Ethical Analysis

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Design Topic: **Amazon Echo Smart Speaker**

Design Problem: **How much users' personal data should Amazon collect in different areas in the home?**

Key Value Tension: (User) Parents [Privacy] vs Amazon [Data Collection]

Although most of the Amazon Echo's users buy the device for more convenience and to facilitate their daily tasks, people should have enough privacy when it comes to their home. Especially when Echo devices are placed in certain rooms in which people tend to value privacy the most, such as bedrooms or bathrooms. However, Amazon needs to collect data from Echo devices that are connected to the cloud whenever possible, the reasons behind that are:

- Echo has to "listen to" and recognize the wake-words in order to be triggered [2]
- Enhancing the user experience (UX) and improve the quality of service [3]
- Fine-tuning the AI models used for speech analysis and natural language processing tasks

Whenever Echo is triggered, recorded conversations will be uploaded to Amazon's cloud servers in order to provide a useful response to the user. When looking through value tensions, we found that **Amazon Echo treats all rooms equally** and are always "listening to" the trigger/wake words no matter where they are placed, and will upload the data after being triggered. This might become problematic as users' private conversation could be exposed to Amazon, especially when Echo devices are placed in some "sensitive" areas or places in the users' home. In more sensitive areas, like bedrooms and bathrooms, Echo's data collection should be as minimal as possible, and in some specific places, it is better to be turned off. In addition, users should have the right to determine how sensitive their rooms are, and which data collection level or protocol should be applied in different rooms.
So, our value tension of focus is between: user' privacy and Amazon's data collection.

Ethical Issue: Privacy

Since Echo's AI assistant is supposed to respond timely, the device's microphones are active all the time in order to recognize the wake-words, and its processors are analyzing what the microphones receive. Assuming no modifications to the current way of how Echo operates, private conversations are prone to be recorded without explicit user permission [5] and stored on the cloud without being completely anonymized, as each conversation could be traced back to the persons involved in [4].

While Amazon might benefit from collecting more data as they can improve the user experience, quality of service and stability of Alexa's response, collecting this huge amount of data will make them much more accountable whenever a privacy problem arises, either private conversations' leak, or using the data for intelligence purposes, similar to NSA's 2013 leak of information, which was pointed out by Edwad Snowden.

From the user's perspective, having the microphones always active might be beneficial in extreme security situations and conditions, like robbery, kidnapping, or even murder. These types of recordings might be very useful if used as evidence by the court or during investigations. However, the decision of keeping this recording device active should be completely up to the user. Being placed anywhere in the user's home, Echo can listen to private conversations which might include personal information which could be used to identify a certain person, and user's privacy might be violated without

anonymity processing. This could be extremely harmful to a person, as a user's privacy is at risk of being exposed to anybody as the data could be leaked in some way, as what happened before with some celebrities. This could lead to serious problems, as a person's fame, mental health, or profit might be in danger. Also, it is crucial for users to have complete privacy in their home, as users might discuss any personal information, health conditions, or even their true opinion towards different social issues, and it would be very problematic if this type of converstaions is leaked or exposed to people other than the user trusts.

Design Decision 1. **Users set different "privacy levels" for each Echo device in different areas in the home.**

Users can set "privacy level" according to various situations, either manually using physical buttons, or voice-based instruction. If the privacy level is high, Amazon should not store the recorded conversations. How Amazon deals with the collected data depends on the user's preset privacy level.

Also after the user chooses the privacy level, Echo informs the user briefly of how data will be collected while activating this specific privacy level, and what to expect from Echo during that period, and Echo will need the user's consent to begin activating this privacy level, either using a physical button or by a voice command.

This resolution has the following implications:

- It gives the users full control on how much data they want to share with Amazon, based on the sensitivity of the conversations in a particular place in the house
- Amazon won't be collecting data all the time
- Protect the users preferences and privacy by limiting the data collection. At the same time, it does let Amazon collect data when placed in low sensitivity rooms
- Amazon can provide custom services depending on the room where the Echo device is placed in, and chosen the privacy level

Design Decision 2. **Develop advanced architecture of Alexa which can process speech words on-device (edge-computing):**

One of Amazon Echo's problems is that it needs cloud processing in order to respond to the user's queries, because the AI models are very computationally demanding. Then the queries or conversations are stored in the cloud. By focusing on making the AI models lightweight, all the necessary processing could be done on-device, without the need to cloud processing, or storing the data in Amazon's servers. Users can voluntarily provide their own data to Amazon for advanced improvements and research.

This resolution has the following implications:

- Largely reduce the amount of data collected by Amazon, thus completely protecting the user's private information
- It is harder for Amazon to improve user experience based on real users' data
- It is harder for Amazon to add features, or update skills on Echo devices, since the device will be offline most of the time

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