

Consent Eyes: Using Augmented Reality to Make Consent to Sex Accessible for Speech-Impaired Partners

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Abstract

Consent technologies have been proposed in HCI as tools for helping people ask for, give, and deny consent to interpersonal behavior. However, most designs remain speculative, leaving open questions about the usability and accessibility challenges that emerge when such systems become functional technologies. These questions are especially important for people with disabilities that affect verbal communication, including deaf, hard of hearing, and neurodivergent people, who face elevated risks of sexual violence. We introduce the concept of Consent Errors: latent accessibility challenges to consent technology that were elucidated through Research through Design of Consent Eyes, an augmented reality (AR) platform created by and for neurodivergent stakeholders to support visual communication of sexual consent. We describe three Consent Errors: misidentifying the object of consent, inaccurately detecting consent status, and conveying consent cues outside a partner's field of vision.

CCS Concepts

• **Human-centered computing** → HCI theory, concepts and models; Accessibility.

Keywords

Consent; Sexual Violence; Augmented Reality; Consent Technology; Neurodivergence; Speech Impairment; Accessibility

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1 Introduction

Consent (or agreement) to sex is central to how sexual violence is defined, recognized, and contested [4, 8, 12]. While many cases of sexual violence are intentionally committed by perpetrators, prior research in social science also shows that unwanted sexual experiences can happen without conscious intention to cause harm due to failures of communication and interpretation of consent [21, 22, 26]. This has motivated HCI research [14, 20, 23, 24, 27, 31, 32, 36–39] and commercial interest [15] in *consent technologies* that support how consent to interpersonal behavior is asked for, given, and denied so as to mitigate sexual harm stemming from misunderstanding of consent. Within HCI, researchers have proposed a range of consent technologies including AI-driven tools integrated into dating apps [16], social media platform features [23], social robots [32], and AR/VR systems [19, 37].

With rare exceptions [10], most consent technology designs remain conceptual or speculative in the form of low-fidelity sketches or text-based design guidelines. While these designs may be compelling in premise, early failed attempts at commercialized sexual "consent apps" serve as cautionary tales for how technical development of functional consent technologies can elucidate underlying usability challenges that can inadvertently harm users. For instance, mobile consent apps such as LegalFling, We-Consent, and Good2Go proliferated in the market almost a decade ago, promising to reduce misinterpretation of agreement to sex by having sexual partners record consent with a "checkbox" in the app. In practice, this design pattern made it far more difficult for a partner to *revoke* consent to sex if they became uncomfortable (i.e., they would have to open the app during sex, if the app supported changing their decision at all) [15, 27, 37]. Such apps have largely been removed from app stores as a result.

In this poster paper, we put an emphasis on *accessibility* challenges of consent technology for people with disabilities, particularly those with physical and/or neurological challenges to verbal speech, including individuals who are deaf, hard of hearing, and neurodivergent. People with such disabilities are at elevated risk of sexual violence [11, 25, 29], in part due to communicative challenges around consent [25]. They have also been historically excluded from "best practice" guidance for sexual consent exchange; namely, affirmative consent [23, 37], which teaches a verbal "yes means yes" mode of consent expression (and is thus literally impractical for people with limited or nonexistent verbal capacity).



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While consent technology in an abstract sense could benefit these user populations, only the technical development of functional consent technologies may reveal inadvertent accessibility challenges associated with their use.

We present insights on accessibility challenges to consent technology through the development of Consent Eyes, an augmented reality (AR)-based platform created by and for neurodivergent stakeholders for exchanging consent to bodily touch through visual (as opposed to verbal) communication. We used Research through Design (RtD) [3, 35] documentation over a 10-week development period for Consent Eyes to answer our **research question: *What are the accessibility challenges to augmented reality-mediated consent to sex?***

Our main finding and contribution to the literature is the concept of *Consent Errors*: accessibility failures in consent technology functionality that contribute to mistakes in the device's detection and conveyance of consent information. Through the development of Consent Eyes, we identified and sought to address three consent errors: incorrect identification of the "object" of consent (i.e., which body part a partner is asking consent to touch), inaccurate consent status (i.e., agreement to bodily touch being mistakenly triggered on the device), and unrecognized consent information (i.e., a visual cue of consent outside of a partner's field of vision).

2 Background

2.1 Computer-Mediated Consent and Consent Technologies

HCI research has examined how technologies shape sexual consent across online dating, social VR, social media platforms, and physical intimacy [19, 23, 31, 37, 38]. Prior work shows that online platforms can unintentionally confuse users about a partner's willingness to have sex [38], while other research has explored how technology might intentionally support asking for, giving, denying, and revoking consent [14, 20, 23, 24, 27, 31, 32, 36–38]. Much of this work draws on affirmative consent, though this model has been critiqued as being hard to implement in technology [9]. More recent work therefore calls for new consent models better suited to computer-mediated interaction [9, 40]. One such model is Aissa and Zytke's Spatial Consent, an AR/VR-oriented model that visualizes consent to personal space and bodily touch [1]. Their work uses trauma-informed design fiction to imagine how people and technologies might participate in consent exchange. However, most consent technologies in HCI remain conceptual or speculative rather than functional research artifacts. A rare exception is Burger and Zytke's Consent Rings, a pair of haptic Bluetooth rings designed to support nonverbal consent exchange for neurodivergent partners [10]. In their system, button presses initiate, confirm, reconfirm, or revoke consent through shared vibration patterns that fade over time unless actively renewed.

2.2 Disability and Computer-Mediated Communication

In recent research, the affirmative consent model has been critiqued for various reasons. On the disability side, this model assumes an unmediated, two-person exchange, where each person directly

gives and interprets consent through their own faculties. This assumption breaks down for neurodivergent people and people with speech, hearing, or communication-related disabilities. Neurodivergent people, for example, may face barriers in verbal and nonverbal communication, interpreting social cues, or managing overstimulation during in-person interaction [30]. Additionally, people who are deaf or hard of hearing rely on nonverbal modes of communication to express their consent, which may increase the risk of inaccurate interpretation and sexual harm [25]. This focus on people with disabilities is especially needed, since they are at elevated risk of unwanted sexual experiences [29].

3 Methodology

3.1 Positionality Statement

Consent Eyes was built by and for neurodivergent stakeholders. The project emerged from the Computer-Mediated Consent Coalition, curated by the last author, which brings together neurodivergent advisors, consent experts, and other stakeholders. The development team comprised five coalition members, including three primary user-stakeholders who identify as neurodivergent and one secondary stakeholder whose parent experiences neurological challenges following a brain aneurysm. We treat the team's lived and relational expertise as a critical standpoint for identifying accessibility issues that may be overlooked when consent technologies are designed.

3.2 Developing Consent Eyes

Consent Eyes draws on *Spatial Consent*, a speculative computer-mediated consent model from our lab that imagines AR/VR systems using visual spatial indicators, such as proximity cues and body overlays, to make consent information visible between partners [1]. The prototype was implemented using XREAL Air 2 Ultra glasses [13], the Beam Pro phone (as the controller and computing device), Unity, the XREAL SDK [33], and a Node.js server hosted on AWS EC2 to connect the two devices. We intentionally kept the prototype scoped to a two-person interaction, rather than implementing the full range of public, multi-person, or proxemic features imagined in Spatial Consent, and we simplified some features to make the prototype usable and testable within the project timeline. In our prototype, we explored features such as traffic-light consent state indicators, body overlays, and safewords for rapid consent revocation to examine how AR-mediated consent might work in embodied intimate interaction. The traffic-light color system was implemented because of its wide recognizability, allowing an easy mapping between color meanings and consent state and eliminating the need for users to learn an unfamiliar color coding system.

3.3 Research through Design Documentation and Analysis

Our Research through Design (RtD) [3] process to develop Consent Eyes took place over 10 weeks and produced a research record consisting of weekly meeting notes, development logs, prototype sketches, and scenario-based tests. The process included 5 iterations. Each included revised requirement definitions, evaluation (internal testing), and reflection notes. We used the Spatial Consent

design fiction [1] as a scenario frame for reflecting on prototype use, and the team tested consent exchanges through low-risk bodily interaction examples such as hand-holding or fist-bumping. Across iterations, the prototype changed from a simple "traffic lights" system per the Spatial Consent model (prototype #1) to a more refined version with more features related to the phone interface that accompanies the AR headset (prototype #5), including switching from sliders to buttons on the controller and modifying the color indicators to flash every time a consent change happens to catch the attention of users. The RtD materials documented technical implementation decisions, design decisions, technical and accessibility breakdowns, and reflective observations about accessibility, safety, and usability. We used thematic analysis [6, 7] to analyze the documented prototype breakdowns, design and technical failures, and moments of consent-related confusion in the materials in order to identify the recurring accessibility errors across the prototype's five iterations.

3.4 Demonstrating Consent Eyes

Imagine Alex and Sam are wearing the Consent Eyes prototype during an in-person interaction. Before the interaction begins, both partners set a safeword in the system. By default, both users' consent indicators appear gray, indicating the neutral state. Alex wants to hold Sam's hand. To ask, Alex changes their consent state to blue and either says the request aloud or sends it through the built-in text feature. Sam sees Alex's request in the AR display through the "Them" indicator. Sam then responds through the phone interface by choosing green, yellow, or red. If Sam chooses to consent, their consent indicator turns green. Alex must also switch to green before touching Sam's hand, confirming that both partners' consent states match. If Sam chooses yellow—the color for caution/proceed slowly—Alex must match yellow and proceed to hold Sam's hand with caution.



(a) Point of view of the Consent Eyes user when wearing the AR glasses



(b) Accompanying smartphone controller interface for inputting consent decisions

Figure 1: Interfaces of the Consent Eyes prototype

If Sam chooses red, Alex must match red and not hold Sam's hand. Consent remains visible throughout the interaction, and Sam can change their state at any time. Either partner can also activate the safeword button, if they feel uncomfortable, to immediately stop the interaction. Unlike simply changing to red—which is an answer to a request and denies a requested action—the safeword is used for an urgent stop. After the interaction, either partner can open the aftercare panel, which summarizes consent-state changes and safeword use to support reflection and check-in.

4 Findings

We use the term Consent Errors to mean accessibility failures in the functionality of consent technology that make consent harder for disabled users to express, perceive, interpret, or act on. Consent Errors may originate in technical development problems, but they are accessibility issues when they require disabled users to compensate through inaccessible means of communication, such as rapid verbal dialogue for neurodivergent, speech-impaired, or hard-of-hearing users. See Table 1 for a summary of the three Consent Errors we found in our prototype.

4.1 Consent Error 1: Incorrect Identification of the "Object" of Consent

A central challenge in AR-mediated consent is that consent is not given in the abstract; it is given in relation to a specific bodily action, body part, or form of touch. For Consent Eyes, this means the system needs to always correctly identify the "object" of consent, such as when a user asks to touch a partner's hand, waist, or another body part. Our development process showed that this seemingly simple requirement introduced significant accessibility and usability challenges. Because Consent Eyes relies on visual recognition and spatial alignment, the system may incorrectly infer which body part is being referenced. A user's selection gesture may be ambiguous, a partner's body may be partially covered or obstructed, or the AR display may highlight a nearby but unintended body region. In intimate interactions, a high-stakes interaction context in which bodies are close together and movement is continuous, even minor errors can substantially change the meaning of a consent request, which may confuse users or convey inaccurate consent information. The system's misidentification of the consent object creates an accessibility barrier for users who rely on nonverbal or visual communication. If the object of consent is misidentified, users may not have an *accessible* way to quickly clarify, correct, or refuse the request.

To address this, rather than implementing a full-body overlay, we narrowed the scope of body-part recognition, focused only on a hand overlay, and replaced more complex proximity rings with a simpler traffic-light consent state indicator. This design choice reduced the risk of object-identification errors temporarily. More broadly, designers of consent technology have to make the object of consent explicit, visible, and correctable before any consent response is recorded or conveyed. This may require designing for *intentional friction*, such as confirmation steps, clear visual highlighting, and accessible mechanisms for correcting the system when it identifies the wrong object of consent.

4.2 Consent Error 2: Inaccurate Consent Status

Technology-specific bugs such as lag, loss of connection and synchronization failure can cause significant accessibility issues for neurodivergent and speech-impaired users. In our Consent Eyes prototype, we noticed that sometimes the system could display an inaccurate consent status/state (e.g., still showing a "yes" consent state when the consent decision had already changed). This was due to the prototype relying on a server to enable communication between two users' devices. At times, one device would connect to the server, but not be detectable by the other user's AR glasses.

Table 1: Consent Errors and Temporary Solutions

Error	Description	Barrier	Temporary Solution
Incorrect identification of consent object	Consent Eyes misidentifies the body part that the user is requesting consent to touch.	User has to engage in verbal dialogue to correct the object of consent.	Reduced functionality preferred over error-prone functionality.
Inaccurate consent status	Consent agreement, denial, or revocation is mistakenly triggered or not triggered on the device.	User has to engage in rapid verbal or physical intervention to clarify consent.	Rapid ejectability functionality.
Undecipherable consent information	Consent information is communicated in a visual form outside the user's field of vision, or in an uninterpretable form.	User has to proactively stop the interaction to seek clarification with their partner.	Omnipresent consent information overlaid on AR glasses.

In situations like this, when the technology malfunctions, the system could not reliably guarantee that both users were seeing the same consent information. This may misrepresent a person's boundaries or intentions and leave users uncertain about whether their consent is still valid. While this may look like a general usability issue, we consider it an accessibility issue because it is disproportionately harmful for neurodivergent and nonspeaking users as it forces them to rapidly intervene verbally or physically to clarify consent. To patch this issue in the prototype, we added two always-visible connectivity indicators/icons in the top-right corner of the display (Figure ??): one showing the user's connection status to the server, and another showing the other party's. These indicators made technology failure more visible, and they would allow users to recognize when the system was malfunctioning and temporarily stop the interaction or switch to another mode of consent exchange. We also considered the need for rapid ejectability: a low-friction mechanism through which users could immediately exit, pause, or invalidate the current consent state when the system appeared to display inaccurate information.

4.3 Consent Error 3: Undecipherable Consent Information

In AR-mediated consent technology, information may be technically present in the system but inaccessible to users if it (1) appears outside a user's field of vision, (2) is visually unclear, or (3) relies on visual cues—such as color, contrast, or saturation—that some users cannot reliably perceive. Research shows that some neurodivergent individuals, particularly autistic and ADHD individuals, experience atypical color perception, color preferences, or visual sensory sensitivity [2, 5, 28, 34]. In this case, the system's reliance on specific colors (traffic-light colors) or on colors alone creates an accessibility barrier because users may not understand this consent information. This also affects colorblind users, users with low vision, and users in visually complex environments.

Consent Eyes uses gray for neutral, blue for asking for consent, green for yes, yellow for caution or slow down, and red for no. If a user cannot distinguish between consent states, then the system risks making consent illegible, even when the consent state is accurate. To address this, we added redundant visual cues, pairing colors with symbols. Red, yellow, green, blue, and gray are respectively paired with an X symbol, an exclamation mark symbol, a check symbol, a question mark symbol, and a dash symbol. We also maintained a consistent spatial ordering of colors on the controller interface, following the familiar traffic-light color sequence [18]. These choices were intended to make consent states recognizable through multiple visual channels rather than color alone. We also allowed the users to customize the colors (change either the opacity or the color altogether) to accommodate color sensitivities.

Lastly, consent information should not appear only in a location that users may easily miss during embodied interaction. For this reason, Consent Eyes moved toward omnipresent AR overlays that keep consent information visible within the user's field of view.

5 Discussion and Conclusion

This work contributes to HCI research on consent technologies by foregrounding disability as a central concern in technology-mediated consent. While prior work has explored how systems might support consent exchange [14, 17, 20, 23, 24, 27, 31, 32, 36–38], less attention has been paid to how these systems may create accessibility barriers for users who cannot rely on verbal speech or rapid embodied communication. Through the development of Consent Eyes, we show that accessibility directly shapes whether consent information can be accurately expressed and interpreted.

Our primary contribution is the concept of *Consent Errors*: accessibility failures in consent technology functionality that distort how consent is detected or conveyed. These consent errors force users with physical and/or neurological challenges with verbal speech to resort to forms of communication that may be inaccessible to them. Our findings show that consent technologies require functional development and usability assessment to reveal accessibility challenges that would be difficult to identify through abstract design guidelines alone. Without such assessment, consent technologies risk reproducing or worsening the communication breakdowns they aim to prevent.

Consent Eyes raises important ethical concerns in consent technology about how displayed consent information may be interpreted and used in intimate interactions. Consent apps show that consent technology can be misused as proof of consent [15]. For this reason, Consent Eyes' consent states should be treated as a mediated representation of a person's current intention. That intention may change at any time because consent is ongoing, reversible, and context-dependent. Moreover, the consent errors also shine more light on how technological failures can distort consent information, and a displayed color may create false confidence or mislead users about whether consent is actually valid. This suggests a need for consent technology to be designed to support more than one consent model, or rules around how consent should be given, received, and denied.

Our work is limited by the scope of our prototype and stakeholder representation. Consent Eyes was developed for neurodivergent users and users with verbal communication barriers. Future work should expand representation across other forms of disability and should conduct usability evaluations with disabled users to validate accessibility.

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