

A controversial nature of 3d-printing

Technology, Information Technology



The Victoria&Albert's museum Rapid Response Collecting display is a section added in order to respond to vital moments in present history through the use of design and manufacturing. The exhibition presents a range of different objects, including the Refugee Flag, Burkini, the Oculus Rift and other revolutionary designs and technologies. Nevertheless, the designs which I decided to bring attention to are the first 3D-printed Gun made by Cody Wilson and the 3D-printed handlebars used by Bradley Wiggins.

Nowadays with the developments which are going on in both design and manufacturing worlds as a consequence from the latest technologies, it is important to analyse and evaluate the important factors of such advancements. These factors are how it affects social, cultural and political events, thereby investigating the ethics behind such inventions is crucial. Each one of the objects from the Rapid Response Collecting can be considered as a pioneer from its category. Not necessarily created to have a practical purpose but created in order to fill or bring attention to a gap in a world of problems. In this essay, 3D-printing as a form of manufacturing will be investigated to determine the advantages and disadvantages which it brings to the present and future of industrial design, engineering and other creative sectors. While there is an infinite amount of possibilities of what can be created using this technology, it is important to determine the ethics behind giving this opportunity to a wide range of people.

3D-printing is a form of additive manufacturing. In order to print something there needs to be a CAD (computer-aided design) file of the object desired to be printed. This file obtains X, Y and Z coordinates of the body and the printer's programme uses this information to create a number of layers

depending on the thickness of the material being used. 3D-printers are only limited by its size and the materials it allows to print. However, these limitations are constantly being solved, thereby continuously reducing the need of hand-made products.

This technology has existed for around 30 years. Chuck Hull developed a process called ‘stereolithography’, a process that created solid objects by printing layers of light curable liquid, meaning a material which would turn solid once active in a chemical reaction. Hull soon realised that this practice was not limited to liquids, but any material which has the capacity of alternating its physical state.

It was only in the past 5 to 10 years nonetheless, that 3D printers started becoming a widespread product. While before 2010 this equipment was limited to industrial applications, due to a vast decrease in price, it has since begun to be a product purchased by the masses. This gave many people the capacity of creating things which before was never thought possible. However, whether this capacity has a positive outcome socially, culturally and politically, or negative, will be discussed in this essay using the examples of the first 3D-printed gun and the 3D-printed handlebar.

The first 3D-printed gun, also known as ‘The Liberator’ was created by Cody Wilson, a graduate law student at the University of Texas. The gun was produced in order to bring attention to the issues that come with 3D-printing and new open source developments as a whole. This object is composed of 15 different parts printed in ABS plastic, a material intentionally used due to its strong characteristics and therefore the fact that it can tolerate the

impact of firing several bullets. The only part of the weapon which is not 3D printed is the firing pin, which in the case of the V&A exhibition is a nail, an item that is effortlessly acquirable in multiple places. The gun parts in the exhibit were printed in London using the open source design by Defence Distributed (Cody Wilson's Organization), in that way demonstrating how straightforward it is to be produced. " You can print a lethal device. It's kind of scary, but that's what we're aiming to show. [...] Anywhere there's a computer and an internet connection, there would be the promise of a gun" (Cody Wilson, 2012 Forbes). While the point Wilson is making matches with the existing concern behind this technology, the way by which he executed this idea is controversial. Through successfully developing a fireable printed gun and then sharing it at an open source, a danger which was previously non-existent is formed. Two days after its release the gun had already been downloaded 100, 000 times.

The level of simplicity in making this gun is one of the factors that creates an ethical issue with ' The Liberator'. The CAD file for the gun is available in a range of different websites. While it is still necessary to have a 3D-printer to make the final product, as mentioned before, nowadays purchasing one has become common. With the prices being as low as £200, having a 3D printer at home is a normality.

Apart from the clear side of the controversy, which is giving people who do not or should not have the authorization of owning and using a gun, this power. It also creates a simple solution for people who are not obeying the law. While in the United States of America, the right to buy a gun is

protected by the Second Amendment, this same law is not applicable in every other country, thereby creating the issue of how the 3D printing would be managed and restricted across different borders. Even though it is possible and simple to purchase a firearm in the USA and in other countries such as Russia, there are still laws which make the process safer, such as background checks and identity confirmation. However, as soon as this project was uploaded to an open source website, it becomes available to those people which the background check is attempting to avoid; people with convictions, people with certain mental problems, people with a drug history, etc. Furthermore, in the United Kingdom and many other countries, it is prohibited for a citizen who is not part of the army or police force to obtain a personal weapon. Therefore, making this available for personal use without any sort of qualification and verification disobeys the laws of every country in the world. By stating “ You don’t need to be able to put 200 rounds through it...It only has to fire once. But even if the design is a little unworkable, it doesn’t matter, as long as it has that guarantee of lethality.” (Cody Wilson, 2012 Forbes) Wilson demonstrates that the real intent behind this project is not to create harm, but it is to prove that anyone can have access to weapons and that gun control laws are ‘ meaningless’.

Ethically there are many issues with this project and Cody Wilson’s argument. From a political standpoint, gun laws exist in order to protect a country’s population. It helps prevent robberies, murders, mass-shootings, etc. While some countries’ policies contradict others, there is always some law attempting to stop those events from happening. In recent times, the murder rates are at a rise and this is mainly attributed to mass-shootings

and crimes in major cities. Undoubtedly, there is the argument that allowing people to possess a gun gives the opportunity of self-protection, however, by attempting to decrease the number of weapons available, the need of protection is not as needed.

From a social point of view, there is also a dispute on whether such developments should be allowed to occur or not. While in countries which it is legal to own a personal weapon the demand for a 3D printed gun would not be as high as in countries with strict gun laws, the same issue is still present due to the fact that it makes it available for kids, teenagers, felons, who in reality represent the majority of people who download the gun file.

On the other side of the spectrum of the 3D-printing world there is Sir Bradley Wiggins' handlebar used to break the Hour Record, setting a mark of 54. 526km. The object was printed to fit exactly to Wiggins's measurements and positions. While harmless when compared against Cody Wilson's gun, it caused controversy in the media and cycling world nonetheless. The reason being how inaccessible this technology is for other cyclists and people attempting to dispute against Bradley's title.

The Bolide HR Handlebar developed by Pinarello Lab is 3D-printed using titanium, one of the latest developments in printing technology. It uses titanium powder and fuses it into a solid by the focus of a laser beam. Also known as direct laser sintering, this innovative process was developed in Germany. Due to its recent invention the machinery necessary to make this possible is still highly expensive and out of reach for most people. However, the argument used in agreement of this kind of method being used more

frequently in the cycling world is that the athletes attempting to break such world records are usually standing behind a brand and therefore have the purchase capacity of utilizing such manufacturing technique. “ When it came to the handlebars, we needed them to be as good in terms of aerodynamics, but we also needed them to be a perfect fit for the rider. We’ve already seen our design working well in trials and Sir Bradley is cycling faster than ever.” (Pinarello, 2015). While this goal was achieved using titanium 3D-printing, seemingly, the target for the handlebar project was to achieve something structurally efficient while making it custom fit to Wiggins and therefore 3D-printing was the simplest and more effective way of doing it. Since more ‘ traditional’ building techniques involve carbon fiber and less technologically advanced procedures, it could be considered less sustainable and even more out of reach to the general public than the printing method.

From a social point of view, it is debatable whether this should be acceptable or not. While such technologies would be available for other athletes and competitors, it does not take into consideration the fans who are watching and admiring. Kids and even adults all over the world dream of achieving times nearly as close as professional riders. By setting an outstanding time using a machine who is yet to be affordable to the masses, this act gives a false sense of hope to amateurs watching.

Structurally, the entire bike is made to perform as the most aerodynamic bicycle ever created. “ Because the handlebars hit the airflow first it’s absolutely critical to perfect that part of the design – 3D printing allows us to make shapes that optimize this aspect that would be very hard to achieve

using other manufacturing techniques.” (Pinarello, 2015) In terms of manufacturing it seems as if the Pinarello had no other option in terms of achieving the desired goal. In regards to the aerodynamics of the bicycle, the handlebars are critical and one of the most important components. By using less materials and time in order to develop this part, Wiggin’s team were able to make the bike simple but advanced at the same time, thereby allowing Bradley to not waste energy due to undeveloped components. Part of the controversy is developed by the question: Should the equipment used by the cyclist be part of the challenge of beating the competition or should technology be used in order to minimize how much the equipment interferes with the athlete’s capabilities? That is an argument, not only with cyclists but in a range of other sports which is whether every competitor should use the same equipment. If an athlete’s team is greatly involved in the creation of the apparatus, the competition becomes an engineering and design one instead of a sportsman’s abilities and expertise. While this competition for what team has the better gear can be positive in terms of pushing the development of new technologies and items available to the public, it proposes an inaccurate understanding of which athletes are the most prepared and who is the most capable.

Fundamentally, the Vitoria & Albert Museum purchased the first 3D-printed gun and Bradley Wiggins’s handlebar not to encourage the production of such objects but to bring attention to how manufacturing processes can have an effect on the world socially, politically and culturally. Firstly, from a political point of view, such advancements can challenge the way a competition is established and more importantly even the way a countries’

policies are set. In the case of the handlebar, it obliges cycling associations such as British Cycling to evaluate how acceptable such advancements are and also how reasonable it is to have sophisticated gear. Likewise, with Cody Wilson's printed gun forces governments to establish laws that were previously unthinkable. Due to the fact that this danger was formerly non-existent due to the lack of the domestic capabilities, it generates a concern that should not be on-going. Secondly, culturally, allowing for such manufacturing process to be available worldwide to every person who can afford it causes a conflict with the way matters usually occur. Using Bradley Wiggins as an example, in sports as a whole there is generally a manner things are traditionally done. By allowing such opportunities, cycling and other sports are altered and become a manufacturing competition. Finally, from a social standpoint, there are a different factors to take into consideration. Most importantly it is how can a technology such as 3d-printing be regulated and administrated so it limits the type of consumer (people with a felony charge, drugs history, etc.) it is selling to and what its consumers are actually printing. On the other side of the social argument it is how far this technology will go and at what point it will start substituting the need for human presence during manufacturing.

Ultimately, 3D-printing is a technology which enables the creation of an infinite amount of designs and promotes innovation with an easier means of production. While it has a vast amount of advantages and gives opportunities which previously were not available to most, it also provides the capabilities of creating items which are ethically provocative. If used while keeping the ethics of social, political and cultural consequences in

mind, it is a revolutionary product that triggers the invention of many others, however for such tools to thrive in this modern society it requires adequate regulations and guidelines that prevent immoral objects to exist.