Prompt 2a.

- **Provide information on your computing innovation and computational artifact.**
- **Name the computing innovation that is represented by your computational artifact.**
- **Describe the computing innovation's intended purpose and function.**
- **Describe how your computational artifact illustrates, represents, or explains the computing innovation's intended purpose, its function, or its effect. (Must not exceed 100 words)**

The purpose of augmented reality (AR) is to enhance a real-world place or thing by combining objects in reality with virtual objects. Using smart glasses, smartphones, PCs with webcams, or some other viewing devices, the user can look at their surroundings with added virtual qualities, like pop-up objects and signs. The location and orientation of the viewer is determined by sensors and used to render virtual images in the user's view ("Know the Augmented Reality Technology"). The computational artifact shows the purposes of AR in detail by showing an assortment of labeled pictures with people using AR for different purposes.

Prompt 2b.

Describe your development process, explicitly identifying the computing tools and techniques you used to create your artifact. Your description must be detailed enough so that a person unfamiliar with the tools and techniques will understand your process (Must not exceed 100 words)

I used Google Drawings to create my artifact. First, I gathered some images that showed the purposes and applications of AR in real life. I uploaded the images and adjusted the sizes of the them. Then, I placed them next to each other, leaving some space at the top left corner, where I typed the name of my technology and a short description. Then, I added text boxes to label each picture to explain what the pictures are showing. Finally, I saved the file as a PDF.

Prompt 2c.

Explain at least one beneficial and one harmful effect the computing innovation has had, or has the potential to have, on society, economy, or culture. (Must not exceed 250 words)

AR provides a way for people to be trained safely in activities that involve risky tasks and harming others, like fighting in the military or performing surgeries, which is beneficial to society. This way, extra resources are not needed and people can be better prepared for performing tasks to ensure that no accidents occur (Perdue). AR has also helped economically by improving advertising and marketing tactics. Some companies integrate AR into their advertisements, allowing customers to use an app to see an object or animation pop up on a flyer or product. The unique marketing style catches the attention of customers ("5

Innovations Shaping"). However, since AR provides easier ways of performing tasks and communicating that rely on technology, social interactions are and will continue to be reduced, which is a harmful effect on society. People don't need to leave their houses for certain experiences. AR creates those experiences virtually all in one place, allowing people to reduce their real-world interactions ("The Pros & Cons"). Also, if people start to rely on AR too much, they can become oblivious to surrounding objects. Objects created by AR can distract people since people become focused on those objects. This effect can cause accidents and has been observed in many people playing Pokemon Go, a game involving AR (Beals).

Prompt 2d.
Using specific details, describe:
- **The data your innovation uses;**
- **How the innovation consumes (as input), produces (as output), and/or transforms data; and**
- **At least one data storage concern, data privacy concern, or data security concern directly related to the computing innovation. (Must not exceed 250 words)**

AR technology uses data collected from sensors to determine where to place virtual objects. Some AR softwares are recognition based and rely on visual data collected from cameras. Visual markers, like QR codes or specific parts of objects (NFT tracking), in the environment are detected. The location of the markers in the viewer's point of view is determined and the orientation/angles of the viewing point are calculated from the relative positions of the visual markers. Location based AR softwares rely on data input collected from satellite signals or other location-determining sensors and a digital compass. The compass helps determine the orientation of the viewer, and satellite signals determine the location of the viewer. Some AR softwares use a combination of both location-based sensors and visual sensors. As the output, virtual objects are rendered in the correct orientations, angles, and locations depending on the processed data ("Know the Augmented Reality Technology"). Since many AR technologies use the viewer's location as data, this could be a security concern if the users' locations are leaked. Data collected from AR technology can include where users travel and the locations they visit most often. One example of the potential harmful effects of the data security concern involves the game Pokemon Go, which tracks user location. Robbers have used the game to find locations of players to rob them (Hafner).

Prompt 2e.
Provide a list of at least three online or print sources used to create your computational artifact and/or support your responses through in-text citation to the prompts provided in this performance task.

● At least two of the sources must have been created after the end of the previous academic year.

● For each online source, including the complete and permanent URL. Identify the author, title, source, the date you retrieved the source, and, if possible, the date the reference was written or posted.
● For each print source, include the author, title of excerpt/article and magazine or book, page number(s), publisher, and date of publication.
● If you include an interview source, include the name of the person you interviewed, the date on which the interview occurred, and the person's position in the field.
● Include in-text citations for the sources you used.
● Each source must be relevant, credible, and easily accessed.

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