

Retractable Table Cover

Ryan Schulte and Kadin Sims

KWR Chart(1/27)

Idea one: Umbrella Backpack Attachment

What do we know about the problem?

Walking in the rain when your hands are full can often be uncomfortable and annoying.

What do we need to figure out?

How to create an umbrella mechanism that is attachable and detachable to any backpack.

What resources do we need?

Vex parts, cheap existing umbrella, spring, laser cutter maybe, wood or acrylic

Idea Two: Phone Attachment - Protector and Accelerometer

What do we know about the problem?

While many phone cases do a decent job at protecting our phone when it falls, accidents still occur where phone screens are damaged. An attachment to any phone that can detect when the phone is falling, and open outwards to protect the phone could help solve this issue.

What do we need to figure out?

How to attach the mechanism to the phone (or any phone). How to use the accelerometer with the mechanism.

What resources do we need?

We could use our own cell phones for testing, laser cutter, 3D printer, vex parts for prototypes (maybe).

Idea Three: Retractable Table Cover Attachment

What do we know about the problem?

Existing table covers can be difficult to get on, clean, fold up, and can often be blown off by windy weather.

What do we need to figure out?
Materials, latching to table legs, how to regulate the speed of the cover retracting, securely attached

What resources do we need?
Table, waterproof fabric, spring, laser cutter, 3D printer, vex parts

Planning(1/28-29)

Project Title/Topic	Retractable Table Cover Attachment
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Goal	
Goal: Formulate an inquiry question or statement that clearly shows your goal, based on your personal interests. Be concise but specific and clear.	Create a Retractable Table Cover Attachment that reduces the difficulty of outdoor table covers, which is easy to use and cost efficient.
What is the purpose of the goal? What do you hope to achieve?	To create a solution to reduce the annoyance of attaching, removing, and cleaning outdoor table protectors.
What prior learning and subject specific knowledge is relevant to the project? How does the project relate to an academic class you are currently enrolled in or have taken?	We can just use basic building techniques We've learned and know from class and robotics. We do need to figure out how the spring mechanism will work.

Global Impact	
Identify how this will impact the community/world:	It is more of a local impact. This will help people maintain cleanliness

Product/Outcome	
What product/outcome will you create in response to the goal, global context and criteria?	We will create a retractable cover for outdoor tables

Form: Function: User/Audience: Costs:	A rolled up fabric around a spring Cover the table Homeowners with a yard and table Just materials which should be about \$25
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Research	
What will be the focus of your research?	Our focus will be on springs to retract the cover as well as how to regulate the speed at which it retracts. We also need to research what material to use for the cover to keep everything dry and safe
Media: (Includes books and articles, etc.)	Websites and possible magazines to look at tables and materials
Surveys: Would surveying your potential audience be useful?	We could survey homeowners to see if they have this problem and would buy a solution
Interviews: What human resources can you tap into for your project?	We could interview homeowners to see if they have this problem and would buy a solution
Other sources for research?	We can go to the stores where you buy outdoor tables to see how you we need to attach the mechanism

Specifications(1/30)

Prompts	Student Designed Criteria	Test or method of evaluation
Form: What will your project look like? What materials will you use? What size will your project be? What tools will you use? How will you assemble your project?	Cylindrical Tube with string and waterproof fabric, along with clamps Plastic, PVC, aluminum or stainless steel, waterproof fabric Tube will be 2-3' in length, with fabric spanning a max of 4-5' Fusion for CAD, vex for prototypes, 3D Printer, Laser Cutter, Bandsaw Assembly with duct tape, super glue, screws, or nails.	Take pictures of product, measure product, survey consumer evaluation of the product.
Function: What is the purpose of your project?	The tube will clamp on to 2 legs of the table, the fabric can then be pulled out and over the table when needed, and clamp onto the legs on the other side of the table. A spring inside the tube will allow the fabric to be easily retracted back into the tube. Should work with most outdoor tables of varied size and shape.	Test the spring and clamping mechanism, make sure they actually clamp/retract. Will use a table when designing the mechanism. Will test a variety of tables to ensure versatility.
User/Audience: Who is your project for? What needs do you expect your project to satisfy? Where/why will your project be used?	Intended for homeowners, people who own outdoor furniture. Product will be used to increase convenience and ease of using outdoor tables and table covers.	Have individuals use the product for their table, and try to use the product without outside instruction. Have them then take a survey rating their experience and the product.

Costs: How much will your project cost to make? *How much will you sell it for? *How much profit could be made on your item/project?	Relatively low cost. Around 20-30\$ to manufacture the product. Could be priced at 35-40\$.	Total the cost of creating the product once it's finished. Ask potential customers how much they'd pay for the product.
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Kadin Sims Finding your passion(1/31)

Use the prompts below to help identify what you are passionate about.

Things I am involved in or do at school, with clubs or social groups are:
Robotics
The things I enjoy doing for relaxation or fun are:
Video Games Spending time with friends Drawing
The most important things to me are:
My family and friends My pets My education My mental and physical health
The things I think people my age are concerned about are:
School, College Social Media Friends, Family
The things I think people around the world are concerned about are:
Climate change, environment Politics Other global and social issues

Things I am passionate about:
My future Robotics Art and Design

Use the prompts below to help identify what you excel at.

My favorite subjects in school are:
Math, science, engineering.
The things I am most proud of are:
My grades My creativity
People tell me I am very good at:
Working hard in school Being an open minded and caring individual

My favorite school projects involve:

Creative freedom
Working with friends
Challenging but fun

Three potential project ideas are:

Building some aesthetic object
Learning a programming language
Working with the community

Ryan Schulte Finding your passion(1/31)

Use the prompts below to help identify what you are passionate about.

Things I am involved in or do at school, with clubs or social groups are:
Rowing team Robotics
The things I enjoy doing for relaxation or fun are:
Climbing Trees Mountain Biking Road Biking Longboarding Looking at stars Hammocking Nerf Gun Fights Frisbee Sleeping
The most important things to me are:
Fun Health Socializing with friends Being Outside
The things I think people my age are concerned about are:
Global warming Pollution Grades Mental Illness Social Life
The things I think people around the world are concerned about are:
Global warming Pollution

Illness Transportation Traffic
Things I am passionate about:
Global warming Pollution Having fun Staying fit Relaxing Sleeping

Use the prompts below to help identify what you excel at.

My favorite subjects in school are:
Engineering, Math, Science
The things I am most proud of are:
Problem solving abilities
People tell me I am very good at:
Biking Rowing Critical Thinking Problem Solving

My favorite school projects involve:

Engineering

Not annotating random passages written by old english dudes

Three potential project ideas are:

Cleaners for oar handles

Secure bottle cage for mountain biking

Breaks For a longboard

Progress Check Form 2**Team Members: Kadin, Ryan****Projected Date: 2/3****Final Score:****Category 1: Goals****What do you want to have finished for your next Progress Check?**

- 3 generated concepts of latching to both sides of table and extending
- Make decision matrix, determine criteria, choose design to prototype
- Create Basic cardboard prototype using string as well
 - Not to scale, use paper as fabric
- Start researching what materials to use, and how to design the spring and latching mechanisms, for next week.
- Research on where to buy table if needed

Category 2: Tasks**What tasks are each group member performing to achieve the above goals?**

Member 1: Kadin	Member 2: Ryan	Member 3:
Create 1 of the generated concepts	Create two of the generated concepts	
Create decision matrix and criteria, choose design to prototype	Create decision matrix and criteria, choose design to prototype	
Research materials, mechanisms	Create Cardboard prototype	
Help with cardboard prototype	Help with research	

Design Constraints(2/4)

- Create a product that reduces the challenge of existing table covers, those being.
 - Attaching and detaching
 - Cleaning
 - Folding
 - Storing
- Allow the product to be attached to the table, and have the table be usable (while the fabric is rolled up) when it is attached.
- Have the product be a realistic size, so that it is not inconvenient when attached to the table.
- The fabric should be easy to roll out and hook on to the other end of the table, and should retract easily
- Have the construction and materials be a low cost, 60 dollars max

Justification

- Design #1 had the highest score on the decision matrix, so that design was chosen to begin CAD and prototypes.

Parts List

- 5' x 10' silpoly Tarping
- 2 ribbon springs
- 2" PVC
- 1/2" PVC
- Filament(Hopefully Nylon for final)
- Dowel rod

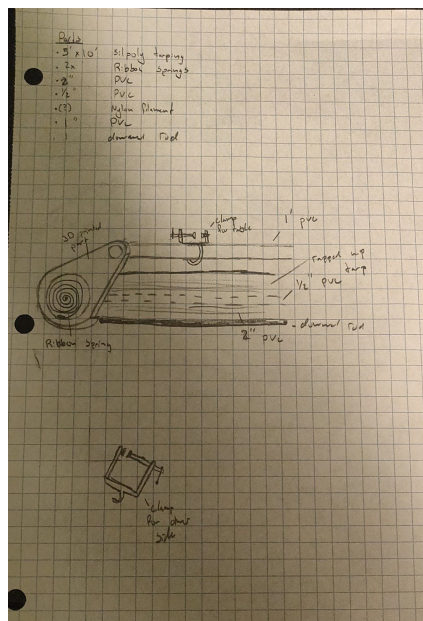
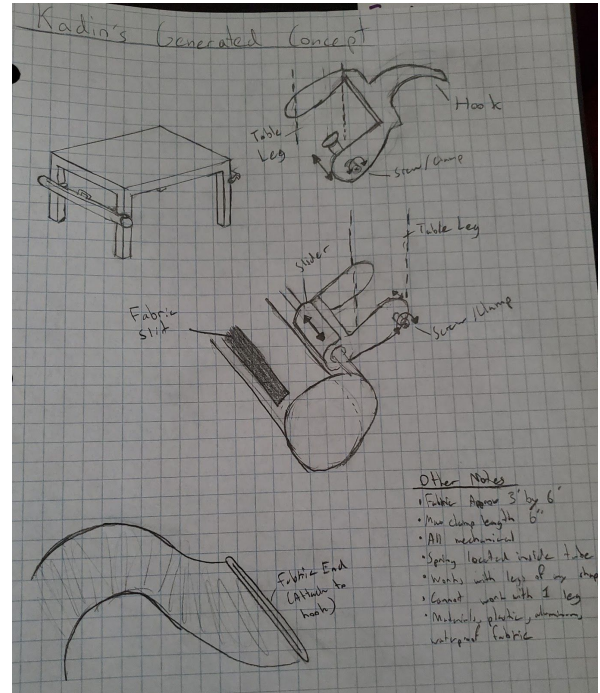
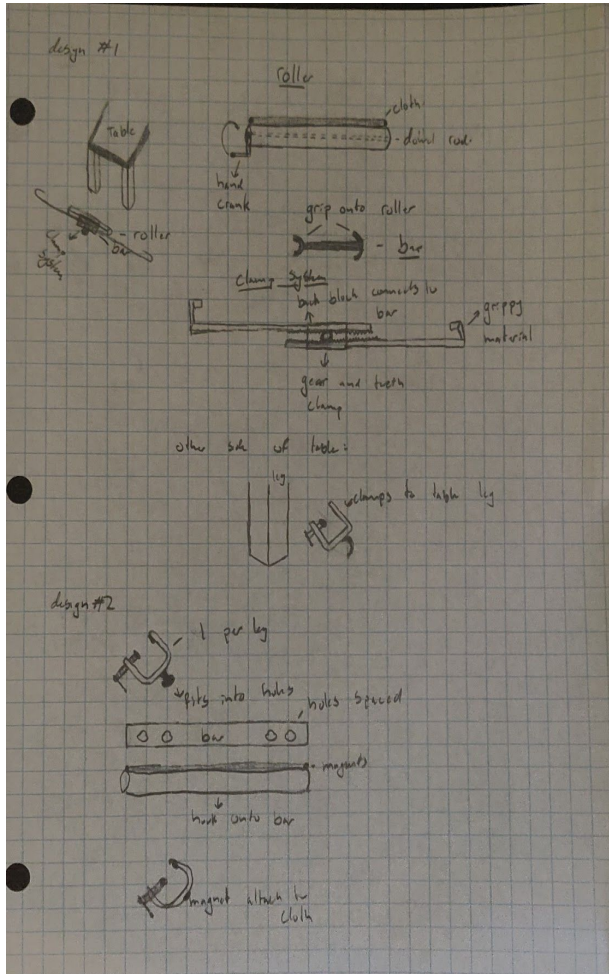
Description;

Clamps are on rod for adjustability of clamping. Clamps attached to the table holding up rolled up material. On the other side of the table, clamps have hooks. The material spools out, with a spring pulling it back, and hooks onto the clamp hooks.

Design Matrix (2/7)

Category	Name	Design 1	Design 2	Design 3		Score each out of 5
Ease of build	Kadin	3	2	5		5 - Excellent
	Ryan	4	3	5		4 - Great
Size	Kadin	4	5	3		3 - Decent
	Ryan	5	4	3		2 - Fair
Sturdyness	Kadin	3	3	3		1 - Lacking
	Ryan	4	3	2		
Versatility	Kadin	4	5	3		
	Ryan	5	5	2		
Cost	Kadin	2	4	4		
	Ryan	5	4	5		
Sustainability	Kadin	3	4	4		
	Ryan	4	3	5		
Total		46	45	44		

Generated Concepts and Final Design(2/4-5)



Progress Check Form

Team Members: Kadin, Ryan

Projected Date: 2/10

Final Score:

Category 1: Goals

What do you want to have finished for your next Progress Check?

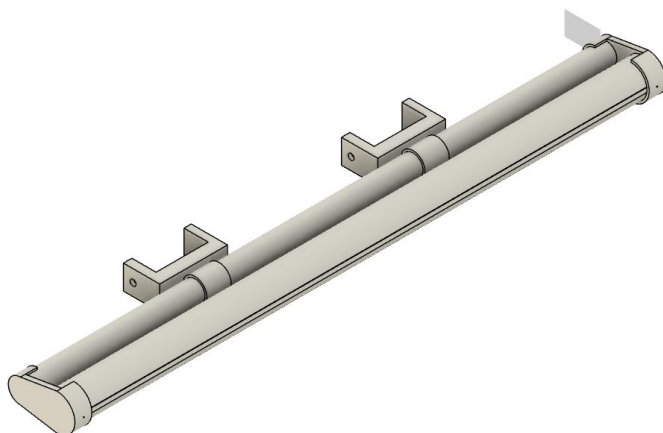
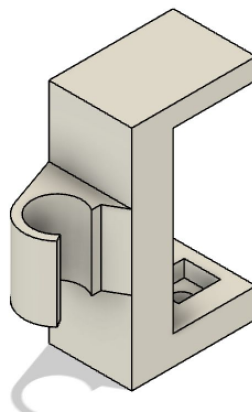
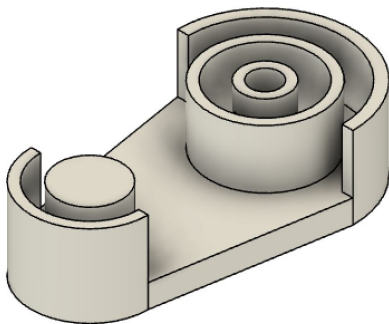
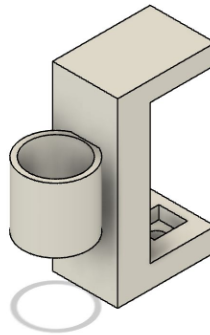
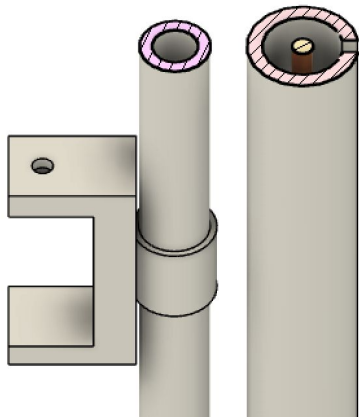
- Create CAD model of the final product
 - Separate parts for PVC and holders
 - Don't need specific CAD for springs
- Work on poster
 - Make slideshow for pages
 - Make layout
 - Start putting it together
- Plan the Video

Category 2: Tasks

What tasks are each group member performing to achieve the above goals?

Member 1: Kadin	Member 2: Ryan	Member 3:
Work on poster Plan video Help with cad	Create CAD Plan the video Help with poster	

CAD Parts (2/11-15)



Progress Check Form 4**Team Members: Kadin, Ryan****Projected Date: 2/17****Final Score:****Category 1: Goals****What do you want to have finished for your next Progress Check?**

- Work on poster
 - Make slideshow for pages
 - Make layout
 - Start putting it together
- Make the Video
- Create table based off CAD dimensions from wood
- Order/buy Parts

Category 2: Tasks**What tasks are each group member performing to achieve the above goals?**

Member 1: Kadin	Member 2: Ryan	Member 3:
Work on poster Create Video Make Table	Work on Poster Create Video Order Parts	

Video Script (2/17)

Hi, my names Ryan

And I'm Kadin, and we're seniors at Huron High School.

A problem that we found was that outdoor furniture covers can be annoying to use. They're difficult to get on, fold up, clean and store. Likewise, most cover that are meant to protect the furniture from outdoor weather just end up getting blown off by wind. So we decided to create a product that worked to eliminate those issues.

We researched existing solutions. We considered traditional table covers, which are waterproof, and fully cover the table, but are often very large and heavy. Likewise, many of these can be as expensive as \$50, where they can still be blown off by wind. Other table covers are made of spandex, which allow it to stretch over the entirety of the table. While these tend to be less expensive than other table covers, they rip easily, and can be difficult to handle.

Other research included different materials, retraction mechanisms, and tables that we could use to test our design.

Once our research was finished we decided on constraints. Our goal was to create a product that reduced the difficulty of existing table covers. We wanted to create a design that attached to any table, and a spring mechanism would allow for a water proof fabric to roll over the table and attach onto the other end. We wanted this product to be easy to use, while being under \$60 for construction and materials.

We created three concepts. One concept involved a sliding latch mechanism, another used a gear and roller, and another used a peg system.

A decision matrix was then used to determine a final design, where the criteria of buildability, size, sturdiness, versatility, cost, and sustainability were considered. The design with the slider gained the highest total score, so we began prototyping.

As we prototype focused on the main impact we wanted our design to have; to create an easier cover that maintained a tidy look. To maintain this low profile, we looked for parts that wouldn't take up a lot of space. We decided on PVC pipe to use for our prototype and to use clock springs to allow the fabric to roll back into the piping. We also chose nylon fabric to use as the cover, due to it being waterproof and thin.

With this idea of what we wanted our final design to look like, we created a basic working allusion out of cardboard and paper. This model did not have a spring attached due to complications with the spring, but it was able to show us problems we may face in the future. We found that the spring, or some other mechanism to wind up the fabric was 100% necessary as the paper was hard to wind back into the tube after use. We also found that it is very important to have a good latching mechanism for the table, ensuring that the product won't move. We also need the clamps to be wide enough to fit most table legs. Allowing for versatile use of our product.

With these ideas in mind, we made our final design in CAD. The final design had the parts and assemblies of how everything will be pieced together. Using a piece of PVC as the outside tube, we will have the fabric spooled around a thinner shafter which is attached to the spring. All of this is attached to the table, allowing for a secure and low profile product.

After building this prototype, we will test the durability and sustainability of our design, making adjustments where we see fit. We will also look to see what space isn't filled, and try and minimize that space. Finally, we will take our design to people who own outdoor tables and survey their ideas about the product .