Dr. Montalbo-Lomboy,

The goal of the universal design project was to create an inexpensive toy that can fit in a kid's happy meal. The toy must be inexpensive and have at least two different functions. It must also implement the universal design principles and follow intellectual property.

Our toy, Fidget Widget, is a tri-wing fidget toy that utilizes a metal ball bearing in its center. The body of the toy is made of ABS plastic and the balls and bearing are made of chromium steel. In each of its three wings, the toy has a small metal ball that rotates in place. This allows for another method of fidgeting that the user can utilize.

The following shows what each group member contributed to this project:

Jason Repmann: Script of Video, Executive Summary, Customer Needs

Matt Tobino: Video Director, Reflections, Affinity Diagram, Problem Definition, Product Description

Noah Carey: Video Editing, Prototype Design and development, Cover Letter, Prototype, Appendices

Zach Waldman: Table of Contents, Main role in video, Reflection, Discussion, Activity Network

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# Universal Design Project

Team 5: Matt T., Noah C., Zach W., Jason R.

## Executive Summary

For the universal design project, five different teams were tasked to make a toy that fits in a McDonald's happy meal and embodies every aspect of a universal design. To be universally designed the toy had to be safe, easy, and intuitive to use, requires low physical effort, and can be used by anyone regardless of disabilities. Each team conducted the project through five phases. In phase one of the project, each team was to brainstorm and create five different potential designs based on the customer's needs which were that the product must have two functions and It must fit in a McDonald's happy meal. The five designs were then pitched to a user of the product to gather feedback, to pick the best design. Phase two of the project each team was to refine their chosen design, making sure to incorporate each aspect of universal design, and then create a task analysis of significant tasks associated with the product. In the final steps of phase two, the teams created a market analysis of the final design. In phase three of the universal design project, the teams were to describe how their final designs incorporated universal design and what types of intellectual property were used as inspiration. Next, each team modeled their final design in 3D software and the last step of phase three was to choose the best type of plastic manufacturing. Each team picked a process out of extrusion, injection modeling, and blow molding and created an economic analysis based on the plastic manufacturing process and the type of plastic used. In Phase four each team was to 3D print prototypes of the final design giving the expected user of the product a chance to physically use it and give more feedback. Using the feedback, the teams would then fine-tune their prototypes until they reached a fully functional product that satisfied the projected user. In phase five of the project, each team was to make a video presentation about their product explaining how it fits the universal design concept and all the information gathered throughout each of the five phases of the project.

**Problem Definition**

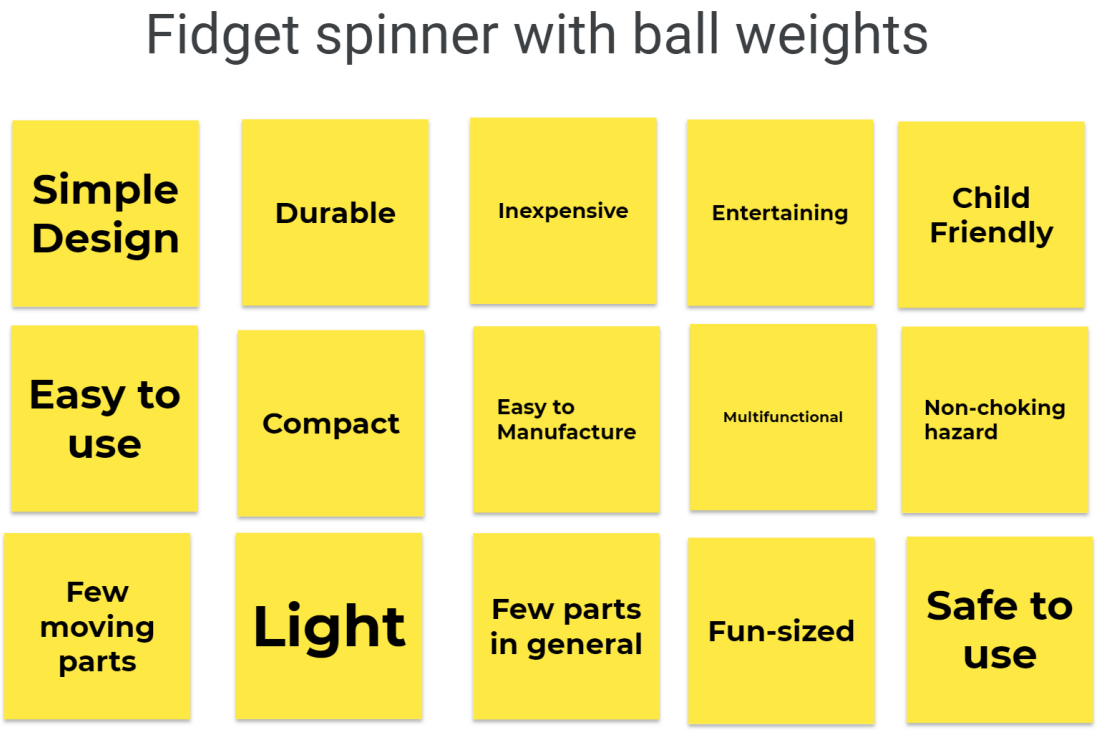
The problem with today's youth is that they can be easily distracted. Many children exhibit ADHD/ADD-like symptoms where they are often restless and lack the ability to focus properly. Parents have invested in several options to try to tame their children's minds and keep them focused. One popular method was through "fidget toys." These toys gave the user something to play around with in their hands and thus limit their distractions. We took steps in creating this product to ensure that we would make a unique fidget toy that was multifunctional and would help limit the distractions of children. We first had to settle on a simple design that children today would be able to easily recognize, and it had to be simple enough for them to figure out how the toy operates. The next problem was figuring out how to make the design unique to us. There are many fidget toys on the market nowadays, so we needed to make ours different from the normal in some way. The last step was making sure the toy was fun to use. By using ourselves as test subjects, we concluded that our toy would work with our target audience and children of all ages.

**Customer Needs**

The product had to incorporate all aspects of Universal design, therefore it had to be safe, easy, and intuitive to use with low physical effort regardless of disabilities. The product also had to have two functions and it had to fit into a McDonald's happy meal. After viewing what characteristics, a user would want from our product, we decided it should be entertaining, light and small, child friendly and it should not have any parts that would result in a choking hazard. Our team added these traits to the product because the age group that this toy would mainly be used by our young children. Keeping our product small and light makes it easier to use for

children and making the toy with no choking hazards in mind allows for it to be safe. The last aspect we added to the list was entertaining because a toy cannot be a toy if it is not entertaining to the user.

While keeping all of the customers' needs in mind our group created the Fidget Widget. The Fidget Widget consists of a tri-wing design that is centered around a bearing that allows it to spin freely when being held. There are also bearing ball weights fitted into each leg of the tri-wing design that acts as weights to conserve spinning momentum. The weights also act as a second function because they rotate around in their sockets. The Fidget Widget's design allows for it to fit all of the user's needs because it fulfills all of the universal design requirements, it is small, light safe, and entertaining. Below is the Affinity Diagram for our product.



**Product Description**

The Fidget Widget is based on the everyday fidget spinner. It uses the same tri-wing design as normal fidget spinners to both move and be moved. However, the main difference between the Fidget Widget and an average fidget spinner is what is at the end of each wing. At the end of each wing, our toy has a metal ball that can be rotated as opposed to additional bearings in traditional fidget spinners. This adds a second function to our toy as the child can either play with the Fidget Widget as any ordinary fidget spinner, or they can play with the metal balls in each of the three wings. This additional function makes our product unique to the other fidget spinners on the market. We also enlarged the size of the original frame in order to ensure the user could not choke on the product itself (As Shown in Figure 1). While the balls themselves present a choking hazard, we made the frame to be press fitted around them so that they could not be popped out easily (Shown in Figure 2). To also make sure the balls could actually go into their respective sockets we chamfered their holes so they can be squeezed and locked into place.

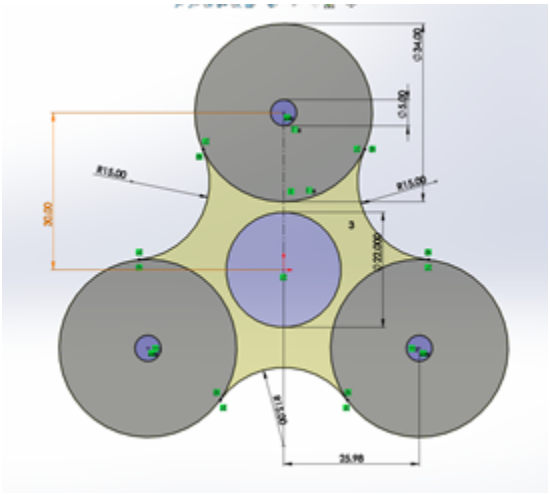


**Figure 1**

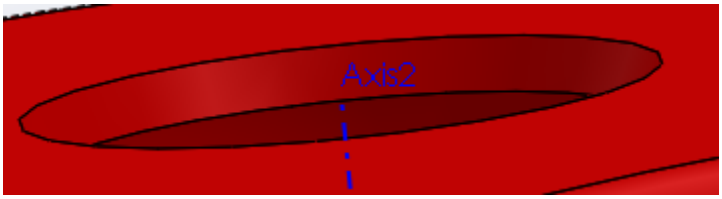



**Figure 2**

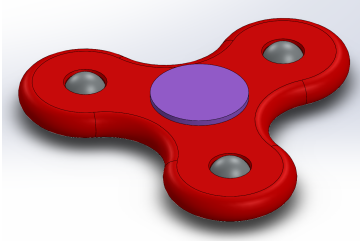
The Fidget Widget can also be sold at a comparable price. By using injection molding and ABS plastic, we can make the main body of the toy for only $1.65. The three metal balls and the center bearing cost another $1.11. This brings the price of production of the toy to a grand total of $2.76. According to Amazon, a pack of 5 fidget spinners would normally cost $20.00. With the unit cost of $4 per spinner, we can see that the Fidget Widget can enter the market at a comparable and competitive price.

**Discussion**

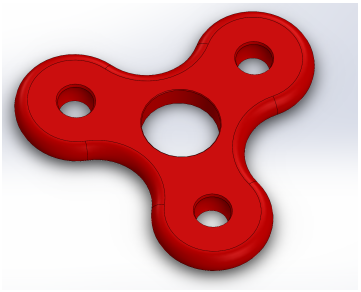
The Fidget Widget consists of three wings protruding from the center where a metal ball bearing is housed. There is a holder in the center so the user doesn't have to hold onto the ball bearing while spinning the Fidget Widget. That gives it a simple yet durable design. The Fidget Widget was designed so that it would be light and compact while still being safe to use and child friendly. At the end of each of the wings there is a chromium steel ball. That ball can be rotated providing another form of entertainment. As a group we all came up with the design. The original design has a button in the center instead of the balls on the ends of each wing. We concluded that that would be too difficult to produce and we opted to change our secondary function. The Fidget Widget can also be made for $2.76. With our method of production, making the frame costs $1.65 and the three metal balls and the ball bearing cost another $1.11 making it inexpensive and easy to manufacture.

**Prototype**

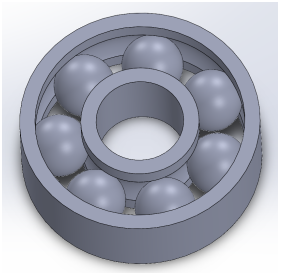
The prototype for Fidget Widget was designed on SolidWorks and printed using ABS plastic. It consists of three plastic parts, three chromium steel balls, and a steel ball bearing. The bearing is press fitted into the center of the toy and then the thumb rests are press fitted together through the hole in the center of the bearing. The holes that the balls are in were created so that once the ball was put into place, it could rotate in place, but not fall out of the body. Wherever a press fit was required, we added a small chamfer in the body so that it will fit together smoothly. The biggest strength of this prototype is that the body is very durable. Another strength is that the balls and ball bearings are tightly secured in the body. A weakness in this prototype is in the thumb rests. The top portion where the user rests their thumb is too thin and has a potential to crack under pressure. To fix this, we would need to change the thickness of that part to 2 mm instead of 1.5mm.



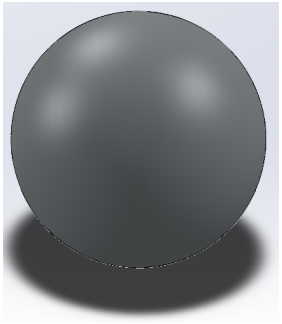
**Assembly**



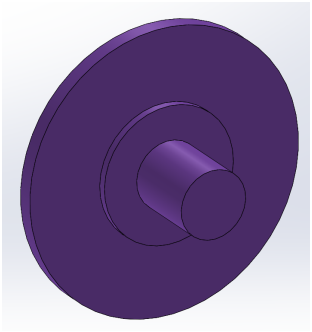
**Body**



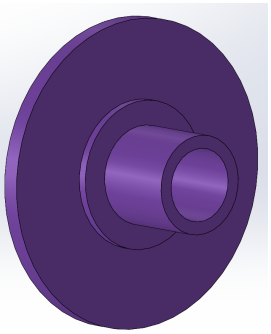
**Ball Bearing**



**Ball**

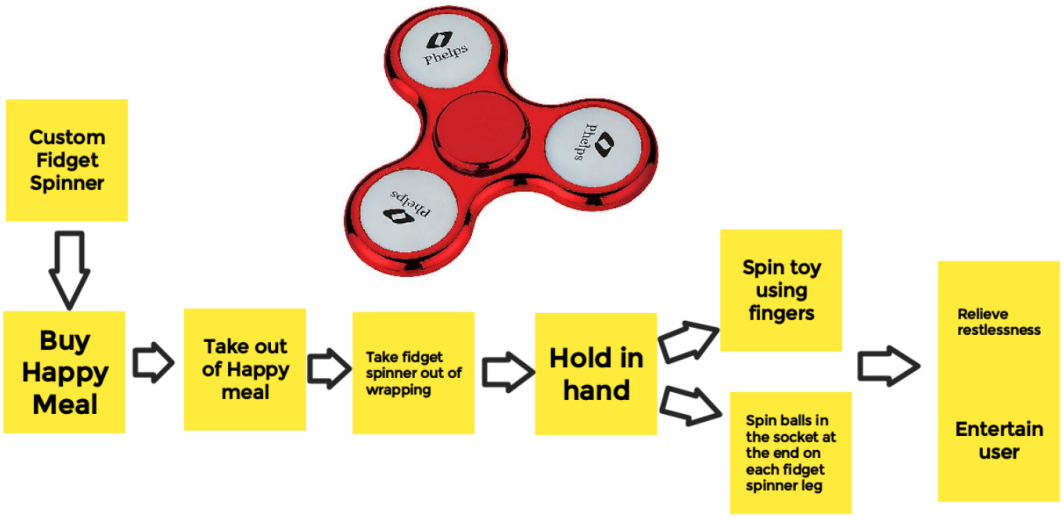


**Thumb Rest**



**Thumb Rest**

# Appendix A - Activity Network



# Appendix B - SolidWorks Drawings