Sandy Fougeres

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Exploratory Paper

 The History of Technology: From the Camera to 3D Printing

Technology created throughout history shaped the way we interact with the world, in the past, present, and future. My interest in the camera, the car and 3D printing motivated me to explore its history, and the intended and unintended consequences in its invented time. The camera interested me because I’ve always wanted to be a nature photographer, the car because I wanted to understand how they changed the world overall and how people travelled prior, and 3D printing because I wanted to educate myself more on how it’s used, and its creation process. I wanted to see how these technologies overlapped and improved life overtime, and how people lived with and without these inventions. This provided me with insight, as I was able to envision myself being in these time periods just by researching the creation of these mediums.

During the 19th century, one of the greatest technologies to be made was the camera. The camera is a device that records visual images, and its output is in the form of photographs, film, or video signal. The history of the camera goes back as far as 400BC, by a Chinese philosopher named Mo-tzu (Mozi) who used something called the camera obscura. This was a dark room with a small hole allowing light to enter, reflecting an exact image from outdoors but flipped upside down. It was affirmed that light traveled in straight lines explaining why the images were flipped and thus the introduction of photography.

In 1816, a Frenchman by the name Joseph Nicéphore Niépce tried to create permanent images utilizing the camera obscura, originally the obscuras were used as reference for painters. He used silver salted covered sheets to cover the back of the room and when the sunlight reflected on the sheets it darkened. He produced a negative photo of nature that eventually vanished however, this was considered the first negative photo. By 1826/27, he accomplished creating a permanent photograph, the view from his work room, using a resin called bitumen of Judea (asphalt) exposing it to the image made in the camera obscura (Britannica, 2022). By 1839, the camera and photography were refined by Joseph’s partner, Jacques Daguerre, and was a turning point in society.

Science and art were the foundations of developing the camera, with improvements throughout the years its impact proved to be monumental in society. Its purpose was debated whether it was just for documenting or if it was another medium in the art world. The camera however, proved helpful in capturing the “realism” that was missing in art. It brought reality into art, changing perspective of landscapes and portraiture. In turn, it shaped its audience in the art world prompting a new form of artistic expression created by photographers called Pictorialist. “As a form of aesthetic expression developed at the end of the nineteenth century, the softly focused camera approach to Pictorialist photographers aimed to establish a link between painting techniques and photography as a relatively new [medium]…At the time when the camera was praised for its ability to mechanically document reality and particularly linked to scientific and commercial projects, the Pictorialist manipulated their images in order to achieve media hybridization and elevate their work to the rank of fine art” (Boultwood, 65).

Intended consequences since the camera’s invention is how it shaped the marketplace and society/culture. In the late 19th century, the masses were able to purchase cameras to take photos of friends, family, and events they attended. The Kodak camera was in high demand, Kodak #1 purchased by upper middle class and the Kodak brownie was a cheaper option. The Kodak # 1 was priced at $25, and millions were sold within a brief period (National Museum of American History, n.d.). The camera and photography had a major effect on society, “Popular photography became widespread with the introduction of the Kodak camera. Pictures taken during holidays or of friends and family began to fill family photo albums” (Forrester, 4).

 Unintended consequences were the fact that photography highlighted some of the issues within society that was not acknowledged before, “Social reform was affected by photographs when photographs of substandard living conditions and of child labor hastened efforts to improve housing and to ban child labor. Photographs of war led to greater understanding of the horrors of war which could never be shown by paintings which tended to glorify war. Photographs of the Vietnam War are often credited with undermining American public support for the war. Magazines began using photographs, both in advertising products and in news stories from around the mid-19th century” (Forrester, 4). Photography became a form of documenting history, African Americans used photography as well, to combat the everyday struggles they faced in a white society.

The camera may have also changed the way we use orality and visuals in describing the world around us. According to “Hearing American History” by Richard Cullen Rath, he describes the shift from a audio world to a more visual one, “I found more odd substitutions of the same sort that piqued my interest in the history of sound: A nineteenth-century pamphlet on thunderstorms in seventeenth-century New England changed thunder to lightening…With the exception of attention to ‘oral culture,’ which, as we shall see, is not historically well-grounded, after Perley’s observations this older audible world slipped from historical consciousness” (p. 417). This means that with the creation of the camera and how can now capture the realism around us we didn’t rely solely on what we heard but more on what we saw. The camera aided in capturing “real life” around us as a permanent image, and without the biased perception that a painter would have. These permanent images could then be studied and used as reference as we got a better understanding of the natural world.

In the 20th century, one invention that changed the world was the automobile/car. An automobile is a four wheeled vehicle used primarily for passenger transportation and is powered by an engine. The history starts in the late 19th century, where it was created in Europe, but with time it was massed produced in the USA. “The automobile was first invented and perfected in Germany and France in the late 1800s, though Americans quickly came to dominate the automotive industry in the first half of the twentieth century. Henry Ford innovated mass-production techniques that became standard, and Ford, General Motors and Chrysler emerged as the ‘Big Three’ auto companies by the 1920s” (History Editors, 2010).

Henry Ford was an engineer and businessman who through his innovations popularized the automobile as well as mass produced it, using a new method that impacted American society and the world. In 1891, he worked as an engineer in the Edison Illuminating Company in Detroit while also working on his own inventions. By 1896, Ford created a gasoline-powered horseless carriage or automobile that he called the Quadricycle. Ford driven to improve his invention eventually created the Model T car which was immediately successful. This also was the creation of the assembly line that resulted in mass production that revolutionized multiple American industries.

In the marketplace, the influence of the automobile and the efficiency of the assembly line created a new era in industry. “The prize was for the intensification and efficiency of the movement, the lowered costs and the shorter working day, the increased wages, and industrial standardization…The assembly line as other than a novelty had never been used on such a scale. The model was based on the ‘process chain,’ used by Singer for sewing machines and by Colt for firearms. Ford, however, innovated in a different way: the assembly line never stopped. The conveyor belt moved without ceasing, and the workers had to adapt to its speed” (Giucci et al., 2, 3). One intended consequence was the assembly line, it introduced a process that proved fast, organized and an increase in production. People were able to purchase the Model T cars as they were being mass produced and were readily available.

The automobile/car introduced a new form of travel and fun for everyone. This motivated Southern states to improve the quality of their roads as people all over the nation had a desire to travel cross country. “Old-fashioned Southern villages have been awakened out of their sleep, with an ensuing desire to paint up and brush up. And for the first time in history the common, ordinary ‘fo’kes’ of the North and South are meeting one another on a really large scale, mostly by means of the National chariot—the Ford car” (Giucci et al., 20). Everyone wanted to drive and be able to experience the level of mobility the Model T promoted, “…promising an auto-mobile for the masses. After a year of production there were 10,000 Model Ts on the road in the United States. By 1927, when manufacture of the Model T ceased, Ford had sold more than 15 million all over the world” (Giucci et al., 3).

The car was used not only a means of transportation but also used for entertainment. People took pleasure in driving cross country, driving at high speeds to experience the feeling of whiplash, travelling to see family and friends, and using cars to conduct business more efficiently etc. The car was the symbol for freedom, individualism, and rebellion, this can be connected to the book “Understanding Media: The Extensions of Man” by Marshall McLuhan, he states “For the ‘message’ of any medium or technology is the change of scale or pace or pattern that it introduces into human affairs. The railway did not introduce movement or transportation or wheel or road into human society, but it accelerated and enlarged the scale of previous human functions, creating totally new kinds of cities and new kinds of work and leisure” (p. 9). This means that the car being the medium added to the human experience when it came to traveling and leisure. People were now able to find enjoyment in traveling cross country, improve their business by being able to travel to customers, and it also motivated the cities to expand and improve their infrastructure. Though there was this new remarkable way of travel, there were also unintended consequences that came along with automobiles/cars.

One of the unintended consequences was the sheer number of cars that were now on the road. This caused traffic congestion and an increase in car accidents/deaths. “It was widely recognized that the problem of motor vehicle accidents was directly related to the rise in the number of automobiles, since both accidents and motor vehicle registrations seemed to be increasing at geometric rates. A black weekly in Norfolk, Virginia, complained that ‘with the rapid urbanization of the population and with the phenomenal increase of automobile ownership with an attendant increase in automobile accidents, it can be seen that America's hospital facilities have hardly kept pace with the demands. Never before in history were patients thrust so precipitately into hospitals as they are since the advent of the motor vehicle’” (Brownell, 31).

Another unintended consequence was the use of cars and the car industry during World War II, “…before Ford’s non-military car and truck lines ceased operations on February 10. The government then stockpiled remaining unsold cars and rationed them to those individuals deemed critical to public safety and the war effort…Automobile companies continued to make cars and trucks for the government while dramatically broadening their output to include military weapons such as tanks, engines, cannons, trucks, and aircraft” (Graff, 2022). Car companies aided in the war effort in creating these weapons and military trucks. As people were dealing/recovering from the aftereffects of the Great Depression, the beginning of WWII caused people to perceive cars differently as there was a cultural shift. The government also made it difficult to own and operate a car. They became very costly to maintain, there was gas rationing like most items at the time, and buying cars became much more difficult as they were deemed only necessary for people who were essential to the war effort.

As time passed, both the car and camera have been improved and are much more advanced. In the 21st century, cameras are constructed within our cellphones and can be used to shoot movies, have photoshoots, or create things with photoshop. Cars have become more luxurious and technological with high-end digital screens, improved sat nav’s for navigating, and includes phone charging ports. As technology continues to be upgraded, one of the most innovative technologies of the 21st century would be 3D printing. Three dimensional printing is an additive that creates a physical object from a digital design, it works by layering a thin material made from either liquid or plastic powder, metal, or cement by fusing the layers together.

The first 3D printing creations were documented in the early 1980s. In Japan, Hideo Kodama was trying to develop a way to create a prototyping system, he came up with a layer-by-layer system that used photosensitive resin that was hardened under a UV light. However, credit of the 3D printer goes to Charles Hull; in 1984 he created the actual 3D printer, he designed a solid imaging process called stereolithography. “Charles Hull invented stereolithography (STL), a process making liquid polymers harden under ultra-violet light. He described a method and an

apparatus for making solid objects by depositing layer-by-layer of this material in a patent issued on August 1984. The first object he was able to build was a cup 5 cm tall and the fabrication

process lasted months” (Savini, 2015). Though 3D printing can be traced back to the early 1980s, it is still considered a technology of the 21st century because it transforms digital models into tangible objects.

3D printers can be used to create a prototype of any object. People can use the printers to make tools, toys, clothing, art, utensils etc. Hobbyist can buy the printers and use them to create objects that are complex or for entertainment purposes. The printers are priced in a range that is low to high cost and is available for purchase by anyone. However, not everyone uses or owns a 3D printer as they are still new, and its capabilities are being explored. As they continue to be adopted into society there are many industries that see a great use for them, “3D printing has recently become a critical tool in the geoscience research, education, and technical communication due to the expansion of the market for 3D printers and materials. 3D printing changes the perception of how we interact with our data and how we explain our science to non-experts, researchers, educators, and stakeholders” (Ishutov et al., 2021).

An intended consequence of the 3D printer is that it shortens the amount of time in creating things and has become an integral part of science. “3D printing offers time savings over traditional manufacturing methods, as the process is largely automated. As well as simple models, 3D printing makes it possible to generate complex morphologies accurately, produce laboratory equipment and generate models for teaching and outreach. 3D printing also removes ethical concerns over using live animals for experimental manipulation” (Walker and Humphries, 2019). It has become a tool in exploring new approaches to medicine and body prosthetics.

According to the article “3D Printing: Applications in evolution and ecology” by Matthew Walker and Stuart Humphries, it says “…3D printing is an established methodology. In medicine, it has been used for almost 20 years to make surgical guides used to plan surgery. Technological developments now allow 3D printing of metals, permitting prosthetics to be custom‐made for the patient. 3D printing is used in microbiology, tissue culture, and the development of replacement, and bionic organs.” 3D printing provides new ways in improving the human experience and the approaches we take through its application.

Unintended consequences of 3D printing have yet to be fully recognized however, I believe one unintended consequence can be the loss of employment and businesses. The fact that any object can be created using 3D printing and its production is largely automated, I think there wouldn’t be a need for certain jobs therefore, people will find themselves without work and loss of businesses. Another unintended consequence is the fact that anyone can buy a 3D printer, that means a lack of background checking and the creation of weapons such as guns can be made at home and used for crime etc. Another consequence I believe, is that it can cause people to be more reliant on what they can create through the printer instead of going in store to purchase things, and this can be detrimental to the economy. As we continue to use the 3D printer, we will get a better understanding of how it will affect society and individuals in the long run.

At the time of the creation of these technologies, they were seen to make life easier, more fun, and promoted individualism. These technologies have overlapped within centuries time and though they may not look the same as when they were created; they still require the blueprint of its original design to continuously be improved. As I completed this assignment, I took more of an interest in the history of cars. I would like to explore more of how it changed the landscape in America and the effects of its creation, as someone who does not have a car of my own but a driver’s license, I found it interesting that the car wasn’t just seen as just a means for transportation. But that it stood for freedom and way to rebel against the government, I felt inspired by this because I always seen it as just a way to get around but to know that people felt more of this way about them, I would like to explore the reasoning for this mindset.

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Videos

How to Create a Camera Obscura: <https://www.youtube.com/watch?v=hsXo4gD7iWI>

Evolution of Cars: <https://www.youtube.com/watch?v=1EHshqHpIzE>

Henry Ford Documentary: <https://www.youtube.com/watch?v=y584yQSu0uo>

3D Printed Guns: <https://www.youtube.com/watch?v=C4dBuPJ9p7A>

3D Printed House: <https://www.youtube.com/watch?v=qV4RCAU7KL8>