

Arca

Current smart home cameras understandably prioritize the needs of a primary owner, and yet can impact the privacy of tenants, workers, or even bystanders in proximity to the camera. Arca is a smart camera designed to bridge this gap by both expanding the functionality of the camera with privacy-oriented modes, and foster trust between owners and co-users through camera design and multiple access levels.

What is the Problem?

The widespread availability of affordable, small-scale cameras and microphones has proliferated into many aspects of daily life. From capturing a photo of an interesting storefront to using dashcam footage as evidence after a road incident, these devices serve various purposes from casual convenience to personal safety. However, when surveillance extends into places with an expectation of privacy, smart cameras may infringe on the privacy of others. Unlike dashcams, which operate in regulated public spaces, cameras such as in smart home systems often face complex social situations in private settings that they are not designed for.

Cameras are primarily designed to serve the interests of the camera owner. This is understandable, but even without malicious intent, the presence of these cameras can sow distrust and resentment from bystanders and co-users of the space without camera access. In a residential home, this could be an AirBNB tenant, a friend pet-sitting during a vacation, or even neighbors visible through windows. This issue is exacerbated by the lack of features in current smart home cameras to address this power imbalance. It can be difficult to determine if a camera is recording, if a microphone is active, or what a small LED indicator means. While the technology for smart sensing has progressed by leaps and bounds, there is work to be done in designing that technology to address the complex ethical situations involved in at-home surveillance.

What is the Solution?

Arca is a design concept for an inclusive, privacy-focused smart camera designed to address privacy concerns for camera owners, co-users, indirect users, and bystanders. It incorporates four core features to enhance user experience and privacy, giving Arca the flexibility to adapt to fit complex social and ethical situations.

The first set of features involves the app design and flexible access controls. The control panel encourages the use of various privacy settings, designed to give the owner a full understanding of the capabilities of their camera. Sharing of app access is also broadened into several levels of status, ranging from temporary guest access to full co-owner status; allowing co-users of a space to join in monitoring the system, even to a small degree, can avoid mistrust growing between owners and co-users.

Technology ID

BDP 8920

Category

Device/Other

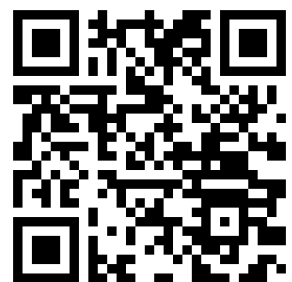
Hardware/Electronics

Selection of Available
Technologies

Authors

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The second set of features focuses on the camera design. Arca introduces partial privacy and strong privacy modes to fill the gap between "fully on" and "fully off"; these modes can blur the video feed, muffle the microphone, or fully block them while remaining sensitive to events like a package at the door. Additionally, the camera's status is clearly indicated through a colored circle, auditory updates, and a physical plastic shutter. This triple redundancy ensures that co-users can easily understand the camera's status even without direct access, and more easily trust the owner of the camera.

What is the Competitive Advantage?

- User-Centric Design: Arca's design prioritizes the needs of all users, including camera owners, co-users, and bystanders. By addressing the "horizontal privacy" concerns between the owner and their peers, Arca serves as a new model for handling smart sensing of private settings.
- Enhanced Privacy Controls: Arca's innovative privacy modes, including partial and strong privacy settings, allow users to blur video feeds, muffle microphones, or fully block them while still detecting important events. This flexibility addresses privacy concerns more effectively than traditional all-or-nothing surveillance options.
- Clear Status Indicators: The triple-redundant indicators, including a colored circle, auditory updates, and a physical plastic shutter, provide clear and immediate feedback on the camera's status. This transparency helps co-users and bystanders understand when the camera is active, fostering trust and reducing privacy concerns.
- Flexible Access Management: The app's user-friendly control panel allows for easy sharing of access levels, from temporary guest access to full co-owner status. This granular control helps balance security needs with respect for privacy, making it easier for homeowners to manage who can view or control the camera, while also allowing their co-users to participate in the process.

References

1. James Pierce, Claire Weizenegger, Parag Nandi, Isha Agarwal, Gwenna Gram, Jade Hurtle, Hannah Liao, Betty Lo, Aaron Park, Aivy Phan, Mark Shumskiy, Grace Sturlaugson(44725) , <https://dl.acm.org/doi/10.1145/3532106.3535195>,
<https://dl.acm.org/doi/proceedings/10.1145/3532106>, 26-40