CST3590: Proposal

A. N. Onymous
M009900X9

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1 Introduction

Blockchain Technology is the engine behind Web3.0, Decentralisation and predicted to become the next General Purpose Technology [2]. Blockchain Technology across a wide spectrum of domains, e.g., Medicine [1], Education [3] and Finance [5]. Consensus algorithms are essential to blockchain technology and are investigated further in the literature review.

Some of these consensus algorithms are responsible for unsustainability [4], particularly Proof-of-Work in Bitcoin. This project aims to propose a consensus algorithm that is sustainable for the future.

2 Aims

To design, develop, evaluate, analyse and compare the proposed consensus algorithm with existing consensus algorithms.

2.1 Objectives

The project's objectives are as follows:

1. Complete design of blockchain system in Python
2. Complete Proof-of-Elapsed-Time in Python
3. Design a consensus algorithm that is Fault Tolerant
4. Run varying tests on the proposed algorithm
5. Evaluate and compare the tests
6. Analyse the results and tests

TITLE	START	FINISH	2025			
			1	2	3	4
Proposal	2025-01-20	2025-02-28				
Feedback	2025-02-14	2025-02-21				
Literature Review	2025-01-20	2025-03-07				
Design	2025-02-28	2025-03-14				
Development	2025-02-28	2025-03-31				
Testing/Experiments	2025-03-14	2025-04-04				
Ch3-5 Thesis	2025-03-10	2025-04-11				

Figure 1: GANTT chart for individual project

3 Resources

To complete this project access to a laptop running a Linux with the following specifications:

- Linux Ubuntu 24.04
- Node Package Manager
- Python3
- 16Gb RAM
- 256Gb SSD
- intel i5 or equivalent

4 Planning

A GANTT chart is presented in fig. 1 and shows the progress of this project over 12 weeks.

5 Ethics

This project is considered minimal risk and the ethical review form has been attached in the appendix of this document.

References

[1] A. Azaria, A. Ekblaw, T. Vieira, and A. Lippman, "Medrec: Using blockchain for medical data access and permission management," in *Open and Big Data (OBD), International Conference on*. IEEE, 2016, pp. 25–30.

[2] E. Filippova, "Empirical evidence and economic implications of blockchain as a general purpose technology," in *2019 IEEE Technology & Engineering Management Conference (TEMSCON)*. IEEE, 2019, pp. 1–8.

[3] I. Mitchell, S. Hara, H. Jahankhani, and D. Neilson, "Blockchain of custody, boc," in *CYBER SECURITY PRACTITIONER'S GUIDE*. World Scientific, 2020, pp. 365–397.

[4] B. R. Sutherland, "Blockchain's first consensus implementation is unsustainable," *Joule*, vol. 3, no. 4, pp. 917–919, 2019.

[5] P. Treleaven, R. G. Brown, and D. Yang, "Blockchain technology in finance," *Computer*, vol. 50, no. 9, pp. 14–17, 2017.

Appendix A

Do not amend before use

Research Ethics Screening Form for Students

Only for students on taught programmes – e.g., BSc, MSc, MA, LLM etc
NOT for PostGraduate Researchers – e.g., MRes/MPhil/PhD degrees

Middlesex University is concerned with protecting the rights, health, safety, dignity, and privacy of its research participants. It is also concerned with protecting the health, safety, rights, and academic freedom of its students and with safeguarding its own reputation for conducting high quality, ethical research.

This Research Ethics Screening Form will enable students to self-assess and determine whether the research requires ethical review and approval via the Middlesex Online Research Ethics (MORE) form before commencing the study. Supervisors must approve this form after consultation with students.

Student Name:	A. N. Onymous	Email: an0000@live.mdx.ac.uk
Research project title:	Proposed Consensus Algorithm	
Programme of study/module:	BSc Cyber Security & Digital Forensics	
Supervisor Name:	Ian Mitchell	Email:i.mitchell@mdx.ac.uk

Please answer whether your research/study involves any of the following given below:		
1. [H]ANIMALS or animal parts.	☐ Yes	☒ No
2. [M]CELL LINES (established and commercially available cells - biological research).	☐ Yes	☒ No
3. [H]CELL CULTURE (Primary: from animal/human cells- biological research).	☐ Yes	☒ No
4. [H]CLINICAL Audits or Assessments (e.g. in medical settings).	☐ Yes	☒ No
5. [X]CONFLICT of INTEREST or lack of IMPARTIALITY. If unsure see "Code of Practice for Research" (Sec 3.5) at: https://unihub.mdx.ac.uk/study/spotlights/types/research-at-middlesex/research-ethics	☐ Yes	☒ No
6. [X]DATA to be used that is not freely available (e.g. secondary data needing permission for access or use).	☐ Yes	☒ No
7. [X]DAMAGE (e.g., to precious artefacts or to the environment) or present a significant risk to society).	☐ Yes	☒ No
8. [X]EXTERNAL ORGANISATION – research carried out within an external organisation or your reseach is commissioned by a government (or government body).	☐ Yes	☒ No
9. [M]FIELDWORK (e.g biological research, ethnography studies).	☐ Yes	☒ No
10.[H]GENETICALLTY MODIFIED ORGANISMS (GMOs) (biological research).	☐ Yes	☒ No
11. [H]GENE THERAPY including DNA sequenced data (biological research).	☐ Yes	☒ No
12. [M]HUMAN PARTICIPANTS – ANONYMOUS Questionnaires (participants not identified or identifiable).	☐ Yes	☒ No
13. [X]HUMAN PARTICIPANTS – IDENTIFIABLE (participants are identified or can be identified): survey questionnaire/ INTERVIEWS / focus groups / experiments /	☐ Yes	☒ No

14. [H]HUMAN TISSUE (e.g., human relevant material, e.g., blood, saliva, urine, breast milk, faecal material).	☐Yes	☒No
15.[H]ILLEGAL/HARMFUL activities research (e.g., development of technology intended to be used in an illegal/harmful context or to breach security systems, searching the internet for information on highly sensitive topics such as child and extreme pornography, terrorism, use of the DARK WEB, research harmful to national security).	☐Yes	☒No
16. [X]PERMISSION is required to access premises or research participants.	☐Yes	☒No
17. [X]PERSONAL DATA PROCESSING (Any activity with data that can directly or indirectly identify a living person). For example data gathered from interviews, databases, digital devices such as mobile phones, social media or internet platforms or apps with or without individuals'/owners' knowledge or consent, and/or could lead to individuals/owners being IDENTIFIED or SPECIAL CATEGORY DATA (GDPR[1]) or CRIMINAL OFFENCE DATA. [1]Special category data (GDPR- Art.9): "personal data revealing racial or ethnic origin, political opinions, religious or philosophical beliefs, or trade union membership, and the processing of genetic data, biometric data for the purpose of uniquely identifying a natural person, data concerning health or data concerning a natural person's sex life or sexual orientation".	☐Yes	☒No
18.[X]PUBLIC WORKS DOCTORATES: Evidence of permission is required for use of works/artifacts (that are protected by Intellectual Property (IP) Rights, e.g. copyright, design right) in a doctoral critical commentary when the IP in the work/artifactis jointly prepared/produced or is owned by another body	☐Yes	☒No
19. [H]RISK OF PHYSICAL OR PSYCHOLOGICAL HARM (e.g., TRAVEL to dangerous places in your own country or in a foreign country (see https://www.gov.uk/foreign-travel-advice), research with NGOs/humanitarian groups in conflict/dangerous zones, development of technology/agent/chemical that may be harmful to others, any other foreseeable dangerous risks).	☐Yes	☒No
20.[X]SECURITY CLEARANCE – required for research.	☐Yes	☒No
21.[X]SENSITIVE TOPICS (e.g., anything deeply personal and distressing, taboo, intrusive, stigmatising, sexual in nature, potentially dangerous, etc).	☐Yes	☒No

M – Minimal Risk; X – More than Minimal Risk. H – High Risk

If you have answered 'Yes' to ANY of the items in the table, your application REQUIRES ethical review and approval using the MOREform **BEFORE commencing your research**. Please apply for ethical approval using the MOREform (https://moreform.mdx.ac.uk/). Consult your supervisor for guidance. Also see *Middlesex Online Research Ethics (*MyLearning area*) and www.tiny.cc/mdx-ethics*

If you have answered 'No' to ALL of the items in the table, your application is Low Risk and you may NOT require ethical review and approval using the MOREform before commencing your research. Your research supervisor will confirm this below.

Student Signature:A.N.Onymous Date: 20/02/2025

To be completed by the supervisor:

Based on the details provided in the self-assesment form, I confirm that:	Insert Y or N
The study is Low Risk and *does not require* ethical review & approval using the MOREform	Y
The study *requires* ethical review and approval using the MOREform.	N

Superivsor Signature: I. Mitchell Date:21/02/2025