Sage Air Defense System Reenactment

For the Making History reenactment project, our group decided to recreate a picture of a United States soldier using the SAGE Air Defense System that was designed by IBM and used by the United States Government during the Cold War to protect our country from potential air attacks. This computer system had a large impact on the history of computing and was significant for many reasons.

According to IBM, SAGE stands for Semi-Automatic Ground Environment. The computer system used the AN/FSQ-7 computer, which was "developed, built and maintained by IBM" ("SAGE."). However, this system was not only made up of one single computer. Instead, it was actually a combination of many of these computers in a system that made the goals of Air Defense possible. "With SAGE, air defense is conducted from about thirty direction centers located throughout the United States. A center is responsible for air surveillance and weapons employment over an area called a sector" (Everett, R. R., et al., 149). According to "SAGE – A Data-Processing System for Air Defense" by R. R. Everett, C. A. Zraket, and H.D. Benington, every single one of these direction centers had one of these massive AN/FSQ-7 computers in it, each using nearly 60,000 vacuum tubes and requiring "over 100 Air Force officers and airmen" in order to run the system. This means that the SAGE Air Defense System was of a massive scale, and not just in one location on its own. The whole system was run by these men sitting at individual stations, or "consoles". According to the article, each computer could store over 1 million bits, had a program of 75,000 instructions, could process data that was inputted, and could even generate and display over 100,000 bits of information every single second (Everett, R. R., et al., 149). Information that was processed was displayed at each console via the "use of CRT terminals" ("SAGE."). The SAGE System also utilized magnetic drum technology in order

to accomplish its goal of Air Defense. "The computer system consists of the following major components: a central computer, the air-defense computer programs, and the system status data stored on auxiliary magnetic drums" (Everett, R. R., et al., 152). Overall, the SAGE Air Defense System is obviously a project that was extremely complex, but also was hugely important to both history in general as well as computing history.

As stated previously, the SAGE Air Defense System was a significant step forward in the world of computing. Additionally, it was important in more than just the computing world, because it also helped protect the United States during the Cold War. At the time of its development by IBM, "SAGE was the largest computer project in the world during the 1950s" ("SAGE."). This is not hard to believe, as the entire system consisted of 23 individual centers, and there were two computers at every single center ("SAGE."). Pushing the boundaries of computing and investing more than ever before in a single project influenced the way computers were viewed by society. They also played a hugely important role because there is a high likelihood that the SAGE System saved many lives during the Cold War, as it acted as a preventative measure to protect from attacks in addition to simply detecting and defending against them. Prior to the SAGE Defense System, the air-defense system that was in place at the time was a manual system, meaning there was no computing power or storage of data that could be performed (Everett, R. R., et al., 148). "The problem was one of inadequate, nationwide data-handling capability: facilities for communication, filtering, storage, control, and display were inadequate. A system was required which would 1) maintain a complete, up-to-date picture of the air and ground situations over wide areas of the country, 2) control modern weapons rapidly and accurately, and 3) present filtered pictures of the air and weapons situations to the Air Force personnel who conduct the air battle" (Everett, R. R., et al., 148). The SAGE System was created

in order to cater to all of these needs the military had, and it was the first of its kind. Finally, not only was the SAGE System important for all of these previously mentioned reasons, it was also the first ever computer to use a CRT monitor to display data, according to History-Computer.com. This was revolutionary in the computing world because it changed the entire landscape of computer systems that would follow after it, as visually displaying information is obviously the most effective way to communicate it. Because of all of these reasons, we felt that the SAGE Air Defense System was incredibly important, and would be a great project to work on recreating this piece of history.

Recreating the photo was a pretty straightforward, but not so easy task. The first task was to decide on what props would be needed in recreating this piece of history. The original photo that we recreated is the first image below. Our group member, Yuya, decided that he would be the actor used for the picture as he already had a suit that he could wear for the photo. He also wore a pair of plain red headphones that were very similar to the ones that appear in the original photo. Capturing the photo itself was probably the easiest part, as it just required setting him up at the proper angle with his hands in the right position and a plain background. This you can see in the images of him posing against the green screen. This finally resulted in the black and white image, which looks very close to the original photo without the SAGE System in front of him. We decided that the best way to recreate the actual computer seen in the photo would be digitally. At first, we attempted to recreate the computer using real life objects that we had accessible, such as notebooks (which you can see in the next image below.) However, this was obviously not good enough. So, Amber used the program Sketchup to model the computer and photoshop it into the photo. She was also responsible for editing the photo as a whole, doing things like trimming the hair, and adding some other small details like pieces of the headphones

to make the image more accurate. You can see the progress that was made in the screenshots of photoshop provided. Finally, we arrived at the final product, which is the last image seen below.
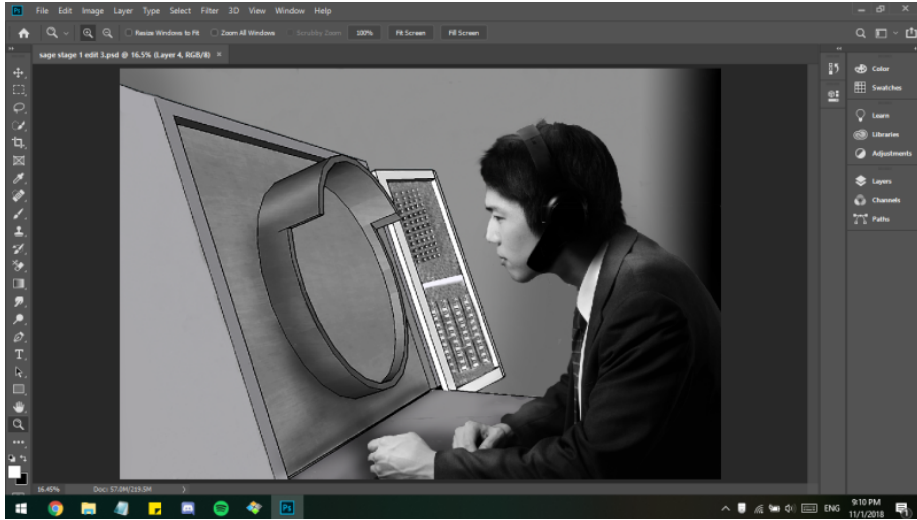
Original Photo:

Recreation Process:

Final Photo:

Presentation link:

https://docs.google.com/presentation/d/1YZxh-ljHlPxFIQW4kb5-zXI0Iw91wo4-7vihNGGKTdg/edit?usp=sharing

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