	Strong reflective analysis, considering weak points and suggestions for further development	Very detailed reflective discussion of the product with clear ideas for further development
Discussion of limitations	Little to no reflection or non-submission	Disorganised, incoherent, and very little reflection	Shows some attempt to evaluate	Clear reflective analysis, with room for improvement	Clear reflective analysis, considering weak points and suggestions for further development	Good reflective analysis, considering weak points and suggestions for further development	Strong reflective analysis, considering weak points and suggestions for further development	Very detailed reflective discussion of the product with clear ideas for further development
Report completeness and quality	Presentation seriously impedes comprehension, or non-submission	Disorganised/ incoherent. No real conclusion.	Shows some attempt to organise in a logical manner.	Shows organisation and coherence.	Organised, coherence and constructed to a high-standard	Organised, coherence and constructed to a very high-standard	Imaginative approach, coherent, well-structured and signposted.	Polished, imaginative approach, coherent, well-structured and signposted.
Beyond Requirements	Severely flawed, does not function, or non-submission	Minimal implementation, falling short of the requirement	Adequately implementation with significant room for improvement	Good attempt at implementation, meeting criteria fairly well with room for improvement	Very good attempt at implementation, meeting criteria	Excellent implementation, meeting all criteria to a high standard	Outstanding implementation, meeting all criteria to a professional standard	A high degree of originality

