

User Experience (UX) in Eye-Tracker Applications: Obstacles, Alternatives and Examples

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Abstract. Many eye-tracker studies exclude individuals with special needs to avoid results' distortion, while few address its application design. The aim in this study was to identify key challenges in developing eye-tracker applications and explore techniques to address them. An integrative literature review was conducted across *Scopus* and *Web of Science*, analysing 26 records and evaluating 10 Tobii Dynavox games as grey literature. Results reveal device limitations, such as inaccuracy, *Midas Touch*, and eye fatigue, that must be considered in interface design. Key recommendations for implementation include: (1) *Snap Clutch* and *MAGIC* frameworks; (2) dwell times; (3) designated rest areas; (4) arrow-flanked and Messenger text-visualization; and (5) three game design paradigms. In conclusion, these methods positively contribute to eye-tracker game design and demonstrate how applications can adapt to encountered obstacles. Future works should explore the effectiveness of combining these solutions and expand the evaluation of eye-tracker games as grey literature.

Keywords: Eye-tracker, design, methods, application, digital games, multimedia, human-computer interaction.

1 Introduction

Eye-tracking devices employ sensors to detect a user's gaze position. These devices have applications across multiple domains, including scientific, psychological, and medical research [1]. A particularly valuable application lies in usability enhancement, particularly for improving accessibility for individuals with motor impairments (e.g., cerebral palsy) who face physical barriers to conventional interfaces.

Isokoski et al. [2] conducted a study demonstrating four main methods of implementing eye-tracker use in games, which may have similar concepts for other multimedia forms. The first method is unmodified implementation, using the device's basic configurations to interact with existing games. Another possibility is to use an external program in conjunction with the game and the eye-tracker. However, this solution may not meet every game's needs, as the interface may not be intuitive for gameplay. The third possibility is modifying the source code to improve device usage. Unfortunately, this is rarely applicable since most game's source code is not publicly available. The last and most complex is building a new game to maximize the device's

potential. Additionally, the work discussed the possibility of applying the device across multiple game genres.

Similarly, Compañ-Rosique et al. [3] developed a guide for creating an accessible game for users with cerebral palsy. In their work, the authors cited different methods for these people to interact with games, mentioning the use of eye-tracking devices. However, the research covered multiple input forms and a general design for these games without focusing specifically on the eye-tracker.

Novák et al. [4] conducted a systematic review about eye-tracker, usability, and user experience, in which they observed that most studies (72%) used the device to evaluate user experience and usability problems in digital products. They found few studies dedicated to design, especially for users with special needs. In fact, they verified that many studies explicitly excluded these people to avoid distortion in their results.

This systematic review was motivated by Vinicius-Filho et al.'s work [5] findings regarding the development of an educational music game for children with cerebral palsy that uses exclusively an eye-tracker for interaction. During implementation, unexpected challenges surfaced due to the absence of design guidelines addressing the device's limitations. Notably, no prior literature systematically documented the core difficulties and viable alternatives for eye-tracker-based game development—a gap that substantially hindered progress. Two key issues proved particularly disruptive: (1) the need to adjust the size and positioning of interactive elements (e.g., buttons and menus) meticulously to compensate for the device's inherent inaccuracy, and (2) the excessive cognitive demand imposed by repeated gaze-based button selections. These oversights in the initial design phase led to labour-intensive refinements later in the development process.

2 Methodology

While Novák et al. [4] conducted a comprehensive examination of eye-tracking technology through the lens of usability metrics and general user experience evaluation, the present study takes a distinctly different approach, focusing specifically on the practical aspects of application design and implementation. Rather than evaluating existing systems, this research methodically investigates the fundamental challenges developers and designers face when implementing eye-tracking interfaces. Furthermore, it analyses these implementation barriers and identifies concrete, practical solutions that can be applied across various applications. By taking this focused approach, the aim in this study was to bridge the gap between theoretical understanding and practical application in eye-tracker-based interface design. Consequently, the research addresses two key questions:

- RQ. 1 - “What are the primary challenges of eye-tracker-exclusive interfaces?”
- RQ. 2 - “What design strategies can effectively address these implementation barriers?”

To address these research questions, this study employed an Integrative Literature Review (ILR) methodology [6], which enables a comprehensive topic examination while synthesizing multiple methods for theoretical advancement. Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework [7], the review was conducted by systematically searching the *Web of Science* and *Scopus* databases using English keywords (and their synonyms) derived from the research questions. These keywords were organised into three primary categories:

1. Identification: *eye move**, *eye track**, *gaze move**, *gaze track**;
2. Techniques: *proxy*, *middleware*, *technique**, *method**, *external program*, *design*, *improve**, *optimisation*;
3. Interactions: *app**, *game*, *gami**, *multimedia*, *human-computer*.

The search strategy combined the three categories using Boolean operators (*Identification AND Techniques AND Interactions*), implemented through a systematic inclusion/exclusion protocol. Table 1 presents the full selection criteria:

Table 1. Inclusion and Exclusion Criteria. Asterisk indicates only one marked criterion is required, not both.

Inclusion Criteria	Exclusion Criteria
Exclusive use of eye-tracker for interaction.	Eye-tracker used in the context of virtual or augmented reality.
Research identified one or more difficulties with eye-tracker use*.	Methods for detecting eye input
Research demonstrated good practices for eye-tracker use*.	
Portuguese or English language.	

Importantly, no year filter was applied, as prior research observed difficulties dating back to the 1990s that persist in modern applications. For this reason, it was believed that other obstacles or attempts to circumvent them may have been detected during this period. Based on the results obtained, this was considered the correct methodological choice for a better understanding of these obstacles.

To avoid *bias*, two authors evaluated each publication individually and in isolation. The analysed publications were saved in a *Google Sheets* spreadsheet and in *Zotero* reference manager. For each publication, a summary of its content was recorded, alongside its group classification. Additionally, one of the authors examined games recommended by Tobii Dynavox [8] as grey literature to identify techniques or usage challenges within them. Tobii Dynavox is a developer that provides assistive communication devices, including eye-tracking systems. The games were tested using the Tobii Eye-tracker 5 [9], an eye-tracking device designed for individuals with conditions such as cerebral palsy, Rett syndrome, or amyotrophic lateral sclerosis (ALS) [10], in conjunction with the TD Control application [11]. The games were primarily evaluated based on the key difficulties identified in the literature analysis.

3 Results and Discussion

As referenced in the previous section, the literature search was conducted in two databases: *Scopus* (176 records) and *Web of Science* (120 records). A total of 296 records were identified, of which 110 duplicates were removed. Subsequently, 31 were excluded for off-topic content or inaccessible documents, and a further 140 were eliminated per Table 1 criteria. Among the latter, 111 studies (79.28%) focused on obtaining user feedback in applications—a dominant trend compared to other uses. This predominant quantity also coincides with findings of Novák et al.’s study [4]. Despite being the majority, Molina et al. [12] highlight the lack of established best practices for these experiments, reflecting the novelty of the documentation gap in this area.

Consistent grouping patterns were identified: two studies on eye-tracker issues, five on design implementation techniques, and nine functional programmes that use the device as input. Interestingly, two of the programmes were non-English virtual keyboards. While these patterns are not mutually exclusive, only the most predominant category was considered during evaluation of the studies. For instance, studies that stated design techniques likely commented on the device's limitations. Of Tobii Dynavox's 13 recommended games [13], two online games were blocked by the development environment's network restrictions, and one required unattainable access permissions. The last game's description notes it requires additional hardware alongside eye-tracking.

Given the paucity of publications focusing specifically on eye-tracker software development, this work analysed 12 secondary references from article citations. After excluding one off-topic reference and one alternative input method, it was found that three references contributed to design frameworks, three to examples, and four to identify difficulties. Figure 1 illustrates the article selection process.

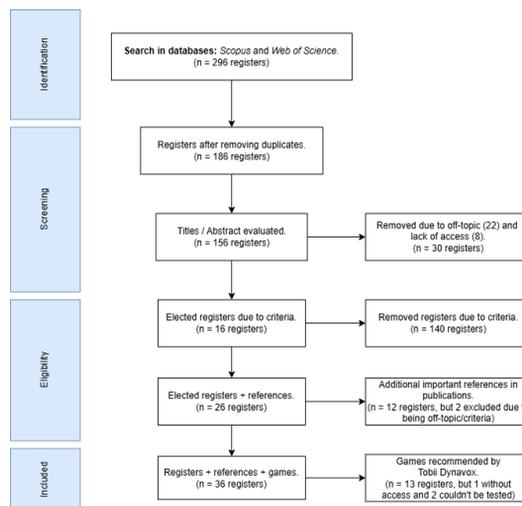


Fig. 1. PRISMA methodology diagram applied.

Figure 2 reveals a modest rise in publications around 2019, but the overall number of studies remains limited. This scarcity underscores the critical need for more comprehensive studies and standardized guidelines – particularly as digital accessibility grows in importance. The current study directly addresses this gap by tackling key implementation challenges.

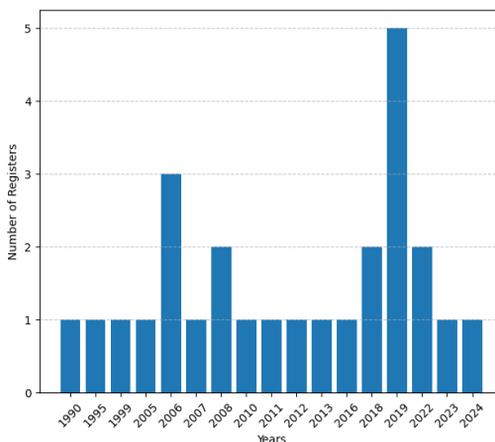


Fig. 2. Yearly distribution of valid records.

The results of this process are quantified in Table 2, which shows the distribution of studies across different categories. This provides a comprehensive overview of the current state of eye-tracker research and implementation.

Table 2. Distribution of evaluated studies by group and quantity.

Group	Number of Works
Design and implementation to eye-tracker applications.	8 (22.23%)
Eye-tracker device obstacle identification.	6 (16.67%)
Applications examples to be used with eye-tracker.	12 (33.33%)
Games recommended by Tobii Dynavox.	10 (27.77%)

The largest category consists of application examples for eye-tracker use (33.33%), followed by Tobii Dynavox recommended games (27.77%), design and implementation studies (22.23%), and obstacle identification research (16.67%). This distribution emphasises practical applications, with more than 60% of works focusing on concrete examples and games. However, the small percentage of obstacle identification studies suggests a gap in research—particularly noteworthy given the implementation challenges of eye-tracking interfaces discussed earlier. After the analysis, the research questions could be answered as follows:

3.1 What are the primary challenges of eye-tracker-exclusive interfaces?

Concerning device limitations, two studies specifically document *eye-tracker accuracy challenges*. Hyrskykari's [14] study on foreign-language reading interface highlights critical design considerations stemming from the attention-visual focus correlation. Furthermore, they identify three fundamental accuracy limitations: 1)

Device inaccuracy: Native system latency. 2) *Calibration issues*: Head movement compensation and eye characteristics such as pupil size and lighting. 3) *Biological factors*: The fovea's 1° visual arc means clear fixation occurs within $\pm 1^\circ$ of targets, which some devices fail to detect.

Jian et al.'s research on Chinese character reading [15] confronted their model's $<0.5^\circ$ precision limit by spacing elements at 1° intervals. Similar to Hyrskykari's work [14], this shows how *understanding accuracy problems allows developers to design around them*.

Also, Gowases [16], as stated by Sundstedt [17], investigated the use of an eye-tracker in the context of two different puzzle games: *Sudoku* and *Tile Slide*. Although the participants found the gaze interaction interesting, it was more susceptible to error due to a lack of player concentration, which could influence the device's accuracy.

Jacob [18] highlights the *Midas Touch* problem in gaze-based interfaces: users naturally expect passive viewing, but every fixation triggers commands. Blinking proves unsatisfactory as an alternative, as it disrupts natural interaction and causes fatigue (consistent with Špakov & Miniotas [19]). The cursor visibility dilemma further complicates design. While theoretically redundant with perfect tracking, real-world inaccuracies create a distracting feedback loop—users chase the cursor, which then relocates to their new gaze point.

The study by Donmez & Cagiltay [20] highlights a potential biological limitation: individuals with low vision. Through collaboration with special education experts, their research developed games to improve children's concentration, tracking, and visual scanning. Even in 2024, they emphasize the *persistent lack of diverse gaze-controlled games*, noting that greater variety could provide more training opportunities for these children.

In addition to publications, this study also analysed games recommended by *Tobii Dynavox* as grey literature. Notes were taken on game descriptions and the consequences of two main problems: device inaccuracy and *Midas Touch*. A column was added in the review spreadsheet for eye strain issues - a phenomenon occasionally experienced by one of the authors (L.V.F.) during prior device use and cited by Špakov & Miniotas [19]. Cases in which these difficulties didn't occur were also documented, along with hypotheses about why. The spreadsheet also included columns indicating whether games were designed for exclusive eye-tracker use and a final column for additional noteworthy observations.

A second barrier emerged in three games: drag actions required TD Control [11] mode-switching. The default cursor mode, which was used the most frequently, enabled fast clicking but couldn't drag by simulating a "hold". The alternate drag mode supported dragging but added an extra layer of interaction to every click, forcing users to either tolerate slower interactions or repeatedly switch modes.

3.2 What design strategies can effectively address these implementation barriers?

Jacob [18] describes dwell time selection as a blinking alternative, in which items are selected after continuous gaze (with customizable duration). Short-term dwells (150-250ms) are feasible for low-consequence actions since errors are easily corrected. Špakov & Miniotas [19] complement Jacob's [18] analysis of blinking methods. They developed *EyeChess* - a gaze-controlled chess programme with three piece-selection methods: (1) dwell time, (2) blinking, and (3) eye gestures. Study participants preferred dwell time, since the other two methods proved to be significantly more fatiguing.

Jacob [18] recommended using arrowed lines before and after the text to read text that doesn't fully fit in a window. The text only scrolls when the user gazes at an

arrow, which keeps the content static during reading and prevents movement distractions. Notably, while Jacob [18] proposed a text balloon design in 1995, the theme remains relevant today, as evidenced by Fatehi et al.'s [21] 2022 study on gaze-game dialogue positioning. Their work addressed a key limitation of the original design by enabling simultaneous text reading and character animation viewing - a critical requirement unmet by early implementations.

Testing with 15 participants revealed that the *Vertical* format (Figure 3) worked best for pure text reading by vertically stacking dialogue history, though it hid all animations. The *Messenger* format (Figure 4) proved more effective overall, with its direction-switching dialogues that maintained conversation history while allowing full animation viewing, making it the preferred choice [21].



Fig. 3 and 4. Speech balloon in *Vertical* and *Messenger* format, respectively. Image taken from [21].

Jacob [18] proposes a dwell-time-based menu interaction technique: gazing at a menu for 400ms opens it, while briefly viewing an item (100ms) highlights it without selection. Prolonged fixation (1s) executes the command, and looking away (600ms) closes the menu. This contrasts with Bissoli et al. [22]'s smart home interface, which offers adjustable dwell times and customizable button sizes to improve accessibility and reduce accuracy demands. Similarly, Chen & Shi [23] developed a two-stage fixation-based method for web searches using adaptive timing thresholds. In stage one, users select commands ("Select," "Cancel," etc.) with uniform 400ms dwell times (no gaze cursor displayed). Stage two applies either a heuristic where the last three viewed links before "Select" predict the target (80% accuracy), or a probabilistic model. Both methods outperformed uniform selection times, with the statistical model achieving superior speed and accuracy.

Similarly, Suryakusuma et al. [24] conducted an experiment comparing the ease of pressing moving buttons. Their results showed that slower-moving buttons were not only faster to select but also preferred by participants based on questionnaires. These recent works by Bissoli et al. [22], Chen & Shi [23], and Suryakusuma et al. [24], similarly to Fatehi et al.'s [21], continue discussions of the fundamental challenges first identified by Jacob [18].

Hyrskykari [14] compensated for eye-trackers' lower vertical accuracy in a reading assistance tool through three methods: ignoring vertical measurement drift, applying line-start vertical corrections, and manually mapping gaze points to text lines. Through these methods, Hyrskykari [14] demonstrated how understanding device limitations can inform more usable interface designs. Eye-trackers can also enable typing through virtual keyboards. Tantisatirapong & Phothisonothai [25] and Nguyen et al. [26] developed predictive text keyboards for Thai and Vietnamese, respectively. Nguyen et al. [26] proposed two layouts for Amyotrophic Lateral Sclerosis (ALS) users: (1) an *Extension Layout* with small buttons for users with precise eye control, and (2) a *Suggestive Layout* with larger buttons across two pages for those with limited accuracy. Both designs are adaptable to other languages.

For games, Ramirez Gomes & Lankes [27] established three primary gaze interaction design paradigms: **Social Gaze**, in which gaze indicates attentional cues (e.g., looking at characters to signal interaction intent); **Gaze Power**, granting players gaze-exclusive control; and **Gaze Hurdles**, which penalizes players for looking at specific elements and challenges players to use vision in non-traditional ways. These approaches demonstrate how gaze mechanics can be strategically varied to mitigate interface challenges.

The design proposed by Ramirez Gomes & Lankes [27] can be compared to earlier works such as Smith & Graham [28], which explored eye-tracker use across three game genres: a First-Person Shooter (FPS), an avatar-based Role-Playing Game (RPG), and an arcade/action game. In the FPS, players could gaze at objects to center them on-screen while using keyboard movement – exemplifying *Social Gaze* concept [27]. The other two games implemented *Gaze Power*, using eye-tracked cursors with click input.

Regarding the *Midas Touch* problem, Istance et al. [29] developed **Snap Clutch**, a universal approach to mitigate this issue across applications. Vickers et al. [30] developed *EyeGuitar*, a game which applied and evaluated the technique with a participant who had motor impairments and reported positive results. This method employs different eye-tracker cursor modes that can switch between each other. To toggle modes, users gaze in one of four directions (up, down, left, or right). The interaction modes are: 1) *Eye Control Off*: A mode that allows the user to interact with menus relaxedly without actively controlling the mouse. 2) *Dwell Click*: A mode where the program simulates a click at the point where the player fixes their gaze. 3) *Park Here*: A mode where the cursor can be left idle, allowing the user to explore freely. When they press a location, the action is triggered at the cursor’s current position. 4) *Drag From Here*: Functions similarly to Park Here, but after leaving the cursor idle, the player’s gaze determines the dragging direction. This mode aligns well with the dragging difficulties observed in the grey literature review.

Another method to simplify eye-tracker implementation is the **Manual And Gaze Input Cascade (MAGIC)** developed by Zhai et al. [31] and exemplified by Nacke et al. [32]. This technique expands the cursor's active area from a single pixel to a defined zone, automatically attracting the cursor when targets appear within it. Testing showed clear reductions in user fatigue, with a preference for the *Liberal* mode.

Analysis of 10 Tobii Dynavox-recommended games revealed a link between *Midas Touch* and increased eye fatigue. Games with densely packed interactive elements (n=2) limited visual rest, while those with designated rest areas (n=8) offered greater comfort—demonstrating a pronounced *Midas Touch* effect that could be related with fatigue. Additionally, games with larger interactive objects reduced fatigue by lowering selection effort, aligning with Bissoli et al. [22] on customisable button sizes. One game required name entry via a dialog box auto-confirmed by any click the sole instance where names were accidentally omitted. Others replaced mandatory dragging with click-based actions, enhancing dynamism by avoiding mode-switching [11] or slow clicks. Table 4 summarises the identified obstacles, solutions, and supporting literature.

Table 4. Main obstacles of eye-tracker use identified, their alternatives and related authors.

Area	Alternatives	Authors
<i>Midas Touch</i> problem.	<i>Snap Clutch</i> , dwell time (uniform, dynamic or customized), and avoidance of interactables on the whole screen.	[18, 19, 22, 23, 29, 30].
Eye-tracker’s inaccuracy.	<i>MAGIC</i> , prediction algorithms, increase of	[14 – 17, 22 – 24,

		interactables' collision, better objects' separation, and buttons with little movement. Inaccuracy is stronger vertically than horizontally.	31, 32].
Fatigue / dynamicity.	Not	Position to rest the eyes and avoidance of eye gestures, blinking, and drag mechanics by holding a click. For assistive virtual keyboards, the development of the user's corresponding language with a prediction algorithm using <i>Extension</i> or <i>Suggested</i> layout.	[18, 19, 25, 26, 29] and our grey literature analysis.
People (children) with low vision.	with	Improvement of concentration, tracking, and visual scanning through games.	[20].
Speech Balloons.		Use of arrow-flanked text windows and the <i>Vertical</i> and <i>Messenger</i> formats.	[18, 21].
Game Design Paradigms.		Use of <i>Social Gaze</i> , <i>Gaze Hurdles</i> , and <i>Gaze Power</i> .	[21, 27, 28].

4 Limitations

This research was limited to the *Web of Science* and *Scopus* databases. Although the grey literature analysis was conducted by a single author, the use of objective, research-driven questions, except for the 'Other observations' field, helped mitigate potential bias. Despite these limitations, the results were satisfactory: both research questions were answered with concrete examples, and the work successfully complemented the design-focused perspective of Novák et al.'s [4] systematic review.

5 Conclusions

From the analysis of 26 publications, it was possible to identify key challenges in eye-tracker systems: (1) inaccuracy (more severe vertically), influenced by calibration, hardware, and user factors; (2) *Midas Touch* problem from unintended gaze activations; and (3) eye fatigue. While promising for interaction, these findings show eye-tracking requires thoughtful and planned design to overcome its inherent technical and physiological limitations.

The findings show that understanding the eye-tracker's limitations can improve application planning, such as adapting to its inherent imprecision. Although research dates to 1995, recurring challenges continue to guide current studies. The limited number of records also suggests that eye-tracker interaction design remains underexplored, especially compared to its use in application feedback.

This study advances the field by synthesising various design approaches and evaluating 10 Tobii Dynavox's recommended games. Current methods for holding and dragging objects lack dynamism, requiring mode switching in TD Control or compromising efficiency. This limitation likely contributes to eye fatigue and *Midas Touch* issues, especially given the absence of designated gaze rest areas.

This study identified key recommendations for designing eye-tracker interfaces:

1. Use the *Snap Clutch* and *MAGIC* frameworks.
2. Implement constant *dwell times* or adaptations that adjust based on user behaviour and context. Blinking and eye gestures are more exhausting in comparison.

3. Include designated rest areas to reduce eye fatigue and mitigate Midas Touch issues.
4. Use the arrow-flanked method for stable text reading and the *Messenger* visualization for dynamic game dialogues.
5. Apply *Social Gaze*, *Gaze Hurdles* and *Gaze Power* in game areas.

These recommendations enable the creation of interfaces that balance functionality with user comfort while addressing the three core challenges: inaccuracy, *Midas Touch*, and eye fatigue. Future studies can complement the research findings and investigate the relationship between the *Midas Touch*, drag mechanics, and eye fatigue. Additionally, they can analyse more game examples as grey literature to identify further potential obstacles in implementing an eye-tracker-based game, incorporating a larger number of users to mitigate analysis *bias*. Also, they can validate the findings with user testing on current eye-gazed applications. Lastly, they can explore the effectiveness of combining these design elements in games to better understand how effective these methods are and whether they can be integrated without compromising their advantages.

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References

1. Punde, P. A., Jadhav, M. E., & Manza, R. R. (2017, October). A study of eye-tracking technology and its applications. In 2017 1st International Conference on Intelligent Systems and Information Management (ICISIM) (pp. 86-90). IEEE. <https://doi.org/10.1109/ICISIM.2017.8122153>.
2. Isokoski, P., Joos, M., Spakov, O., & Martin, B. (2009). Gaze controlled games. *Universal Access in the Information Society*, 8, 323-337. <https://doi.org/10.1007/s10209-009-0146-3>
3. Compañ-Rosique, P., Molina-Carmona, R., Gallego-Durán, F., Satorre-Cuerda, R., Villagrà-Arnedo, C., & Llorens-Largo, F. (2019). A guide for making video games accessible to users with cerebral palsy. *Universal Access in the Information Society*, 18, 565-581. <https://doi.org/10.1007/s10209-019-00679-6>.
4. Novák, J. Š., Masner, J., Benda, P., Šimek, P., & Merunka, V. (2024). Eye-tracking, Usability, and User Experience: A Systematic Review. *International Journal of Human-Computer Interaction*. doi: 10.1080/10447318.2023.2221600.
5. Vinicius-Filho, L., Tymoshchuk, O., Oliveira, R., Moreno, D., Oliveira, L. (2025, in press). Play with Music: Developing an Inclusive Digital Music Game for Children with Cerebral Palsy. In World Conference on Qualitative Research. Cham: Springer Nature Switzerland.
6. Libraries, A. U. (2025, January 02). LibGuides: Systematic Reviews/Evidence Synthesis: Integrative Reviews. Retrieved from https://libguides.adelphi.edu/Systematic_Reviews/integrative-review.
7. Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ...Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*, 372, n71. doi: 10.1136/bmj.n71.
8. Tobii Dynavox Global. (2025a). Tobii Dynavox Global. Retrieved from <https://www.tobiidynavox.com>.

9. Tobii Eye-tracker 5 | Next Generation of Head and Eye-tracking. (2025). Retrieved from <https://gaming.tobii.com/product/eye-tracker-5>.
10. Tobii Dynavox US. (2025). TD I-Series | eye-tracking-enabled SGD | world's #1 eye-tracker. Retrieved from <https://us.tobiidynavox.com/pages/td-i-series>.
11. Tobii Dynavox Global. (2025b). TD Control. Retrieved from <https://www.tobiidynavox.com/products/td-control>.
12. Molina, A. I., Arroyo, Y., Lacave, C., Redondo, M. A., Bravo, C., & Ortega, M. (2024). Eye-tracking-based evaluation of accessible and usable interactive systems: tool set of guidelines and methodological issues. *Universal Access in the Information Society*, 1-24. <https://doi.org/10.1007/s10209-023-01083-x>.
13. Tobii Dynavox Global. (2025c). Accessible games. Retrieved from https://www.tobiidynavox.com/collections/games/eye-control+eye-control?sort_by=manual.
14. Hyrskykari, A. (2006). Utilizing eye movements: Overcoming inaccuracy while tracking the focus of attention during reading. *Computers in human behavior*, 22(4), 657-671. <https://doi.org/10.1016/j.chb.2005.12.013>.
15. Jian, Y. C., Chen, M. L., & Ko, H. W. (2013). Context Effects in Processing of Chinese Academic Words: An Eye-Tracking Investigation. *Reading Research Quarterly*, 48(4), 403-413. <https://doi.org/10.1002/rrq.56>.
16. Gowases, T. (2007). Gaze vs. Mouse: An evaluation of user experience and planning in problem solving games. Master's thesis. University of Joensuu, Finland.
17. Sundstedt, V. (2012). Gazing at games: An introduction to eye-tracking control (Vol. 14). Morgan & Claypool Publishers. <https://doi.org/10.1007/978-3-031-79552-7>
18. Jacob, R. J. (1995). Eye-tracking in advanced interface design. *Virtual environments and advanced interface design*, 258(288), 2. <https://doi.org/10.1093/oso/9780195075557.003.0015>.
19. Špakov, O., & Miniotas, D. (2005, August). EyeChess: A tutorial for endgames with gaze-controlled pieces. In *European Conference on Eye Movements* (pp. 14-18).
20. Donmez, M., & Cagiltay, K. (2024). Eye training games for children with low vision. *Educational Technology & Society*, 27(4), 406-416.
21. Fatehi, B., Harteveld, C., & Holmgård, C. (2022, June). Guiding Game Design Decisions via Eye-Tracking: An Indie Game Case Study. In *2022 Symposium on Eye-tracking Research and Applications* (pp. 1-7). <https://doi.org/10.1145/3517031.3529613>.
22. Bissoli, A., Lavino-Junior, D., Sime, M., Encarnaçao, L., & Bastos-Filho, T. (2019). A human-machine interface based on eye-tracking for controlling and monitoring a smart home using the internet of things. *Sensors*, 19(4), 859. <https://doi.org/10.3390/s19040859>.
23. Chen, Z., & Shi, B. E. (2019). Using variable dwell time to accelerate gaze-based web browsing with two-step selection. *International Journal of Human-Computer Interaction*, 35(3), 240-255. <https://doi.org/10.1080/10447318.2018.1452351>.
24. Suryakusuma, D. A., Wicaksono, A., Hartanto, R., & Wibirama, S. (2022, September). Implementing design thinking in the development of digital signage user interface for public health education. In *2022 8th International Conference on Science and Technology (ICST)* (Vol. 1, pp. 1-6). IEEE. <https://doi.org/10.1109/ICST56971.2022.10136306>.
25. Tantisatirapong, S., & Phothisonothai, M. (2018, September). Design of user-friendly virtual thai keyboard based on eye-tracking controlled system. In *2018 18th International Symposium on Communications and Information Technologies (ISCIT)* (pp. 359-362). IEEE. <https://doi.org/10.1109/ISCIT.2018.8587965>.
26. Nguyen, M. H., Ngo, T. D., Hung, N. B., Mao, C. V., Kieu, H. D., & Le, T. H. (2023). On-screen keyboard controlled by gaze for Vietnamese people with amyotrophic lateral sclerosis. *Technology and Disability*, 35(1), 53-65. <https://doi.org/10.3233/TAD-220391>.
27. Ramirez Gomez, A., & Lankes, M. (2019). Towards designing diegetic gaze in games: The use of gaze roles and metaphors. *Multimodal Technologies and Interaction*, 3(4), 65. <https://doi.org/10.3390/mti3040065>.
28. Smith, J. D., & Graham, T. N. (2006, June). Use of eye movements for video game control. In *Proceedings of the 2006 ACM SIGCHI international conference on Advances in computer entertainment technology* (pp. 20-es). <https://doi.org/10.1145/1178823.1178847>.
29. Istance, H., Bates, R., Hyrskykari, A., & Vickers, S. (2008, March). Snap clutch, a moded approach to solving the Midas touch problem. In *Proceedings of the 2008 symposium on Eye-tracking research & applications* (pp. 221-228). <https://doi.org/10.1145/1344471.1344523>.

30. Vickers, S., Istance, H., & Smalley, M. (2010). EyeGuitar: making rhythm based music video games accessible using only eye movements. ACM Other conferences. Association for Computing Machinery. doi: 10.1145/1971630.1971641.
31. Zhai, S., Morimoto, C., & Ihde, S. (1999, May). Manual and gaze input cascaded (MAGIC) pointing. In Proceedings of the SIGCHI conference on Human factors in computing systems (pp. 246-253). <https://doi.org/10.1145/302979.303053>.
32. Nacke, L. E., Stellmach, S., Sasse, D., Niesenhaus, J., & Dachsel, R. (2011). LAIF: A logging and interaction framework for gaze-based interfaces in virtual entertainment environments. *Entertainment Computing*, 2(4), 265-273. <https://doi.org/10.1016/j.entcom.2010.09.004>.