

MAKING EXTENDED REALITY SAFE AND SECURE FOR TEENAGERS WITH PARGUARD

Agasthya Gangavarapu, Researcher, Safety4XR.org

1. INTRODUCTION

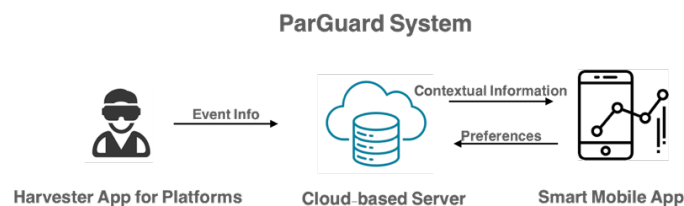
Extended Reality (XR) is expected to grow exponentially with significant investments from big tech companies such as Meta and the introduction of related and supporting new technologies such as web3, blockchain, etc. Like other technologies, most of the discussion and analysis is focused on the positive benefits of XR technologies and systems at the inception stage. If history was any guide, then the negative impacts of XR technologies with ultra-personalization capabilities and advanced immersive technologies are likely to be much worse, especially for teenagers. Based on the current direction of regulations and laws related to the use of technologies, including social media and XR, the current expectation is that parents ‘regulate’ the usage of the technologies and nudge their teenage children away from the ill effects of XR technologies [1]. This is an unreasonable expectation and an onerous burden placed on the parents given personalized algorithms and the fast-changing nature of the underlying technologies. ParGuard, a smartphone-based app system, is designed to help parents to navigate through a maze of technologies and ultra-personalization algorithms, and guard children from the ill effects of new technologies.

2. PARENTAL PROBLEMS

Most concerned parents have signed up with social media platforms to provide any guidance needed for their children. While these practices have worked to a certain extent with current social media because of limited algorithmic personalization, the parents get to see the same posts and to a certain extent similar ads as their children [2]. However, personalization algorithms and immersive experiences of XR technologies are driven by the history of interactions, and implicit preferences of the users. Parents are served with totally different experiences because their interaction history and ongoing choices are different from that of their children. Also, parents need to understand the contextual background when their children are having a negative emotional response such as stress or loss of appetite.

3. PARGUARD

To help parents to track their children’s XR platform activity and provide contextual guidance, I am developing ParGuard. There are three components to the solution in development: a harvester component for each of the XR platforms, a smartphone app for parents to enter the teen’s emotional details and get insights, and a cloud-based server for classifying impactful events and actions.



Harvester component

The first component of the ParGuard system is the Harvester. The component is customized for each of the popular XR devices like Meta’s Oculus Quest and is installed and activated with the child’s account. Once activated, the component captures emotional information such as mental fatigue [3], cognitive load [4], toxic interactions, etc. using the cameras, sensors, and others. The Harvester sends the information securely to a cloud-based server for synthesis and generating insights [5].

Smart mobile app

The mobile app is primarily designed for parents to receive all contextual and event information along with Machine Learning (ML) based insights from cloud-based server. This information is mashed with the personal information of the concerned child, securely entered in the app, to get insights about the child's emotional wellness and identify any potential causes for concern. Parents can choose the type and details of personal information to enter about their children. For example, the parents can enter negative emotions the teenager is experiencing in the app and the information gets synthesized with XR experiences to generate personalized interventions and recommendations.

Cloud-based server

A cloud-based server facilitates and synthesizes the information received from the mobile app and harvester to identify potential problems and generate personalized recommendations. The data is encrypted and provided to authorized apps using ephemeral tokens.

4. DEMO

The demo, which lasts for about 3 min, will be principally focused on the mobile app and how it provides actionable insights for the parents. Also, the demo will highlight how the app could be used to customize for child's sensitivities such as flashlight sensitivities. Since the information captured and used in ParGuard is highly sensitive information, the demo will show how differential privacy is enabled to protect the privacy of all parties involved.

REFERENCES

- [1] <https://www.govtech.com/policy/conn-bill-would-restrict-teenagers-social-media-use>
- [2] <https://www.wsj.com/articles/tiktok-to-adjust-its-algorithm-to-avoid-negative-reinforcement-11639661801>
- [3] <https://eprint.iacr.org/2020/340.pdf>
- [4] <https://www.sciencedirect.com/science/article/pii/S09333365717306140>
- [5] Ishimaru S, Kunze K, Kise K, Weppner J, Dengel A, Lukowicz P, et al. In the Blink of an Eye: Combining Head Motion and Eye Blink Frequency for Activity Recognition with Google Glass. In: ACM Augmented Human International Conference. New York, NY, USA: ACM; 2014. p. 15:1–15:4.