A Comparative Study on Home Network Management Tools

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ABSTRACT

Home Network Management plays a critical role in maintaining and optimizing residential computer networks, which have grown increasingly complex due to the proliferation of connected devices. The effectiveness of these tools largely depends on user-friendly interfaces that enhance usability and support efficient network practices. However, many users lack the technical knowledge required to navigate these tools effectively, often resulting in suboptimal network performance. This study addresses usability challenges in home network management tools by adopting a mixed-method approach that integrates Content Analysis with the System Usability Scale (SUS) to provide a comprehensive evaluation of their functionality and user experience.

Keywords— home network, network management, comparative study, usability evaluation, system usability scale (SUS).

INTRODUCTION

Home Network Management involves overseeing and controlling a residential computer network, including devices and infrastructure. It shares similarities with professional network administration, focusing on configuration, access control, security, monitoring, and maintenance. The goal is to optimize network usage, ensure continuous connectivity, and enhance user experience.

METHODOLOGY

This study employs a combined approach using Content Analysis and the System Usability Scale (SUS) to evaluate issues in home network management tools. Content Analysis enables systematic identification and categorization of tool features and usability issues, while SUS offers a quantitative measure of user satisfaction and perceived usability [1][2]. By integrating the strengths of both methods, this mixed-method design provides a more holistic and nuanced understanding of user experience and system functionality. Previous research supports that such combinations yield actionable insights for improving software interfaces and usability outcomes [3][4].

The System Usability Scale (SUS) is a widely validated tool for evaluating perceived usability across software domains, including network management applications [5][6][7]. In this study, SUS was used to assess user satisfaction, interface clarity, and task efficiency based on direct interaction with the selected tools.

Integrating findings from Content Analysis and Usability Study offers a holistic understanding of both content quality and user experience. Aligning insights from these methodologies aids in refining and enhancing the design of educational tools, thereby improving their effectiveness and user-friendliness. This approach not only identifies critical usability issues but also validates them through direct user feedback, ensuring that the findings are robust and applicable to real-world scenarios [3][8][9].

Content Analysis

Content Analysis is used to systematically review and categorize existing research on home network

management tools. This technique involves a detailed examination of selected studies to identify key issues, features, and limitations associated with these tools. The process (refer Figure 1) includes:

Literature Review: Conducting a comprehensive review of relevant articles to gather data on home network management tools. The review focuses on features such as device identification, connection control, user interfaces, and automation [1].

Categorization: Analyzing the content to categorize findings into different themes related to tool functionalities and user experience. This step involves identifying recurring issues and strengths across various studies [1].[2].

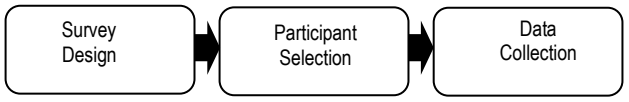
Synthesis: Synthesizing the categorized information to draw meaningful conclusions about the effectiveness and limitations of current home network management tools [10].

Fig. 1 Content Analysis Workflow: From Literature Review to Synthesis

Usability Study

To complement the Content Analysis, a usability study is conducted using the System Usability Scale (SUS), developed by Brooke [6]. SUS is a widely used tool for assessing the usability of various systems, including software and hardware tools. This evaluation provides a quantitative measure of user satisfaction and tool effectiveness Figure 2 shows the process of usability study.

Fig. 2 Workflow of Quantitative Measurement Using SUS



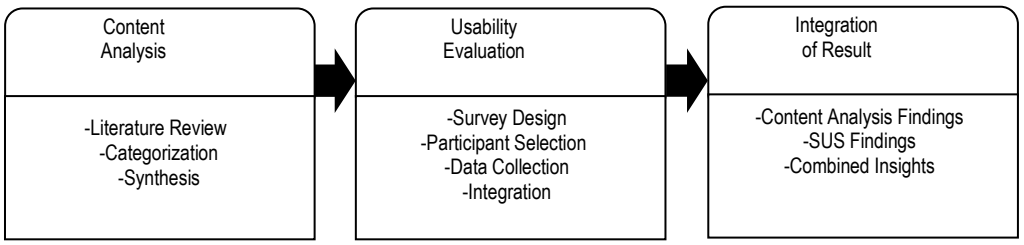
Survey Design: A SUS-based questionnaire is designed to evaluate user experience with selected home network management tools. The questionnaire includes ten questions that cover aspects such as ease of use, learning curve, and user satisfaction [5][7].

Participant Selection: A diverse group of over 50 participants is selected, representing various levels of technical expertise. Participants must be drawn from multiple studies, ensuring a broad range of user perspectives [3].

Data Collection: Participants complete the SUS questionnaire after using the home network management tools. The collected data is analyzed to identify trends in user satisfaction and usability issues [3][11].

Integration with Content Analysis: The findings from the SUS evaluation are integrated with the results of the Content Analysis. This combined approach (refer Figure 3) helps validate the issues identified in the Content Analysis with user feedback on usability [12].

Fig. 3 Integrated Workflow of Content Analysis and Usability Evaluation



RESULT AND DISCUSSION

This section explores the efficacy and roles of various home network management tools and their usability as analyzed from previous research. The discussion is divided into three key areas: (1) Tools and The Roles, (2) Identified Issues, and (3) Usability Study.

Tools and Roles

Effective home network management involves identifying and addressing problems that occur during network operation. These challenges can range from software bugs and hardware malfunctions to uncertainties in usage and insufficient documentation. The resolution of these issues is crucial for improving network management and performance [11][12][13].

Addressing the Core Issues

Home network management encounters significant challenges due to the limited feature sets of existing tools. These tools can be overly complex for some users while insufficient for others.

Many tools lack essential functionalities such as monitoring, blocking, website filtering, scheduling, and both automated and manual connection management, underscoring the need for more comprehensive solutions [3][14] [15]. Current tools often cater to network professionals, which can be intimidating for non-experts.

Effective home network management tools should be user-friendly and accessible to individuals with varying technical expertise [16][10].

Cost is another critical factor, as high-quality tools are frequently expensive and may require additional purchases for full functionality. This often forces users to settle for basic packages that lack vital features, impeding their ability to establish a secure network [17]. Affordable tools that provide a balanced range of features without extra costs are necessary.

Furthermore, many tools are limited to basic tasks and lack advanced features, such as detailed device information, that could enhance network management capabilities [18].

Physical limitations, such as insufficient memory and processing power, also affect tool performance, highlighting the need for reasonably priced options with adequate specifications [3][19].

Automation is also crucial; many tools require manual input of network information, which can lead to errors and complicates management for non-experts. Tools with automated functions would improve usability and accuracy across all skill levels [20][21].

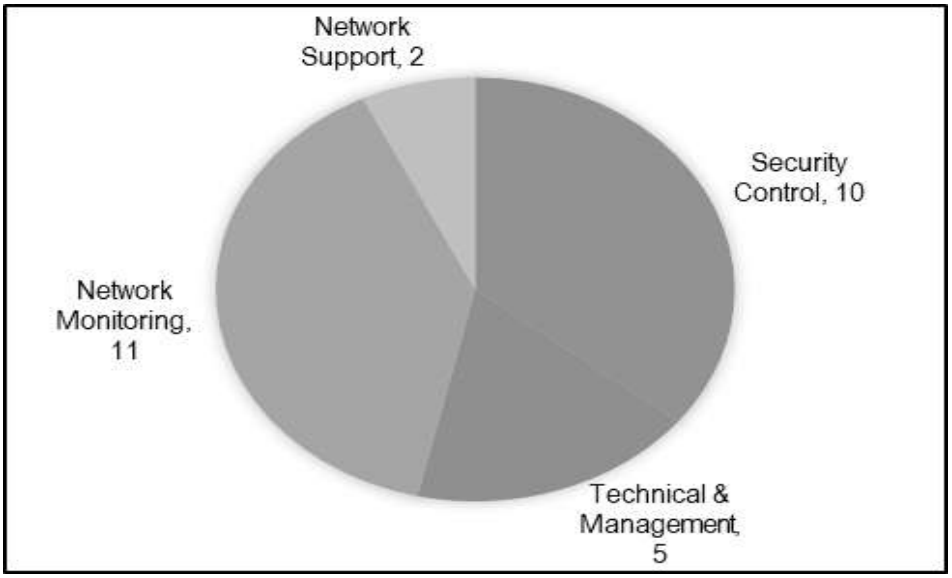
Battery consumption is a practical concern for mobile tools; excessive battery drain can reduce their usability, necessitating adherence to battery-saving practices [22][10][23].

Security is paramount, as some tools expose sensitive network usage data. Proper security measures should limit access to authorized individuals only [24][25]. Finally, a user-friendly interface is essential for effective network management, providing intuitive navigation and efficient access to features [16][20].

Review of Existing Tools

An analysis of over 25 home network management tools (refer Figure 4) highlights their distinct roles and functionalities, categorized into four main areas: security control [22][3], technical management [26], network monitoring [27], and network support [28].

Fig. 4 Distribution of Home Network Management Features by Category



For instance, security solutions such as those offered by Trend Micro integrate with home Wi-Fi routers through Ethernet and support both Android and iOS platforms, providing comprehensive network traffic scanning to prevent intrusions and enhance privacy [29] [30]. Similarly, the home network tools described by "Eden and Yang" offers extensive functionalities for user access control, traffic monitoring, and Quality of Service (QoS) management, featuring a user-friendly interface for effective network oversight [22][17].

Arcai's "NetCut" [31] focuses on defending devices from spoofing attacks while maintaining network performance, utilizing WinPcap for private network management and peak time monitoring. Cisco Systems Inc.'s "Cisco Network Magic" [17][14] and Chetty's "uCap" [32] both provide a range of features including security alerts, troubleshooting, and real-time traffic control, with user interfaces catering to various technical skill levels.

The "Home Network Assistant (HNA)" combines monitoring, management, and understanding of network behavior through dynamic HTML5 interfaces [33]. TuxCut (Blandford et al., 2016), an open-source tool, protects Linux computers from spoofing with a straightforward interface for effective security management [34]

Russell C.'s "Third-Party Customization of Residential Internet Sharing using SDN" emphasizes customization and monitoring of Internet sharing with household quotas and age-based filtering [35]. Mortier's "Homework" offers interactive features for network infrastructure management, including DNS integration and device-specific access control [36].

"Spyrix Personal Monitoring" provides extensive monitoring of network and social media activities [37], while "Distributed IP Mobility Management (DMM)" simplifies smart device management [38]. "Angry IP Scanner" delivers detailed information about online devices through various scanning techniques [39]. Collectively, these tools offer diverse functionalities addressing various aspects of network management to meet varied user needs and preferences.

"PingTest.net" and "SpeedTest.net" are online tools that evaluate network performance. PingTest.net measures network latency and packet loss, providing insights into connection stability and quality. SpeedTest.net assesses internet speed by testing download and upload rates. Together, these tools offer a comprehensive view of network performance, helping users diagnose issues and optimize their connections for better efficiency [40].

"Axence NetTools" is a comprehensive network management and diagnostic tool that offers various features such as network scanning, monitoring, and troubleshooting. It enables users to efficiently manage network

resources, detect issues, and enhance overall network performance. The tool's user-friendly interface and robust functionality make it a valuable asset for network administrators aiming to maintain secure and optimized networks [40].

"Netscan" is a network scanning tool that identifies devices and services on a network. It helps users detect potential security vulnerabilities, manage network resources, and optimize performance. By providing a comprehensive overview of the network, Netscan simplifies network management and enhances security measures [41]. "NetWorx" specializes in bandwidth monitoring, offering clear insights into network usage and performance to help users address bottlenecks and optimize connectivity [40].

CEBus is a home automation protocol that standardizes communication between devices, making it easier to integrate and control various systems in a home [42]. Cisco NetFlow analyzes network traffic, providing detailed insights into usage and performance to help manage and optimize the network [43]. Together, they enhance both home automation and network management, offering improved control and efficiency in their respective domains. Their combined use can lead to more streamlined operations and better overall system performance.

"OPNET" and "NS2" are important network simulation tools utilized for analyzing and optimizing network performance. OPNET is widely used in industry due to its detailed simulations and capabilities for network design and evaluation [44]. Conversely, NS2 is often favored in academic research for modeling and analyzing network protocols and behaviors [44]. Both tools play crucial roles in enhancing network design and performance.

"Wireshark" is a leading network protocol analyzer that captures and inspects traffic in real-time, providing detailed data for diagnosing network issues and troubleshooting connectivity problems [45]. "SolarWinds Network Performance Monitor" offers comprehensive network performance monitoring with advanced analytics, customizable dashboards, and real-time alerts, helping users manage network health and efficiency [46].

"MOTE-VIEW" is a tool for monitoring wireless sensor networks. It lets users track data and system performance in real time from a distance, making network management easier. The simple interface helps users manage and use the network more effectively [47]. "Ubiquiti UniFi" offers scalable network management for home and small office environments, with features for centralized management, flexible deployment, and performance optimization [48].

"NetSpot" is a Wi-Fi analyzer and site survey tool that helps optimize wireless network performance by providing visual maps and analysis of signal strength and interference, ensuring stable and efficient wireless coverage [49]. "ManageEngine OpManager" provides network monitoring and management with customizable dashboards and advanced alerting systems, offering real-time insights into network health and performance [50].

The range of network management tools discussed offers a variety of functionalities to enhance network usability, performance and security. Tools like Trend Micro and NetCut provide strong protection and network efficiency, while Cisco Network Magic and uCap offer real-time traffic management and troubleshooting. Performance evaluation tools such as PingTest.net, SpeedTest.net, and Wireshark help diagnose and optimize network issues. Additionally, network management solutions like Axence NetTools and Netscan improve network oversight and security. The integration of home automation protocols such as CEBus with traffic analysis tools like Cisco NetFlow demonstrates how these technologies can work together to streamline network and system management. Overall, these tools collectively enhance network control, performance, and security to meet diverse user needs.

Table I below summarizes the comparative strengths, limitations, and usability characteristics of selected home network management tools evaluated in this study. The tools are assessed based on their key features, user accessibility, and suitability for different user profiles.

Table I Comparative Usability and Feature Analysis of Home Network Management Tools.

Tool	Key Feature	Usability Aspect	Strength	Limitation
NetCut	ARP protection, spoofing defense	Medium	Simple interface, device defense	No automation, limited features
Cisco Network Magic	Traffic control, troubleshooting	High	Intuitive UI, comprehensive tools	Paid version for full features
Spyrix	Monitoring and parental control	Low	Detailed logging	High battery consumption
uCap	Internet data management	Medium	Usage caps, quota setting	Limited to bandwidth
Home Network Assistant	Monitoring + diagnostics	Medium	Dynamic UI, network insights	Limited platform support
TuxCut	Linux spoofing protection	High	Open-source, lightweight	Linux-only
Eden	User access control, QoS	High	Comprehensive control	May be complex for non-tech users
NetSpot	Wi-Fi analyzer with heat maps	Medium	Visualization of signal strength	Needs manual interpretation
Angry IP Scanner	Device detection and scan	High	Fast device identification	Basic interface
Manage Engine OpManager	Real-time monitoring, alerts	Low	Dashboard customization	Enterprise-oriented
Wireshark	Real-time packet capture	Low	Deep diagnostics	Complex for average users
Axence NetTools	Troubleshooting suite	High	Multi-tool integration	Advanced users only
SpeedTest.net	Speed test (upload/download)	High	Easy to use, quick	Limited to speed only
CEBus	Home automation protocol	Medium	Integration-ready	Needs compatible devices

The Issues

Effective home network management requires diagnosing and addressing issues such as bugs, software/hardware uncertainties, or inadequate documentation [10][17][12]. Understanding these problems allows for the development of solutions that improve network management and performance.

A major challenge is the lack of essential management features in existing tools. Many tools fall short in

providing critical functionalities like monitoring, blocking, website filtering, scheduling, and connection management, which are vital for effective home network control[17][51]. Addressing these gaps is crucial for enabling users to manage their networks more efficiently.

Most current tools are designed with advanced features suited for network experts, making them complex for non-technical users. An ideal home network management tool should offer basic, user-friendly functionalities accessible to individuals regardless of their technical expertise [52].

Cost also plays a significant role. High-quality tools often come with high price tags and may require additional purchases for full functionality, limiting access for budget-conscious users. This financial constraint often leads to the use of basic packages that lack essential features, impairing the establishment of a secure and comprehensive network setup [17].

Many available tools are limited to basic functions and lack advanced features that could enhance network management. For example, they may not provide detailed information about connected devices, hindering users' ability to optimize network management [53][54].

Additionally, many budget tools suffer from physical limitations such as insufficient memory and processing power, resulting in slow performance and inefficiency. Therefore, affordable tools must also meet adequate performance standards [55][56].

Automated functions are often missing, requiring manual input of network information, which can lead to errors and complicate management for non-experts. Incorporating automation would significantly improve usability and accuracy for all users [57][58].

Battery consumption is another concern for mobile tools. Tools that excessively drain battery power due to frequent network activity may be uninstalled by users. Adhering to battery-saving practices or reducing network request frequency can enhance power efficiency and user experience [59][60][56].

Security risks arise when tools allow unrestricted access to network usage logs. Proper security measures should restrict access to sensitive data to authorized individuals only, ensuring the protection of user privacy [61][62][63].

A user-friendly interface is essential for effective tool usage. The interfaces should be intuitive, easy to navigate, and provide efficient access to features, making the tools more accessible and functional for users [64][58].

Table II Mapping of Usability Issues to SUS Aspects and Their Impact on User Experience

Item	SUS Aspect	Explanation
Diagnosing issues	Ease of Use	The ability of users to easily identify and resolve problems affects the perceived ease oDf use and overall satisfaction with the tool.
Essential management features	Functionality	The presence and effectiveness of key functionalities contribute to the tool's usability and whether it meets user needs.
Advanced features for network experts	Functionality	Tools lacking advanced features and detailed information may not meet user expectations and requirements for effective network management.
Physical limitations	Performance	The tool's performance in terms of speed and efficiency impacts usability and user experience.

Automated functions	Ease of Use	Lack of automation can complicate use and lead to errors, affecting the ease of use and overall satisfaction with the tool.
Battery consumption	Efficiency	Tools that drain battery quickly affect usability, as users seek efficient solutions that do not impact device performance negatively.
Security risks	Security and Privacy	Proper security measures to protect sensitive data enhance user trust and satisfaction, impacting overall usability.
User-friendly interface	Ease of Use	An intuitive and easy-to-navigate interface significantly improves usability and user satisfaction.

Overall, these challenges underscore the need for advanced home network management tools, as summarized in Table II. A usability review was conducted with selected respondents to assess the effectiveness of existing home network management tools. Addressing these challenges will facilitate the creation of tools that better fulfill the diverse needs of users, thereby improving home network management across various demographics.

Result of the Usability Study

This section outlines the usability study process using the System Usability Scale (SUS), developed by John Brooke [5][7], conducted on selected Home Network Management Tools to evaluate usability. A diverse group of participants—varying in age, race, education, and profession—was involved to ensure a comprehensive assessment of user interactions. The SUS questionnaire consisted of 10 items, each measuring different aspects of usability, rated on a 5-point Likert scale from "Strongly Disagree" to "Strongly Agree." Table III summarizes the responses from 25 respondents.

Table III Response Distribution for Each SUS Item in the Usability Evaluation

Question	1	2	3	4	5	6	7	8	9	10
Strongly Agree	0	1	0	6	0	2	0	5	0	3
Disagree	10	3	12	10	4	11	8	10	7	12
Neutral	5	7	6	7	5	6	7	8	5	6
Agree	8	11	5	1	12	5	10	1	9	3
Strongly Agree	2	3	2	1	4	1	0	1	4	1

The SUS score is calculated by adjusting the scores for each item and summing these adjusted scores. For odd-numbered questions, the score is calculated by subtracting 1 from the user's rating. For even-numbered questions, the score is calculated by subtracting the user's rating from 5. The adjusted scores are then summed and multiplied by 2.5 to obtain a score out of 100. Table IV summarizes the average responses, adjusted scores, and interpretations for each SUS question.

Table IV Average Scores and Interpretations for Each SUS Item

Question	AverageResponse	Adjusted Score	Interpretation
1	2.68	1.68	Some users found the system somewhat difficult to use.
2	3.56	1.44	Some users found the system somewhat complex.

3	2.88	1.88	Users felt that the system could be more intuitive.
4	2.56	2.44	Some users experienced inconsistency in the system.
5	3.36	1.64	Users believe the system requires a learning curve.
6	3.04	1.96	Some users felt the system was slightly cumbersome.
7	2.48	2.52	Users were not entirely confident using the system.
8	3.28	1.72	Some users felt the system was not easy to master.
9	3.32	1.68	Users found that the system's functions could be better integrated.
10	2.56	2.44	Some users found inconsistencies in the system.

To validate the SUS findings statistically, we computed the average score across all respondents. The mean SUS score was **50.42 ± 10.85 (SD)**, which falls significantly below the industry benchmark of 68 for acceptable usability. The 95% confidence interval for the SUS score was **[46.16, 54.67]**, indicating with high certainty that user perceptions of usability were consistently low to marginal. These results highlight the necessity for substantial improvements in interface design, consistency, and user-friendliness.

The overall SUS score is calculated by summing the adjusted scores for each question and multiplying by 2.5 to obtain a score out of 100. A score above 68 suggests the system is generally usable and meets user expectations, while scores below 68 indicate potential areas for improvement. User feedback revealed strengths and weaknesses in the system, particularly regarding ease of learning, complexity, and function integration. The SUS evaluation indicates that while the system is generally usable, further refinement is needed, especially in addressing complexity and improving consistency.

Visual Summary of Usability-Solution Mapping

The following table summarizes how specific usability issues, identified via SUS and content analysis, correspond to design challenges and lead to actionable feature suggestions. This mapping provides a high-level framework for tool developers to align usability problems with targeted solutions.

TABLE V Usability Issue Mapping to Design Challenges and Interface Solutions

Usability Issue	Design Challenge	Suggested Feature
Manual setup	High error rate	Auto-detection of devices
Unclear terminoloy	Misintrepretation by users	Tooltips and user guidance
Cluttered interface	Visual incostency	Minimalist UI design
Low SUS score (Q4, 10)	Navigation nconsistency	Standardized layout patterns
No automation	Tedious manual actions	Smart automation modules

CONCLUSION

As a result of the combined content analysis and usability evaluation, several overarching patterns have emerged. These include recurring interface design shortcomings, limited automation, and accessibility barriers

that affect user satisfaction. The following conclusion synthesizes these insights and outlines practical implications for the development of more user-centered home network management tools.

This study underscores the pressing need for more user-friendly and feature-rich home network management tools. The findings reveal significant gaps in current tools, particularly in areas such as automated monitoring, user accessibility, and cost-effectiveness. These deficiencies highlight the necessity for advancements in tool design that cater to a broader user base and enhance overall network management experiences.

Current Limitations

The analysis identified that existing tools often lack essential functionalities, such as comprehensive automated monitoring, intuitive user interfaces, and affordability. Many tools are either overly complex for casual users or insufficiently equipped for those requiring advanced features. This disparity necessitates a reevaluation of design priorities to better address user needs.

RECOMMENDATIONS FOR IMPROVEMENT

As identified in SUS items 4 and 10, users experienced inconsistency in the interface and had difficulty navigating between functions. Therefore, we recommend redesigning the UI flow to ensure smoother and more predictable navigation, especially for non-technical users.

Future developments in home network management tools should prioritize usability improvements, incorporating intuitive interfaces that facilitate ease of use for users with varying levels of technical expertise. Additionally, the integration of automation features can significantly reduce manual input errors and enhance the overall efficiency of network management. Addressing cost barriers by providing more affordable solutions with a balanced range of features will also be crucial in making advanced tools accessible to a wider audience.

Future Directions

To better meet diverse user needs, future research should focus on integrating user feedback into the design process and exploring innovative solutions that address the identified gaps. By enhancing tool functionalities and usability, it will be possible to improve user satisfaction and effectiveness in managing home networks.

Overall, addressing these critical issues is essential for the development of more effective and accessible home network management solutions that can better serve users across different demographics and technical backgrounds.

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REFERENCES

1. K. A. Neuendorf and A. Kumar, “Krippendorff, K. (2018). Content analysis: An introduction to its methodology. Sage publications.,” Int. Encycl. Polit. Commun., vol. 1, no. May, 2015.
2. K. A. Neuendorf and A. Kumar, “Krippendorff, K. (2018). Content analysis: An introduction to its methodology. Sage publications.,” Int. Encycl. Polit. Commun., vol. 1, no. May, 2015.
3. K. Klaus, Content Analysis: An Introduction to Its Methodology. 2004.
4. J. R. Lewis and J. Sauro, “Usability and User Experience: Design and Evaluation,” in Handbook of Human Factors and Ergonomics, 2021, pp. 972–1015.
5. K. Sagar and A. Saha, “A systematic review of software usability studies,” Int. J. Inf. Technol., pp. 1-24., 2017.

6. J. Brooke, "SUS: A 'Quick and Dirty' Usability Scale," in Usability Evaluation In Industry, 2020, pp. 207–212.
7. J. Brooke, "SUS : A Retrospective," J. Usabilitsssssy Stud., vol. 8, no. 2, 2013.
8. R. A. Grier, A. Bangor, P. Kortum, and S. C. Peres, "The system usability scale: Beyond standard usability testing," in Proceedings of the Human Factors and Ergonomics Society, 2013, vol. 57, no. 1, pp. 187–191.
9. R. Pushpakumar et al., "Human-Computer Interaction: Enhancing User Experience in Interactive Systems," Kufa J. Eng., vol. 14, no. 4, pp. 23–41, 2023.
10. K. Khowaja, D. Al-Thani, A. Aqle, and B. Banire, "Accessibility or Usability of the User Interfaces for Visually Impaired Users? A Comparative Study," in Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 2019, vol. 11572 LNCS, pp. 268–283.
11. H. F. Hsieh and S. E. Shannon, "Three approaches to qualitative content analysis," Qual. Health Res., vol. 15, no. 9, pp. 1277–1288, 2005.
12. H. F. Hsieh and S. E. Shannon, "Three approaches to qualitative content analysis," Qual. Health Res., vol. 15, no. 9, pp. 1277–1288, 2005.
13. L. Campanile, M. Gribaudo, M. Iacono, F. Marulli, and M. Mastroianni, "Computer network simulation with ns-3: A systematic literature review," Electron., vol. 9, no. 2, pp. 1–25, 2020.
14. Chakraborty, M. Islam, F. Shahriyar, S. Islam, H. U. Zaman, and M. Hasan, "Smart Home System: A Comprehensive Review," Journal of Electrical and Computer Engineering, vol. 2023. 2023.
15. J. Yang and W. Edwards, "A Study on Network Management Tools of Householders," rPoceedings 2010 ACM SIGCOMM Work. Home networks. ACM., vol. 82, no. 10, pp. 1–5, 2010.
16. E. Shehan and W. Edwards, "Home networking and HCI: what hath god wrought?," Proc. SIGCHI Conf. Hum. factors Comput. Syst. ACM., 2007.
17. N. U. Huda, I. Ahmed, M. Adnan, M. Ali, and F. Naeem, "Experts and intelligent systems for smart homes' Transformation to Sustainable Smart Cities: A comprehensive review," Expert Systems with Applications, vol. 238. 2024.
18. J. Yang, W. K. Edwards, and D. Haslem, "Eden: Supporting home network management through interactive visual tools," in UIST 2010 - 23rd ACM Symposium on User Interface Software and Technology, 2010, pp. 109–118.
19. S. Ibrahim, A. M. Abbas, A. M. A. Hassan, W. M. F. Abdel-Rehim, A. Emam, and S. Mohsen, "Design and Implementation of a Pilot Model for IoT Smart Home Networks," IEEE Access, vol. 11, pp. 59701–59728, 2023.
20. S. Ryu and C. W. Hur, "Monitoring system for integrated management of IoT-based home network," Int. J. Electr. Comput. Eng., vol. 6, no. 1, pp. 375–380, 2016.
21. Stolojescu-Crisan, C. Crisan, and B. P. Butunoi, "An iot-based smart home automation system," Sensors, vol. 21, no. 11, 2021.
22. M. A. Khan et al., "Smart Android Based Home Automation System Using Internet of Things (IoT)," Sustain., vol. 14, no. 17, 2022.
23. R. E. Grinter et al., "The ins and outs of home networking: The case for useful and usable domestic networking," ACM Trans. Comput. Interact., vol. 16, no. 2, pp. 1–28, 2009.
24. Nur-A-Alam, M. Ahsan, M. A. Based, J. Haider, and E. M. G. Rodrigues, "Smart monitoring and controlling of appliances using lora based iot system," Designs, vol. 5, no. 1, 2021.
25. S. J. Philip, T. (Jack) Luu, and T. Carte, "There's No place like home: Understanding users' intentions toward securing internet-of-things (IoT) smart home networks," Comput. Human Behav., vol. 139, 2023.
26. N. Gnotthivongsa, D. J. Huang, and K. N. Alinsavath, "Real-time corresponding and safety system to monitor home appliances based on the internet of things technology," Int. J. Mod. Educ. Comput. Sci., vol. 12, no. 2, pp. 1–9, 2020.
27. K. Gram-Hanssen and S. J. Darby, "'Home is where the smart is'? Evaluating smart home research and approaches against the concept of home," Energy Res. Soc. Sci., vol. 37, pp. 94–101, 2018.
28. J. Vanus et al., "Monitoring of the daily living activities in smart home care," Human-centric Comput. Inf. Sci., vol. 7, no. 1, 2017.
29. S. K. Chaudhary, S. Yousuff, N. P. Meghana, T. S. Ashwin, and R. M. R. Guddeti, "A Multi-Protocol Home Automation System Using Smart Gateway," Wirel. Pers. Commun., vol. 116, no. 3, pp. 2367–2390, 2021.
30. S. Romana, J. Grandhi, and P. R. L. Eswari, "Security Analysis of SOHO Wi-Fi routers," in Proceedings -

2020 International Conference on Software Security and Assurance, ICSSA 2020, 2020, pp. 72–77.
31. N. Nthala and I. Flechais, "Rethinking Home Network Security," 2018.
32. W. Rahman, P. T. Nguyen, M. Rusliyadi, E. Laxmi Lydia, and K. Shankar, "Network monitoring tools and techniques uses in the network traffic management system," Int. J. Recent Technol. Eng., vol. 8, no. 2 Special Issue 11, pp. 4182–4188, 2019.
33. M. Chetty, H. Kim, S. Sundaresan, S. Burnett, N. Feamster, and W. K. Edwards, "UCap: An internet data management tool for the home," in Conference on Human Factors in Computing Systems - Proceedings, 2015, vol. 2015-April, pp. 3093–3102.
34. Kortebi, P. Le Dain, and F. Dure, "Home network assistant: Towards better diagnostics and increased customer satisfaction," in Global Information Infrastructure Symposium, GIIS 2013, 2013, p. . pp 1-6.
35. S. Ahmed, H. Casakin, and G. V. Georgiev, "Sustainable design and prototyping using digital fabrication tools for education," Sustain., vol. 13, no. 3, pp. 1–17, 2021.
36. H. Habibi Gharakheili, L. Exton, V. Sivaraman, J. Matthews, and C. Russell, "Third-party customization of residential Internet sharing using SDN," in 25th International Telecommunication Networks and Applications Conference, ITNAC 2015, 2015, pp. 214–219.
37. R. Mortier et al., "Control and understanding: Owning your home network," 2012 Fourth Int. Conf. Commun. Syst. Networks (COMSNETS 2012), pp. 1–10, Jan. 2012.
38. S. Ali, M. Elgharabawy, Q. Duchaussoy, M. Mannan, and A. Youssef, "Betrayed by the Guardian: Security and Privacy Risks of Parental Control Solutions," in ACM International Conference Proceeding Series, 2020, pp. 69–83.
39. D. Shin, K. Yun, J. Kim, P. V. Astillo, J. N. Kim, and I. You, "A Security Protocol for Route Optimization in DMM-Based Smart Home IoT Networks," IEEE Access, vol. 7, pp. 142531–142550, 2019.
40. R. Mortier et al., "Homework: Putting interaction into the infrastructure," in UIST'12 - Proceedings of the 25th Annual ACM Symposium on User Interface Software and Technology, 2012, pp. 197–206.
41. B. Burhanuddin, "Analisis Kinerja Jaringan Wireless LAN Dengan Menggunakan Metide QOS," J. Teknol. Terap. Sains 4.0, vol. 1, no. 2, p. 241, Dec. 2020.
42. M. Mufadhol, G. Aryotejo, and A. Wibowo, "Netscan and networx for management bandwidth and traffic with simple routing," Telkomnika (Telecommunication Comput. Electron. Control., vol. 15, no. 1, pp. 464–470, 2017.
43. L. A. Bertsch, "Development tools for home automation," IEEE Trans. Consum. Electron., vol. 36, no. 4, pp. 854–858, 1990.
44. C. So-In, "A Survey of Network Traffic Monitoring and Analysis Tools," Cse 576-06 Comput. Syst. Anal. Proj., no. January 2006, pp. 1–24, 2009.
45. J. Pan, "A Survey of Network Simulation Tools: Current Status and Future Development," 2008.
46. P. Goyal and A. Goyal, "Comparative study of two most popular packet sniffing tools-Tcpdump and Wireshark," in Proceedings - 9th International Conference on Computational Intelligence and Communication Networks, CICN 2017, 2017, vol. 2018-Janua, pp. 77–81.
47. O. M. Nwakeze, "The Role of Network Monitoring and Analysis in Ensuring Optimal Network Performance," Int. Res. J. Mod. Eng. Technol. Sci., vol. 06, no. 06, pp. 3009–3025, 2024.
48. M. Turon, "MOTE-VIEW: A sensor network monitoring and management tool," Second IEEE Work. Embed. Networked Sensors, EmNetS-II, vol. 2005, pp. 11–18, 2005.
49. C. Eko Suharyanto, M. Ilmi, and Y. Arifin, "Implementasi Network Management Controller pada Jaringan Berbasis Unifi," Digit. Transform. Technol., vol. 4, no. 1, pp. 24–33, 2024.
50. R. S. Muhawech, "Site Survey and Analysis of the Student Barracks in the Campus Area," Luleå University of Technology, 2024.
51. T. P. Rahmadani, "Analisis Pemantauan Access Point Local Area Network dengan Menggunakan OpManager," J. Netw. Comput. Appl., pp. 11–23, 2022.
52. T. Fratczak, M. Broadbent, P. Georgopoulos, and N. Race, "HomeVisor: Adapting home network environments," in Proceedings - 2013 2nd European Workshop on Software Defined Networks, EWSDN 2013, 2013, pp. 32–37.
53. J. Sventek et al., "An information plane architecture supporting home network management," 12th IFIP/IEEE Int. Symp. Integr. Netw. Manag. (IM 2011) Work., pp. 1–8, May 2011.
54. N. Castelli, C. Ogonowski, T. Jakobi, M. Stein, G. Stevens, and V. Wulf, "What Happened in my Home ?: An End-User Development Approach for Smart Home Data Visualization," in 2017 CHI Conference on

Human Factors in Computing Systems, 2017, pp. 853–866.
55. Y. Zhong et al., "Smart home on smart phone," Proc. 13th Int. Conf. Ubiquitous Comput. - UbiComp '11, p. 467, 2011.
56. K. Xu, X. Wang, W. Wei, H. Song, and B. Mao, "Toward software defined smart home," IEEE Commun. Mag., vol. 54, no. 5, pp. 116–122, 2016.
57. S. S. Sandhu, A. Rawal, P. Kaur, and N. Gupta, "Networking in Information Communication," Comput. Commun. Appl. (ICCCA), 2012 Int. Conf. IEEE., pp. 1–6, 2012.
58. S. Lee, K. Levanti, and H. S. Kim, "Network monitoring: Present and future," Comput. Networks, vol. 65, pp. 94–98, 2014.
59. Zhu, P. Lin, and S. Cheng, "Design and Realization of Home Appliances Control System Based on the Android Smartphone," 2012 Int. Conf. Control Eng. Commun. Technol., pp. 56–59, Dec. 2012.
60. J. Froehlich, "Promoting energy efficient behaviors in the home through feedback: The role of human-computer interaction," Proc. HCIC Work., vol. 9, pp. 1–11, 2009.
61. R. Jahn, M., Jentsch, M., Prause, C. R., Pramudianto, F., Al-Akkad, A., & Reiners and M. Jentsch, "The energy aware smart home," 2010 5th Int. Conf. Futur. Inf. Technol. (FutureTech), IEEE., pp. 1–8, 2010.
62. R. Ball, G. Fink, and C. North, "Home-centric visualization of network traffic for security administration," Proc. 2004 ACM Work. Vis. data Min. Comput. Secur. ACM., pp. 55–64, 2004.
63. Ghafir, V. Prenosil, J. Svoboda, and M. Hammoudeh, "A Survey on Network Security Monitoring Systems," in 2016 IEEE 4th International Conference on Future Internet of Things and Cloud Workshops (FiCloudW), 2016, pp. 77–82.
64. C. Wilson, T. Hargreaves, and R. Hauxwell-Baldwin, "Benefits and risks of smart home technologies," Energy Policy, vol. 103, no. January, pp. 72–83, 2017.
65. Moallem, "Why should home networking be complicated?," in Advances in Usability Evaluation: Part II, CRC Press, 2013, pp. 4169–4178.
66. F. L. Verdi, H. T. De Oliveira, L. N. Sampaio, and L. A. M. Zaina, "Usability Matters: A Human-Computer Interaction Study on Network Management Tools," IEEE Trans. Netw. Serv. Manag., vol. 17, no. 3, pp. 1865–1878, 2020.