

Design Proposal Template:

School: Parkrose Middle School **State:** Oregon

Division:

Middle School

High School

Team Members' Names: Dax Richardson, Jackson Vo, Khanh Pham, Emily Strohmayer

Project Title: Should be creative and give readers a general sense of what the project is about and want to read more. (20 word maximum)

Team KOLD Introduces Project PONCHOS: Portable, Outdoor, Non-expensive Cooling & Heating Operating System for the Parkrose School Community.

Community Challenge Being Addressed: Describe the community challenge that you will attempt to address with your proposed solution. (75 word maximum)

Many Parkrose students struggle with staying warm or cool during extreme weather. This is due to many families struggling financially. Thus, many students have to stretch the use of their clothes or wear "hand-me-downs." However, they may feel insecure or embarrassed while wearing them at school. When students' needs aren't met, they can't focus in school. We want to help students feel comfortable and included in the Parkrose community.

Community Research and User Identification: Explain the process used to identify the community challenge and select your user. Include any research done to identify issues in your community and understand which groups face challenges because of these issues. (150 word maximum)

We first began by interviewing various school personnel about what students struggle with every day. In our interview with our client, Ms. Read, the school counselor, we learned that Parkrose has many students who struggle to stay warm or cool in extreme weather. Our research showed that Parkrose has approximately 150 students identified as homeless, many of whom cannot afford strong, effective, weatherproof clothing that ranges from \$50 to \$300. In addition, most clothing can only protect from one type of weather.

Our research also revealed that the USDA reported low-income neighborhoods and communities of color, like Parkrose, are more likely to experience elevated levels of intra-urban heat island intensity than other areas. In addition, we have experienced record-low temperatures in our area this winter. We agree that many of the current solutions to this issue are not affordable, easily accessible, and comfortable for many Parkrose students.

User Profile: Provide a detailed description of your selected user. Include information about challenges they face, how those challenges impact their lives, and specific project needs based on user feedback. (150 word maximum)

Our intended users are Parkrose students who struggle with staying warm or cool in extreme weather. They come from low-income households who can't afford clothing that protects them from such weather (ex, heat islands, freezes). They often wear multiple layers of clothing to stay warm or wear thin clothing to stay cool. This is inconvenient for users, because they aren't easy to store, are only appropriate for some types of weather, and are expensive. When students' needs are not met, they feel excluded from the community. The following needs were identified from user feedback:

1. **Accessibility:** A poncho would be useful as it is easy to carry around and store in a locker.
2. **Durability:** It should withstand different kinds of weather (i.e., waterproof for rain).
3. **Comfortable:** It should help the user stay warm or cool in various types of weather.
4. **Affordability:** It should be inexpensive for low-income households.

Project Goals: List your project goals and explain how these goals will address the community challenge. Project goals should define the desired outcomes, not specific features of the proposed solution. (150 word maximum)

The following project goals were identified:

1. **Accessible:** Create a poncho that is accessible to anyone, regardless of age, and can be light and easily stored anywhere.
 - a. Parkrose students would be able to use it with ease.
2. **Durable:** Use material that is durable or resistant against damage caused by extreme weather (e.g., water damage from rain or storms, heat damage from extensive heat exposure).
 - a. Parkrose students wouldn't have to worry about one-time usage.
3. **Comfortable:** Incorporate a heating and cooling system that can:
 - a. Turn on the heating or cooling when reaching a specific temperature and then turn off when no longer in use.
 - b. The poncho will adjust the temperature for Parkrose students whenever they wear it.
4. **Affordable:**
 - a. Create a poncho that uses inexpensive materials and can be easily maintained by users coming from low-income households
 - b. Parkrose students who come from low-income households can afford this poncho.

Proposed Solution: Describe your proposed solution, including any innovative and unique features, and explain how this solution will address your users' needs and the challenges they face. (150 word maximum)

Our proposed solution is a poncho that can adjust its internal temperature depending on certain temperatures. It will help houseless people who don't have ways to maintain a comfortable temperature during extreme weather.

- **Accessible:** The poncho is light and can easily be put into a student's locker.
- **Durable:** It is made of polyester, which is found in sports gear to protect from heat and water damage.
- **Comfortable:** It has adjustable laces to keep cold or warm air in the poncho.
 - **For the heating,** we have 7 polyimide heating pads, located on the chest, ears, and back, and turns on when the temperature drops below 10 °C (50 °F).
 - **For the cooling,** we have 4 mini fans around the poncho that turn on when the temperature gets about 23°C (73.4 °F)
- **Affordable:** The total cost of the materials is approximately 15-30, which is affordable for many low-income households.

Initial Design: A single graphic of your first design idea with key features adequately labeled. It should be easy to understand, and the reader should have a general understanding of how the prototype functions by looking at the graphic. Max size 8.5" x 11". May contain up to 4 views of the design.

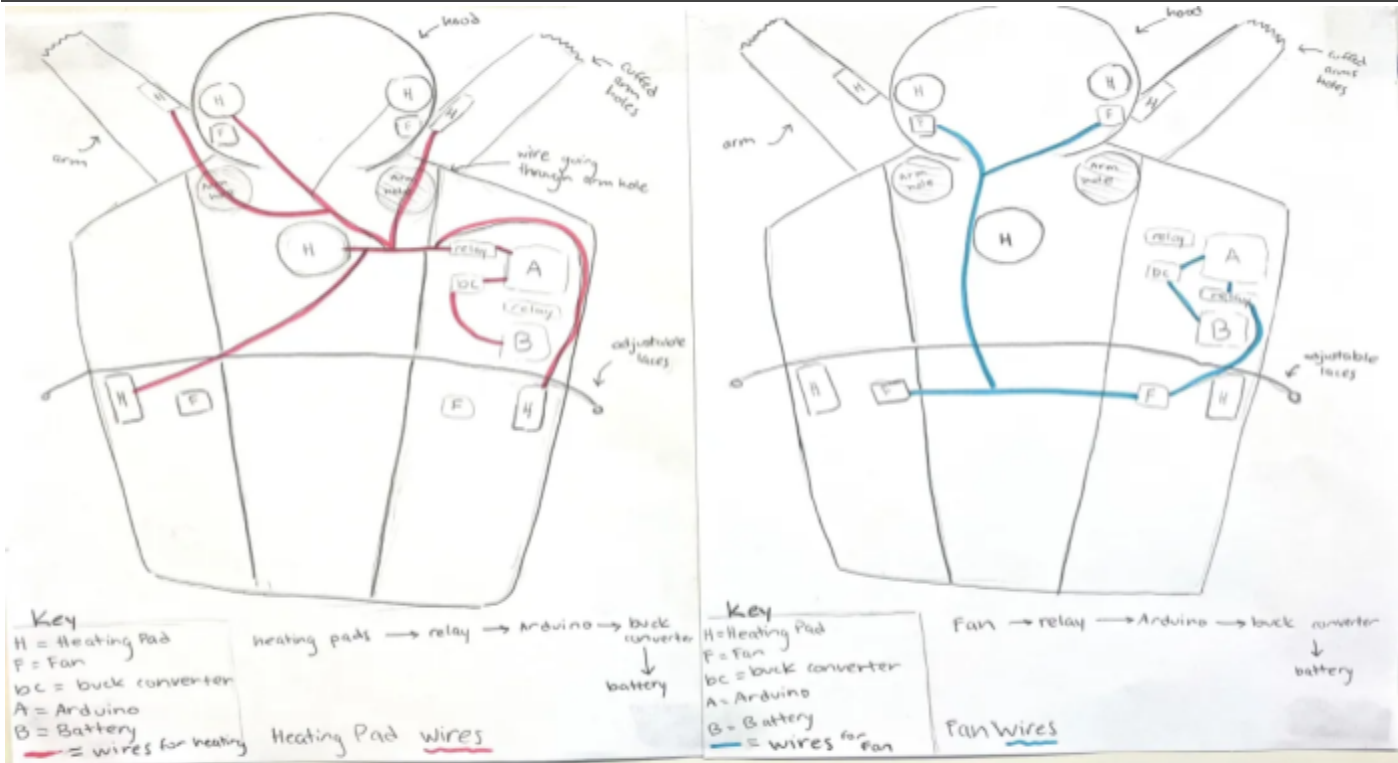


IMAGE #1: Heating and Cooling Fan Wiring within Poncho (split version)



IMAGE #2: Diagram of wiring connections (with volt conversions, and more up-close)