

## Explore – Impact of Computing Innovations

### Written Response Submission Template

Please see [Assessment Overview](#) and [Performance Task Directions for Student](#) for the task directions and recommended word counts.

#### Computational Artifact

2a)

The computational innovation I choose present is Augmented Reality (AR). AR adds virtual features to the real world in the user's perspective. Its intended purpose is to augment the real world we experience with virtual elements, in aspects of seeing, touching, smelling, hearing, and tasting. Most augmented-sight-oriented AR devices superimpose images on the world through screens, contact lenses, or glasses to add virtual elements. In my computational artifact, I create a video to illustrate the definition of AR, explain how AR works, and introduce several examples of AR devices to discuss their effects and impacts on society and culture.

2b)

I use a MacbookPro, a smartphone, and a phone stand to create the computational artifact. I use the phone stand to adjust my phone to a proper position, thereby I am able to record myself. The smartphone also serve as voice collector to generate an audio within my phone. I sent the video and audio clips I need to my MacbookPro through Airdrop. For video production, I choose to use iMovie. iMovie allows me to put titles, subtitles, within the video, put some key words and animation to show, and incorporate several video clips together to complete the video production.

## Computing Innovation

2c)

Augmented Reality has upsides and downsides. Positively, AR hugely increases the engagement of users when using AR Apps. For instances, AR-assisted GPS routing and online buying. When applying virtual visual elements into the user's sights, the GPS can provide much more efficient guide for the user than conventional e-maps. When combined with big-data technology, AR can significantly make the traffic more ordered. Similarly, Houzz CEO Adi Tatarko declared that users of their AR tools were shockingly "11x more likely to make a purchase(Kumarak, Greg)" than conventional method. Apple's "Quick Look" app even introduces sound features when users are buying products. AR's promising economic prospect is ensured by the huge quantity of smartphone users in the world. For almost any smartphone, AR can be easily installed. Therefore, the future of AR industry is bright. Nevertheless, AR does have its downsides too. A research on AR's effect on human sociability conducted by Nina Savela and her colleagues reveals that this concern is needed. Through experimenting with voluntary students, they discovered that compared to pen-and-book using participants, AR-app using participants are less likely to speak to others and overall having decreased sociability. The conclusion of the research alarms the AR developers and entrepreneurs the potential threat of AR to the society. If AR is used without proper constraints and instructions in the future, the sociability of people may decrease and lead to some unexpected problems. Undoubtedly, the future generation will be dominated by AR/VR. Used wisely, they provide limitless opportunities for the people.

2d)

Augmented Reality uses a variety of data to operate, including location information, digital graphic information, and position (tilted angle and relative distance from objects) information. SLAM (Simultaneous Localization and Mapping), a powerful system consisting sets of algorithms to render virtual images in the real world, combined with marker recognition technology and GPS, process the data to make AR possible. Take an AR app that guide users through city streets for example, the app firstly receives GPS information from

satellites in Earth orbit. Simultaneously, the app also collects graphic information from the smartphone camera and angular position information of the phone from the gyroscope inside. Next, the app transforms the GPS information into phone-readable information and synthesizes the position and graphic information into relative distance and angle data. The app also synthesizes the graphics with location data to identify landmarks, streets, shops, and intersections, etc. Then, the app generates icons, texts, videos, comments on restaurants, or any additional information of the places in the streets that may gain from internet or local storage. The app outputs graphic data with these elements superimposed on the camera perspective background, aligned in proper angle and sizes according to the position information synthesized previously. AR does bring privacy concern. Once it gets popular in the public, people can look at a stranger with their AR app and get to know his or her Facebook, Twitter, LinkedIn, and many private information that the person may not want to share with a stranger.

## References

2e)

Greg Kumparak, Apple Expands Quick to let Retailers Sell Things Directly in Augmented Reality, TechCrunch, March 1, 2020, February 14, 2020, <https://techcrunch.com/2020/02/13/apple-expands-quick-look-to-let-retailers-sell-things-directly-in-augmented-reality/>

Shirin Ghaffary and Rani Molla, How tech companies are trying to make augmented and virtual reality a thing, again, Recode, March 2, 2020, February 11, 2020, <https://www.vox.com/recode/2020/2/11/21121275/augmented-virtual-reality-hiring-software-engineers-hired>

Kevin Bonser and Nathan Chandler, How Augmented Reality Works, How Stuff Works, Feb 28, 2020, Nov 9, 2018, <https://computer.howstuffworks.com/augmented-reality.htm>

Augmented Reality: it's like real life, but better, Engine Creative, Feb 28, 2020, <https://www.enginecreative.co.uk/blog/unlocking-potential-augmented-reality/>

Sales, Know the Augmented Reality Technology: How does AR Work?, New Gen Apps, Feb 28, 2020, Nov 23, 2017, <https://www.newgenapps.com/blog/augmented-reality-technology-how-ar-works>