

# University of Plymouth

School of Engineering,  
Computing, and Mathematics

MAL3018

Computing Project

2024/2025

Filpal Nexus (USB Management System)

Vincent Goh Kah Fung

BSCS2309526

BSc (Hons) Computer Science (Cyber Security)

## Acknowledgements

### 1 Abstract

In collaboration with Filpal (M) Sdn Bhd, this project addresses the critical security risks posed by USB devices, such as data breaches, malware propagation, and unauthorized access. The project focuses on the development of a USB Whitelisting Application designed to enhance endpoint security by allowing only authorized USB devices to connect to a system while blocking all others.

The application is developed using C# and implements a robust whitelisting mechanism that identifies USB devices using their unique Vendor ID and Product ID. It features a real-time monitoring system that verifies connected devices against a predefined whitelist, ensuring compliance with security policies. The project includes an intuitive Windows Forms interface for user-friendly operation and an administrative panel for managing whitelist policies, viewing logs, and generating reports.

The application's backend logic is implemented in C#, ensuring seamless integration with Windows operating systems and providing scalable solutions for small to large enterprises. This project not only strengthens Filpal's cybersecurity framework but also offers a practical solution for organizations seeking to mitigate USB-related security risks.

Testing and evaluation demonstrate the application's effectiveness in preventing unauthorized USB access while maintaining ease of use for approved devices. This collaborative effort contributes to the field of cybersecurity by providing a reliable tool for USB device management, with potential applications in corporate, educational, and government environments.

## Contents

1	Abstract .....	1
2	Introduction .....	5
2.1	Objectives .....	5
2.2	Background .....	6
2.3	Benefits of USB Whitelisting .....	6
2.4	Deliverables .....	7
2.5	Project Planning and Requirements .....	7
2.6	Source Code and Code Documentation .....	10
3	Literature Review of Filpal Nexus .....	11
3.1	Evolution of USB Technology and Management Challenges .....	11
3.1.1	Historical Development of USB Technology .....	11
3.1.2	Emergence of Security Vulnerabilities .....	11
3.1.3	Management Challenges in USB Ecosystems .....	11
3.1.4	Potential Role of Filpal_Nexus .....	12
3.1.5	Future Directions for USB Management .....	12
3.2	Research.....	12
3.2.1	Data Exfiltration .....	12
3.2.2	Device Spoofing and Firmware Manipulation .....	13
3.2.3	Keystroke Injection and HID Attacks .....	13
3.2.4	Driver-Related and Exploit-Oriented Attacks .....	13
3.2.5	Detection and Prevention Strategies .....	13
3.2.6	Organizational Policies and User Education .....	14
3.3	Security and Usability Trade-offs .....	15
3.3.1	The Core Tension Between Security and Usability .....	15
3.3.2	Adaptive Systems as a Middle Ground .....	15
3.3.3	The Role of User Behavior and Education .....	16
3.3.4	Organizational and Cultural Considerations .....	16
3.3.5	Potential Relevance of Filpal_Nexus to Security-Usability Trade-offs .....	17
3.3.6	Future Directions for Addressing Trade-offs .....	17
3.4	Relevance of Filpal_Nexus in the Current Landscape .....	18
3.4.1	Context of USB Security Challenges in the Current Landscape .....	18

3.4.2	Speculative Contributions of Filpal_Nexus Based on Available Information .....	18
3.4.3	Positioning Filpal_Nexus Within the Open-Source Ecosystem .....	19
3.4.4	Relevance to Windows-Centric Environments and Corporate Needs .	19
3.4.5	Broader Implications and Community Impact .....	20
4	Current Mitigation Techniques and Detection Strategies .....	20
4.1	Authentication and Access Control .....	20
4.2	Real-Time Monitoring and Anomaly Detection .....	20
4.3	Forensic Logging and Incident Response .....	21
4.4	Emerging Countermeasures .....	21
5	Comparative Analysis of USB Management Systems .....	21
5.1	Existing Solutions and Frameworks for USB Management .....	21
5.1.1	Commercial Solutions for USB Management .....	21
5.1.2	Open-Source Frameworks for USB Management .....	22
5.1.3	Hybrid and Emerging Approaches .....	23
5.1.4	Potential Alignment of Filpal_Nexus with Existing Solutions .....	23
5.2	Evaluation Metrics .....	24
5.3	Challenges and Future Research Directions.....	25
6	Method of Approach ( Agile methodology) .....	25
6.1	Overall Agile Strategy .....	26
6.2	Development Phases .....	26
6.3	Design & Architecture .....	27
6.3.1	Overall System Design .....	27
6.3.2	Component Breakdown .....	41
6.3.3	Technical Tools & Resources .....	42
6.4	Implementation Strategy .....	43
6.4.1	Coding Framework .....	43
6.4.2	Detailed Implementation Steps .....	43
6.4.3	Integration Approach .....	43
6.5	Testing and Validation .....	44
6.5.1	Test Plan .....	44
6.5.2	Deployment Testing .....	45
6.5.3	User Acceptance Testing (UAT) .....	45
6.5.3	Risk Management and Mitigation .....	47

7.1	Identified Risks .....	47
8	Project Timeline and Milestones .....	47
8.1	Timeline .....	48
8.2	Milestones .....	48
9	Legal, Social, Ethical, and Professional Issues .....	48
9.1	Legal Issues .....	48
9.2	Social Issues .....	49
9.3	Ethical Issues .....	49
9.4	Professional Issues .....	50
10	Project Management Plan for Filpal Nexus .....	50
10.1	Project Initiation .....	50
10.2	Project Planning .....	51
10.3	Project Execution .....	51
	10.4 Monitoring and Control .....	52
	10.5 Project Closure and Post-Implementation Review .....	52
11	End-project Report .....	53
	11.1 Executive Summary .....	53
	11.2 Challenges and Mitigation Strategies .....	53
	11.3 Lessons Learned .....	53
	11.4 Future Developments .....	54
12	Post-Mortem .....	55
	12.1 Successes and Achievements .....	55
	12.1.1 Strengths .....	55
	12.1.2 Weaknesses .....	56
	12.1.3 Challenges and Areas for Improvement.....	57
	12.1.4 Lessons Learned .....	58
	12.2 Recommendations for Future Projects .....	58
13	Conclusion .....	59
14	References .....	61

[https://youtu.be/\\_HJzkPcNVRy](https://youtu.be/_HJzkPcNVRy)

[https://github.com/vincentvp69/Filpal\\_Nexus](https://github.com/vincentvp69/Filpal_Nexus)