1. ABSTRACT

"I am going to 3D print a gun" – Wilson, 25 years old Texas law student (May 5, 2013).

According to the Bill of Rights, it is not illegal to manufacture arms in the state of Texas, unless they don't sell the guns they make [6]. When the above claim was made, it was disregarded by the world, as the consequences of Wilson being successful were still unrecognized. However, it was only until a year later, when he was successful in proving his claim.

Gunsmiths like Imura have already exposed the loop holes in the law by designing rifles, derringers and multi-round handguns using a 3D printer [7]. 3D printed guns have already taken away couple of lives [4, 5]. Unfortunately, its destruction levels are still underestimated. Hence, it is necessary to identify the scope and potential of 3D printer guns based on the advancements of it counter-parts [2] and propose amendments in laws relating to manufacturing arms.

2. INTRODUCTION

3D PRINTING - The process of manufacturing 3 dimensional (3D) objects using a 3D printer is known as 3D printing. It requires digital files to store the designs of the object to be manufactured. It is also referred as additive manufacturing or desktop fabrication. Additive manufacturing is the method of manufacturing objects by adding consequent layers of material, until the required object is obtained.

3D PRINTER – As the name suggests, unlike common printers, 3D printer prints three dimensional objects. Most of the 3D printers available now apply the rapid prototyping model. In this model, a fine powder is applied layer-by-layer bed to form a 3D object. The powder used in this process distinguishes the properties of the printed object from a realistically manufactured object. Powders of plater, bioplastic, polyurethane, polyester, and epoxy are one of the most commonly used materials.

For an individual user, the price of a 3D printer is a barrier to enjoy the services of a 3D printer. But, there are simple versions of 3D printers for a hobbyist which are affordable.

APPLICATIONS – In its short existence, 3D printing has already touched various fields. On October 28 2011, using a 3D-printed lung splint, a new life was presented to a child born with defective windpipe by the doctors at University of Michigan. Some of the leading companies of The Automotive industry, General Motors and Ford Motor Company have already realized the

significance of this technology and have used this technology in their manufacturing. In 2015, NASA's rocket engine injector made from a 3D printer passed a major hot fire test [8].

People have already started working on The World's First 3D-Printed Car, The World's First Chocolate Printer and The World's First 3D-Printed bikini. It is no wonder that the world famous magazine, 'The Economist' has quoted the following lines in one of their magazines.

"Three-dimensional printing makes it as cheap to create single items as it is to produce thousands and thus undermines economies of scale. It may have as profound an impact on the world as the coming of the factory did....Just as nobody could have predicted the impact of the steam engine in 1750—or the printing press in 1450, or the transistor in 1950—it is impossible to foresee the long-term impact of 3D printing. But the technology is coming, and it is likely to disrupt every field it touches."

— The Economist, in a February 10, 2011 leader [2]

3D printing technology has witnessed life-saving incidents to life-taking incidents. Once, Wilson was able to succeed in 3D printing a gun, others have started manufacturing guns with ease [3]. Blueprints of the world's first gun was downloaded a hundred thousand times in just two days [4].

3. BODY

LIBERATOR - Liberator is the world's first 3D-printable gun, illustrated in the figure below. It was published online on May 6, 2013. They were released by the open source firm Defense Distributed. It is available at websites like The Pirate Bay [2].

Figure 1 – Digital Liberator pistol by Defense Distributed [9]

The above illustration depicts all the parts that are designed from the online blue print [4]. The ease with which the parts can be assembled can also be inferred. Defense Distributed is offering a pre-sale of its new milling machine, allowing buyers to print and also assemble a steel AR-15 rifle in the comfort of their own home. Moreover, it is completely untraceable.

GHOST RUNNER - The same company has come up with a new milling machine. It is named as Ghost Gunner, and a computer-numerically-controlled (CNC) machine. Unlike its ancestor, Liberator Gun, designed via 3D printer, it can be manufactured using a PC-connected hardware with a low receiver of the popular AR-15 rifle [2].

According to the Bill of Rights, "An unlicensed individual may make a 'firearm' as defined in the GCA for his own personal use, but not for sale or distribution" [6]. Ironically, after the announcement of the Liberator, Congress extended the Undetectable Firearms Act of 1988 by 10 years. This law prohibits gun makers to produce firearms invisible to metal detectors [6].

The increasing popularity and the advancement in method used for designing the firearms, 3D-printing a gun is getting even easier. The significant transformations allow even a lament in 3D-printing technology allows them to start printing things even like materials from limestone, bronze and iron. Moreover, economically, it is as cheap as $25 to 3D-print a gun.

In 2011, a 3D printed gun took away a couple of lives. According to a statement, that followed after the thorough investigation of that investigation, they died of multiple gunshot wound after they "mishandled the machinery" while trouble shooting a malfunction. In the same company, on September 11th 2014, a 3D printer jammed while printing a metal pistol and took away lives of two technicians and injuring an intern [5].

On November 6th, 2015, the State Department of Texas sent a letter to gun access group Defense Distributed, requiring them to get specific permission from the government before publishing its 3D printable gun files online [7]. This warning has come out more than two years after the State Department sent Defense Distributed an initial letter telling it to take its gun files off its website pending a decision about their legality.

One of the well-known gunsmiths, Imura, have already designed rifles, derringers, multi-round handguns and the components needed to assemble semi-automated weapons using the 3D printer [7]. They have realized the potential of this technology and claim that advancement in these arms

are only waiting to be tested. This only concludes that, as time progresses, weapons will become more and more destructive.

These incidents only raise questions on the limitations on the law. The group has not violated any laws, but has exposed the loopholes of the laws on arms. Before more incidents occur and extremists misuse the power of technology, it is necessary to bring changes in the laws.

4. RESULTS

Concerned about the loop holes in laws that may result in terrorist activities, The US Department of Homeland Security and the Joint Regional Intelligence Center released a memo stating, "Significant advances in three-dimensional (3D) printing capabilities, availability of free digital 3D printable files for firearms components, and difficulty regulating file sharing may present public safety risks from unqualified gun seekers who obtain or manufacture 3D printed guns" [2].

Apart from United States, gun controls are generally tight across the globe. It is believed that this impact may be severe in those parts, where firearms are not easily identifiable.
European officials have made is clear that, producing a 3D printed gun is illegal according to their gun control laws [2].

5. CONCLUSION

It is evident from the incidents that, proper standards for manufacturing such machines should be formulated. They should be thoroughly tested, before being released as an open source that may lead to further mishaps.

Similar to the Europeans, laws should be amended across the globe, realizing the evolution in technology and level of possible destruction. Negligence by even a minority of the population, may result as a hub for terrorist activities.

6. REFERENCES

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