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### Explore — Impact of Computing Innovations

#### Computational Artifact

**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 intended purpose and function.
- Describe how your computational artifact illustrates, represents or explains the computing innovation intended purpose, its function or its effect.

The computing innovation represented by my computational artifact is smartwatches. The purpose of this innovation is to provide people with more useful features on a watch rather than their typical purpose of displaying a time, including pulse tracking, device finder, fitness tracker, text messaging service, phone and video calling, and entertainment-based applications in them (3). The computational artifact illustrates the purpose by showing images of activities smartwatches allow users to perform rather than just displaying the time.

**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 those tools and techniques will understand your process.

I used Gimp to create my artifact. I collected four images online that represented my computational artifact's purpose and compiled them to make the artifact. I used the scale tool to resize each image to be exactly one-fourth of the canvas size. Then, I used the move tool to move each image to the center of one-fourth of the canvas. After that, I used the rectangle select tool to select and remove the center of the image. Then, I added in the center an image of a smartwatch. Lastly, I added "Smart Watch" at the top of the image, making "Smart" a black colored text and "Watch" a white colored text.

**2c.** Explain at least one beneficial effect and at least one harmful effect the computing innovation has had, or has the potential to have, on society, economy, or culture.

A beneficial effect that users will be more aware of their health. Smartwatches provide users the ability to track their pulse through a pulse tracking app, displaying a heart rate monitor. Smartwatches use a photoplethysmography technique to track heart rate, having green LEDs that are paired to photodiodes to detect the amount of blood moving through the wrist (5). Users are able to see when their blood rate is too low or too high via a smartwatch and are then aware they may have a health issue. Some smartwatches, such as the Apple Watch, even have the option to notify users when their heart rate is irregular (2). Smartwatches give users the option to track their sleep as well. Through tri-axis accelerators found in smartwatches and their heart rate trackers, they can detect when the user is asleep due to little to no movement detection and low heart rate detection (6). They report to the user how long they have been asleep for and their heart rate during that time. Users are able to know whether they have been asleep for longer or shorter than necessary. Knowing if anything is unusual within their sleeping cycle and their heart rate through smartwatches, users are more aware of their health and are able to take any immediate action.

A harmful effect that smartwatches have on society is the increased exposure of radiation on consumers. Smartwatches, being worn on the wrist, provide users a much greater exposure to radiation than smartphones do which is known to cause health problems such as eye irritation, headaches, reduced appetite, nausea, mood swings and sleep disruption (4).

**2d. Using specific details, describe:**

- The data your innovation uses.
- How the innovation consumes (as input), produces (as output), and/or transforms data.
- At least one data storage concern, data privacy concern, or data security concern directly related to the computing innovation.

Smartwatches use sensor, message, call, image, and video data to operate in all its applications. Sensor data is consumed in their health app when the sensor device in the smartwatch detects the users' heart rate and outputs the data in a detailed report that can be easily saved (1). Both image and video data are used in entertainment-based applications, being consumed from the other source through an internet or Bluetooth connection and produces the data onto the users' smartwatch screen. Message data is used when the user sends or receives a message on their watch. This data is consumed when the user types their message and clicks send. The watch then grabs that data and sends it through an internet or Bluetooth connection to the recipient. The same thing goes for call data. The smartwatch consumes call data when the user makes a phone call and sends this data to the recipient, notifying them that the user is calling them.

Smartwatches collect so much data and the fact that smartwatches are fairly new devices makes it more vulnerable to a data breach. "Malicious third party could steal the poorly managed data and subsequently sell to unscrupulous organizations that use that data to assess consumers' health risks" (7). This causes a data privacy concern due to how vulnerable smartwatch data is to data stealing.

## References

**2e. Provide a list of at least three online or print sources used to create your computational artifact and/or support your responses 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, include the 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 citations for the sources you used, and number each source accordingly.
- Each source must be relevant, credible, and easily accessed.

1. Magid, Larry. "Magid: Devices Monitor Health from Your Wrist or Pocket." The Mercury News, The Mercury News, 7 December 2018, [www.mercurynews.com/2018/12/06/magid-devices-monitor-health-from-your-wrist-or-pocket/](http://www.mercurynews.com/2018/12/06/magid-devices-monitor-health-from-your-wrist-or-pocket/). Accessed 13 December 2018
2. Potuck, Michael, and Michael. "How to Set up Apple Watch Irregular Heart Rate Notifications." 9to5Mac, 9to5Mac, 6 December 2018, [www.9to5mac.com/2018/12/06/apple-watch-heart-notifications/](http://www.9to5mac.com/2018/12/06/apple-watch-heart-notifications/). Accessed 13 December 2018
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4. Razani, Amanda. "Are Wearables Exposing Us to Unwanted Health Risks?" ReadWrite, ReadWrite, 25 August 2018, [www.readwrite.com/2016/04/13/wearables-health-risks-radiation-dl4/](http://www.readwrite.com/2016/04/13/wearables-health-risks-radiation-dl4/). Accessed 14 December 2018
5. Allison, Conor. "A Complete Guide to the Apple Watch Heart Rate Monitor." Wareable, 13 September 2018, [www.wareable.com/apple/apple-watch-heart-rate-monitor-guide-340](http://www.wareable.com/apple/apple-watch-heart-rate-monitor-guide-340). Accessed 14 December 2018
6. Max. "How Do Smartwatches Track Sleep? - Appcessories." Appcessories - App-Enabled Accessories and Wearables, 24 November 2016, [www.appcessories.co.uk/how-do-smartwatches-track-sleep/](http://www.appcessories.co.uk/how-do-smartwatches-track-sleep/). Accessed 15 December 2018

7. Draper, Sam. "How Data Breach Is Inevitable in Wearable Devices." Wearable Technologies, 5 October 2018, [www.wearable-technologies.com/2018/10/how-data-breach-is-inevitable-in-wearable-devices/](http://www.wearable-technologies.com/2018/10/how-data-breach-is-inevitable-in-wearable-devices/). Accessed 15 December 2018