Activity 1.7.a: What Is It?

Engineering is a field that requires engineers to constantly brainstorm for solutions to problems. Engineers are required to think outside of the box so that they can provide solutions and improve situations. One example of an important issue that many face today is blocked drains. This is when drains and sewage lines are clogged and filled with waste and harmful bacteria. Hence, I chose the top right image as my design. The object of the design is a drain unblocker. The purpose of this design is to prevent drains from being blocked and ensures the health of everyone in every household. This object is an invention that will greatly benefit society in the long-term.

When designing this invention, there are many criterias that are necessary to be considered to guide the design. By doing this, it ensures that the design is innovative and useful. One criteria that was used to guide the design is that it must be user-friendly and practical. This design is meant to be able to be used by anyone, whether they are professional or not. This means that the design must not have complicated features and the instructions are fairly simple. Simple technology reduces the risk of consumer injuries. By considering this criteria, it ensures that the invention reaches out to everyone experiencing clogged drains and is easy to manage. Another criteria that must be considered is the durability of the design. The design must be sustainable and won’t break easily. To achieve this, the materials used to produce the design must be chosen wisely to ensure that it is long-lasting. It is also necessary to make sure that the materials used will not harm the environment in any way. A quantitative constraint of this design is that the invention must be limited to a certain amount of material that is used for producing this design. If the materials used for this design are too costly or too much in quantity, then this could result in the product being unaffordable for consumers. Thus, the quantitative constraints of this design must be the amount of materials used and the cost of those materials. The third criteria that is used to guide the design is effectiveness. The design must be able to serve its purpose when produced and used by consumers. To accomplish this, the design must have an intricate system and include all the details necessary to successfully carry out its function. This criteria ultimately determines whether or not the design was successful and if it had benefited society. All three of these criterias are essential to guide the design. It is only through these criteria will the design result in success.

Moreover, there are many features of the design that are crucial and allow it to perform its intended purpose. To begin with, one important feature of the design is the metal cable. The metal cable is what will ultimately unclog drains. The metal cable is a long metal wire with a slightly larger metal spring at the front of it. The extensive length of the cable allows it to collect waste and go deep into drains and areas where it may be
The larger metal spring is vital to the design because it is where most of the waste and bacteria that are stuck in the drain will be trapped into. When the metal cable is withdrawn from the drain, the waste that is now stuck in the metal spring will be removed and also brought back up. By allowing this feature in the design, it allows maximum waste to be removed from the drain while unclogging it. In addition, another feature that is important to the design is the turning knob and grip handle. These two work together in the drain unblocker because it is where a person must place their hands and maneuver the invention to perform its purpose. The grip handle allows a person to place one of their hands on it to make sure the metal cable is moving in the right direction and that it is properly removing all the waste and bacteria that is stuck in the drain. The turning knob gives the consumer the ultimate control of the invention. It allows the user to maneuver and metal cable and extend the cable into the drain as much as they desire. If they wish to retract the wire at any point, they can do so with the turning knob. The turning knob also serves as a place where the user can get a firm grip of the invention so that the metal cable can properly go down the drain. The grip handle and turning knob function together in a way that allows the user to control everything that occurs to the invention while at use and perform its intended purpose. The last important feature of the design is the sturdy material that it is made of. The design is made of sturdy plastic and metal. By using these materials, it is ensured that the design is long-lasting and will not break easily. Using sturdy plastic allows the invention to not rust, crack, or break into pieces easily and hold its shape. By using metal for the cable, the cable is not easily bent or snapped. The metal can withstand even the toughest clogs and complicated twists and turns in the drain while still holding its spring shape. Overall, the most important features of the design is the metal cable, grip handle and turning knob, and the sturdy materials it's made of. These are the features that ultimately allow the design to perform its intended purpose successfully.

When designing this product, the effects it had on society must be considered. This product is designed specifically for affecting the society and environment in a positive way. The product is meant to be used to protect the health of citizens and the environment. When blocked drains occur, there are waste and bacteria that are stuck in the drains. This can contaminate the water, especially drinking water, that goes through the drains by infecting them with harmful bacteria and waste. When humans come into contact with the now infected water, they can eventually develop diseases because of this. By designing a drain unblocker, it will be able to prevent all the harmful waste and bacteria from contaminating people’s water. In addition, the drain unblocker affects the environment by protecting it from pollution. Wastes and bacteria that are stuck in the drains and sewages are commonly washed away over time and flow with the water that goes through the pipe. The output of drains and sewages are usually lakes and rivers. When the water that is now contaminated in sewages gets poured into lakes and rivers, it pollutes those bodies of water. These bodies of water are crucial to the environment
as it serves as a habitat for many animals. Animals that drink or live in contaminated water are less likely to survive, causing them to most likely become extinct. Thus, drain unblockers serve to protect the environment and maintain its stability. To add on, this product also affects society by helping many people save money. When people experience clogged drains in their household, they often have to call a plumber to resolve this problem. However, plumbing services can be costly, and not everyone can afford to pay for these services. On the contrary, the drain unblocker is a much more affordable option that does not require any expert service. This product is meant to be long-lasting, so consumers will be able to use it more than once if drains do get clogged again. Anyone is allowed and able to use this product, not just certified plumbers. Although there are many benefits to the drain unblocker, there are also negative effects this product has on society. One big issue the drain unblocker can have on society is taking away the jobs of plumbers. With the drain unblocker, people with clogged drains no longer need to call and hire plumbers. This would cause plumbers to go out of business and not earn any profits to live in society. This product causes people to not make as much money as before. Overall, the drain unblocker is a product that is much more affordable than calling for plumbing services and can affect society by saving people money.

To conclude, the top right image is a drain unblocker that unclogs drains and sewages. This is a design that plays a vital role in society. Clogged drains may seem like a minor issue at first, but can escalate quickly and cause lots of harm. Through engineering, I am able to design this product so it will be long-lasting and effective. From its metal cable to grip handles, every aspect of this design is plotted out carefully to ensure maximum usage of this product.

About the Author:
Hi, my name is Jessica Wang. My engineering discipline is mechanical engineering. Mechanical engineering is a discipline that focuses on designing, building, and improving mechanical devices and systems. Knowledge from mechanical engineering has greatly benefited me when creating my design and solving the problem. With the knowledge, I was able to determine how the metal cables would function in a way that it collects the waste and bacteria from drains. Additionally, it allowed me to brainstorm designs that featured precise gears and specific placements. It helped me think of various solutions to unclog drains and sewages. This contributed to the overall design by setting a successful roadmap for the product. By using my knowledge of mechanical engineering, I was able to successfully design a product that solves the problem of clogged drains.

Conclusion Questions
1. Why is it important for engineers to be creative and think outside the box?
It is important for engineers to be creative and think outside the box because some problems cannot be solved easily. It may require alternative solutions or solutions that nobody has ever come up with before. By thinking outside the box and being creative, engineers are able to solve any problem.

2. What other characteristics do you believe engineers should possess in order to be successful problem solvers?

Other characteristics that engineers should possess are technical skills, team working skills, communication skills, patience, determination, and organization skills.