FUTURE OF PRIVACY FORUM

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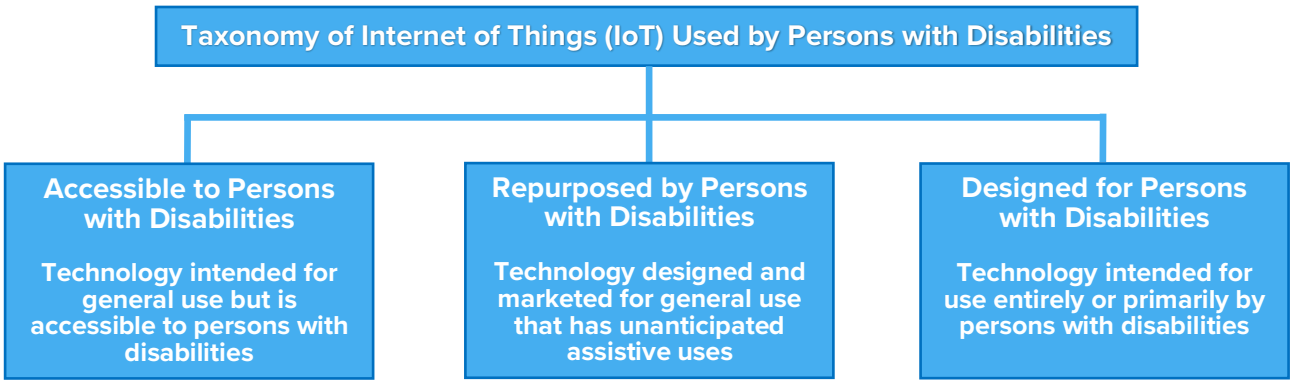
The Internet of Things (IoT) and Persons with Disabilities: Exploring Benefits, Challenges, and Privacy Tensions

The Internet of Things (IoT) has the potential to transform the lives of persons with disabilities, our societies, and industries. Today's IoT devices and services are increasingly accessible to persons with disabilities; some IoT technologies are specifically designed for persons disabilities, and others are repurposed by persons with disabilities (see figure below). The IoT and its associated data collection is producing accessibility-related advances, ranging from smart home devices to self-driving cars. IoT-based services are also empowering persons with disabilities to participate more fully and autonomously in everyday life by reducing some needs for human intermediaries or accommodations. Data derived from persons with disabilities' use of IoT devices and services can provide insights into the challenges or opportunities experienced by persons with disabilities while using IoT devices. These insights can be used to enhance existing IoT products or develop new ones.



Despite the potential benefits of IoT devices and services for persons with disabilities, unique privacy risks and challenges can be raised by the collection, use, and sharing of data about users. Depending on the circumstances, privacy can be enhanced or diminished by technologies, creating a tension between privacy gains and losses. How people balance those tensions depends upon context—including how the service or device is used, who is using it, and individuals' preferences and values. Some members of the disability community may consider benefits and privacy risks differently than other communities. This consideration—evaluating the ways IoT devices and services allow persons with disabilities to enhance their privacy vs. creating privacy risks via data collection—deserves more nuanced consideration and engagement.

In our forthcoming paper, we aim to identify a taxonomy of IoT devices and services used by persons with disabilities; describe benefits the IoT can offer to individuals with disabilities, communities, and companies; and explore the privacy challenges faced by persons with disabilities who use IoT services:

I. Taxonomy of IoT Devices and Services used by Persons with Disabilities
II. Benefits of Data Collection, Use, and Sharing
III. The Privacy Tensions, Expectations, and Challenges of Persons with Disabilities
IV. Proposed Reccomendations:
    A. Include Persons with Disabilities in the Design of IoT
    B. Promote Research and Innovation
    C. Build Privacy by Design Approaches
    D. Foster Cross-Sector Collaboration

Below, we outline the potential benefits, challenges, and mitigation strategies of a variety of IoT devices and services used by persons with disabilities in order to facilitate a discussion with a diverse group of stakeholders. We hope this discussion will further the conversation around inclusive IoT devices and services, illuminating privacy concerns that are central to persons with disabilities and opportunities for future work.

Case Studies

1. Smart Home Devices

Benefits: The same features of smart home devices that promise comfort and convenience to persons without disabilities provide independence for persons with disabilities. For example, being able to control lights, temperature, and locks via Smart Home assistants can be a game changer for persons with visual or mobility disabilities.

Privacy Challenges: Transparency mechanisms, such as notice and consent, can exclude some persons with disabilities when provided through only one form of communication. Data could potentially be misused for discriminatory purposes.

Mitigation Strategies: Provide notice and consent of data collection through a variety of visual, auditory, or tactile cues to ensure that the broad array of needs encompassed by the disability community are addressed.

2. Wearables and Tracking Devices

***Benefits*:** Wearables and other tracking technologies enable further data collection about users, which can improve certain aspects of the "data divide" for persons with disabilities. Improved data could impact policymaking and resource allocation, helping to reduce social and economic inequities.

Privacy Challenges: Disclosure and use of IoT data could unintentionally reveal sensitive facts about users with disabilities and potentially lead to stereotyping or discrimination.

***Mitigation Strategies*:** Consider the spectrum of sensitivities that may exist for IoT and recognize the variety of privacy expectations users may hold by creating sufficient user notice and choice.

3. Communications Technologies

***Benefits*:** Communication technologies can replace or augment roles, systems, and services previously operated or performed by persons, such as text-to-speech applications and teletypewriters, offering persons with disabilities more independence and confidentiality by interacting without a human interpreter.

***Privacy Challenges*:** The confidentiality and privacy standards of traditional service providers may be left behind when new IoT devices and services are created to replace or augment these services.

***Mitigation Strategies*:** As technology augments and replaces current systems and services used by persons with disabilities, integrate existing privacy provisions into the design of the technology.

4. Facial Recognition Technologies

Benefits: Facial recognition technologies can help persons with disabilities navigate spaces and conversations with others. These technologies can identify persons in photos or nearby people and inform persons with disabilities, who would otherwise be unable to detect them.

Privacy Challenges: Notice and choice mechanisms for third parties may be difficult to implement. Facial recognition data can pose significant privacy concerns if recorded and stored, if taken in private or sensitive spaces, or if subjects do not consent to or are not aware of the use of such services. Concerns could also arise from law enforcement access to this data or if this data is used in privacy invasive ways.

***Mitigation Strategies*:** Implement varying levels of consent mechanisms (opt-in vs opt-out) depending upon the interaction context and whether or not a user is already affirmatively connected to the facial recognition subject.

5. Cloud Technologies

Benefits: Cloud technologies afford persons with disabilities the ability to create custom, replicable settings for devices and services, allowing for consistent access to information and services that meet the specific needs and preferences of the user.

Privacy Challenges: Cloud-based infrastructure can be vulnerable to denial of service attacks, data breaches, and data loss. Further, there are fewer protections from compelled disclosure for data stored on the cloud.

Mitigation Strategies: Implement a comprehensive security program for data stored on the cloud and utilize secure transmission techniques to mitigate improper data disclosure or leakage. Support stronger legal protections for government access to cloud data.