BSc Project Log Book

Student Name: Jai Telymonde

Project Name: Analysis of Cybersecurity Controls

Internal Supervisor: Yunxiao Zhang

External Supervisor: (if any)

Log of Activities

Date	Key activities	Outcomes	Comments/Action plans
24/9/24	First Supervisor Meeting:	Project overview and background. Discussed initial ideas and related literature on control optimisation, learned intial background on attack paths	Read cybersecurity literature: Scalable min-max objective cybersecurtiy optimisation over probabilistic attack graphs
25/9/24	Individual Research:	Read shared literature and did further research on google scholar	Do more research
1/10/24	Supervisor Meeting:	Discussed related topics such as economics and metrics for controls	Read cybersecurity literature and do independent research on economics and metrics for cybersecurity
5/10/24	Individual Research:	Read shared literature and did further research on google scholar related to economics and metrics for control measure	Do more research/begin theorising paper ideas
8/10/24	Supervisor Meeting:	Discussed exhisting cybersecurity frameworks for optimisation and control selection such as NIST CSF	Begin structure for literature review paper
10/10/24	Indiivdual Work	Began structuring paper in latex and gathering citations	Add more potential sources
17/10/24	Supervisor Meeting:	Discussed literature review structure and next steps for writing to meet deadline	Begin filling in main body of literature review and introduction
24/10/24	Supervisor Meeting:	Discussed literature review draft submission	Send in literature review at least week before deadline
23/10/24 - 6/11/24	**NATURE SUBMISSION**	**NATURE SUBMISSION**	**NATURE SUBMISSION**
7/11/24	Supervisor Meeting: literature review draft structure	Discussed progress on literature review thus far and overviewed project plan section	Start timeline and project planning section and fill out specifics on dates to complete project

14/11/24	Supervisor Meeting: Overview of literature review draft	Discussed literature review draft and feedback to best strengthen work before deadline	improve intro by providing purpose and outcomes Clarify the project's goals from the start Focus more on explainability in studies and related works Add aims and objectives more clearly for project plan section, and timeline fix latex citation bug [?] and improve image/figure quality
15/11/24 - 17/11/24	Indiivual Literature Review Work:	Restructured entire paper by minimising existing sections and added additional sections to expand project scope	Refine paper for submission
18/11/24	Supervisor Meeting: Final literature review pre submission meeting	Discussed final literature review structure before submission and discussed poster project and final project report submission Discussed changes I made to the report since last meeting, and refinements to overall structure	Further refine literature review before submission and begin structuring project code
20/11/24	**LITERATURE REVIEW SUBMISSION**	**LITERATURE REVIEW SUBMISSION**	**LITERATURE REVIEW SUBMISSION**
28/11/24	Supervisor Meeting:	Discussed project code and aims of overall structure for the project, and existing website made for cybersecurity optimisation	Ensure features are seamless and intregrated fully with each part
19/11/24 - 3/12/24	**LEARNING FROM DATA SUBMISSION**	**LEARNING FROM DATA SUBMISSION**	**LEARNING FROM DATA SUBMISSION**
5/12/24	Supervisor Meeting:	Discussed current functionality of project, attack graph generation and optimiser linked	Good functionality thus far, take it easy over break
4/12/24 - 18/12/24	**ALGORITHMS SUBMISSION**	**ALGORITHMS SUBMISSION**	**ALGORITHMS SUBMISSION**
13/1/25	Supervisor Meeting:	Discussed current project functionality and ideas on expanding by adding in metrics for more explainability	Continue building out project and add additional metrics, think about how to implement Shapley values
15/1/25	Individual Project Work:	Worked on adding ROSI equation in python form	Continue working on ROSI and test
17/1/25	Individual Project Work:	Test ROSI program with input data, and checked output manually by solving data mathematically	Continue adding ROSI functionality

19/1/25	Individual Project Work:	Integrated ROSI with the full system to take network graph parameters as input	Continue adding ROSI functionality
20/1/25	Individual Project Work:	Added graph output to show ROSI metrics below graph display	Ready program for supervisor meeting review
21/1/25	Supervisor Meeting:	Discussed Project and adding potential about section and Shapley Values	Good progress, try to integrate Shapley values to measure control marginal contribution
22/1/25	Individual Project Work:	Worked on shapley.py file to adapt Shapley equation to input data	Continue working on shapley.py
23/1/25	Individual Project Work:	Continued working on shapley.py	Integrate shapley.py with attack graph
25/1/25	Individual Project Work:	Integrated shapley.py with attack graph and added graph to display output	Prep program for supervisor meeting, and theorise how to refine current functionality
27/1/25	Supervisor Meeting:	Discussed project functionality, added ROSI, Shapley values, and built out website application	Good progress so far, potentially implement more dynamic user interactions such as clicking and dragging. Graph
28/1/25	Individual Project Work:	Current program does not allow for UI interaction, have to rebuild core interaction module, researched what python imports will allow it.	Rebuild core module with Dash to fix non user interactable graph display
29/1/25	Individual Project Work:	Began rebuilding core with Dash	Continue changing core module
1/2/25	Individual Project Work:	Continued changing to Dash	Continue overhauling to Dash
2/2/25	Individual Project Work:	Add user interaction support such as clicking edges to display controls and clicking nodes to show information	Continue working on user interaction support
3/2/25	Individual Project Work:	Finished user interactions with edges and nodes to display control information: cost, effectiveness, rosi and shapley scores.	Prep program for supervisor meeting.
4/2/25	Supervisor Meeting:	Discuss new built project, rebuilt from ground up with dash cytoscape for user interactability	User interactions work well, reorganise outputs
5/2/25	Individual Project Work:	Reorganised outputs to be more easily readable, changed centering and metric graph formatting	Continue changing website visuals
7/2/25	Individual Project Work:	Continued altering visuals on website, including primary network attack graph to be more readable and clear with large labels	Prep for supervisor meeting
11/2/25	Supervisor Meeting:	Discussed fact checking metrics to ensure reliable output, unclear on how to check if shapley output is mathematically correct. Shapley = total probability reduction across network	Check equation output and ensure Shapley sums to correct values

Date	Activity	Description	Next Steps
13/2/25	Individual Project Work:	Ensure shapley.py prints debug information to check total probability, total reduction, and shapley total	Refine visuals of site
15/2/25	Individual Project Work:	Changed fonts, visuals, organisation to make website look more professional and presentable	Begin converting to modular system
16/2/25	Individual Project Work:	Started converting system to modular system, monolothic system was inneficient and poorly organised	Continue converting to modular system
17/2/25	Individual Project Work:	Continued converting system to modular system from monolithic	Prep for supervisor meeting
18/2/25	Supervisor Meeting:	Discussed website functionality and output and new visuals, and simplified graph construction	Consider introducing more complex graph construction such as multi edges and clearer edge probabilities
20/2/25	Individual Project Work:	Begin altering graph construction to include multiple edges between nodes, have to reformat inputs for all modules to include edge keys and change from u, v for edge to u, v, k	Continue adding multi edge functionality
19/2/25 - 5/3/25	**ENTERPRISE SUBMISSION**	**ENTERPRISE SUBMISSION**	**ENTERPRISE SUBMISSION**
7/3/25	Supervisor Meeting:	Discussed poster structure A0, and specific sections to add, how many words to add, fontsizes, and potential figures	Look over example poster diagram
14/3/25	Supervisor Meeting:	Discussed Poster Draft submission date and current poster as is	Finish poster and send draft for supervisor review by date
19/3/25	Individual Poster Work:	Started poster including the structure and introduction/ motivation sections	Continue working on poster sections, add figures and
5/3/25 - 19/3/25	**HPC SUBMISSION**	**HPC SUBMISSION**	**HPC SUBMISSION**
20/3/25	Supervisor Meeting:	Poster draft submission and feedback, change poster size to A1	Change font to something dyslexic friendly, and upgrade image quality to 300 dpi, use better contrasting colors to improve readability (change orange background, white text), center images, and realign design section with flowchart
21/3/25	Individual Project Work:	Continued changing to multi edge format	Continue multi edge functionality across system
22/3/25	Individual Project Work:	Continued changing to multi edge format	Continue multi edge functionality across system
23/3/25	Individual Project Work:	Continued changing to multi edge format	Continue multi edge functionality across system

24/3/25	Individual Project Work:	Continued changing to multi edge format, and update poster figure to include new multi edge network	prep for supervisor meeting
25/3/25	Last Supervisor Meeting:	Final Poster review, discussed final report structure and due dates to ensure correct submission time. Final report spec review.	Complete final report and send draft for review by 21st of April
26/3/25	Individual Poster Work:	Refined poster and rewrote results section and conclusion to be stronger	Do more work on poster before submission
27/3/25	Individual Poster Work:	Redesign poster, change font sizes to improve visual clarity and change colors to make sure it is clear, particularly where equations are	Finalise poster for submission
28/3/25	Individual Poster Work:	Cut down words to make poster more streamlined and reformat design slightly to make it less complex, add in citations	Submit poster before break
29/3/25	**POSTER SUBMISSION**	**POSTER SUBMISSION**	**POSTER SUBMISSION**
1/4/25	Individual Report Work:	Developed report structure and setup latex with formatted template	Work on introduction and abstract
2/4/25	Individual Report Work:	Wrote abstract and introduction	Work on aims and motivation
3/4/25	Individual Report Work:	Wrote aims and motivation	Add more sources to existing work
5/4/25	Individual Report Work:	Did more research on google scholar to find articles to improve motivation section	Work on background
7/4/25	Individual Report Work:	Wrote background section	Work on methodology/theoretics of project
9/4/25	Individual Report Work:	Wrote methodology for MILP optimisation and ROSI	Expand methodology section
11/4/25	Individual Report Work:	Wrote methodology for Shapley values and path probality calculation	Add more equations and sources to methodology
12/4/25	Individual Report Work:	Added more equations to strengthen explanation and found more sources to expand on methodology section	Work on results section and input figures and tables
14/4/25	Individual Report Work:	Input metric graphs for figures and added tables describing case study parameters and other relevant information	Develop test cases for scalability and retrieve results
16/4/25	Individual Report Work:	Refined report for draft overview by supervisor, added additional background and motivation sources to strengthen sections	Further refine report for draft overview
18/4/25	Individual Report Work:	Additional refinements to report, primarily in grammar and sentence structure to make it more concise and reduce redundancy	More refinements for report draft

Date	Activity	Description	Next Steps
20/4/25	Individual Report Work:	Sent off report draft and worked on adding more descriptive tables to provide insight of case study	Add comments to code
22/4/25	Individual Project Work:	Began adding comments to code base	Prep for supervisor meeting
23/4/25	Supervisor Meeting:	Discussed final report draft. UI Picture in report. For presentation print out new results for markers to look at. In line ROSI SHAPLEY graphs in report, change citation numbers.	add more to tool implementation section. Prepare for presentation and technical questions. Higher figure quality for some.
24/4/25	Individual Report Work:	Fixed all draft feedback from supervisor excluding adding more to tool implementation section	Add more to tool implementation section
26/4/25	Individual Report Work:	Expanded tool implementation and included UI figure for results section	Continue working on report
27/4/25	Individual Report Work:	Went through report, re read and refine section grammar and writing	Continue working on report
29/4/25	Individual Project Work:	Went through code and double checked comments and functionality	Submit everything
30/4/25	**REPORT - CODE - LOGBOOK SUBMISSION**	**REPORT - CODE - LOGBOOK SUBMISSION**	**REPORT - CODE - LOGBOOK SUBMISSION**