

### Problem Statement:

- Snow and other cold climates affect more than half of the United States based on surface area. Because of this many people around the country and further more around the world face problems with cold weather. The CDC states that around 56,000 people every year die of the common cold as of last year. As college students we see the problem of cold weather. The problems arise with cold weather which weaken some people's immune system causing them to get sick more easily. The place where we face the most trouble with cold weather is walking from class to class. To reduce the amount of people getting sick or having problems caused by the cold we aim to make a coat for people who get cold walking around during the winter/fall/spring while it is cold.

### Background Description:

- Making a coat that takes the temperature of outside along with your body temperature to heat up to a comfortable temperature. Also making the temperature adjustable if the coat is too hot or too cold.

### Timeline

First Prototype: November 15

Second Prototype: November 27

Final: December 4-6

### Management Plan:

- Project Leader:
  - We will communicate via text and meet every Saturday at the Engineering LLC to work on this project for at least 2 hours.

### Risks and Exposures:

- Exposures:
  - Heating pad gets too hot and burns wearer
  - Heating pad gets too hot and burns coat (catches coat on fire)
  - Heating pads come in late (don't ship in time)
- How to recover:
  - Put fabric over pads to lessen heat or limit it. Reduce to amount of heat that is being transferred (Could also lead to energy saving).
  - We can just look and see in either the code or wiring of the project to where the problem happened and fix it by the time we test our first prototype
  - If pads come late we can still write the code and still try and then once they get here just adjust some of the numbers in the code

### Environmental rational:

- Implementation Program: Up to Blake
- Naren and Graham can build and code as necessary

- Naren can sew

#### Budget/Bill:

- Cost of heating pads: \$3.56 for 10+ (\$35.6 for all of them)
- Coat (Goodwill \$10)
- Battery Pack (w/ switch or if not then add switch also)
- Wires
- Batteries
- Sewing Supplies (string, needle)
- Fabric (For making pockets inside coat) (Can we sow electronics in between the jacket layers? And then use a zipper for accessibility and 'style/aesthetics). Also could get fireproof fabric or heat resistant fabric to counter heating pads.
- Sensors (For detecting temp of outside and body(2+)): temp sensor(\$1.50(ard) or \$5(node & max 8) each (depends on type of mc))(might need to test sensor to make sure it works like what we want...), Also will need a pot or other adjustable sensor for temp controllability.
- Microcontroller (node or other mc(prob arduino if so) - needs plenty of analog ports.)
- Possible shipping costs

#### Evaluation:

- Will know the project is completely working when the heating pads and everything start to heat up and reach a comfortable temperature for the user.
- The user can wear the coat without thinking it is too hot or cold

#### Resources/Sources:

##### Health Info

<https://www.webmd.com/cold-and-flu/qa/how-many-people-die-from-the-flu-each-year-and-how-is-it-prevented>

<http://ergo.human.cornell.edu/studentdownloads/dea3500notes/thermal/thsensnotes.html>

<https://explorable.com/skin-senses-temperature>

#### Purchase Links:

<https://www.adafruit.com/product/3670>

[https://www.adafruit.com/product/1518?gclid=Cj0KCQiA8f\\_eBRDcARIsAEKwRGelM932nvvaNYgPrtrHqms8YHnJahJN2bljXWxvgSmc8CpMfNLxMKgaArdqEALw\\_wcB](https://www.adafruit.com/product/1518?gclid=Cj0KCQiA8f_eBRDcARIsAEKwRGelM932nvvaNYgPrtrHqms8YHnJahJN2bljXWxvgSmc8CpMfNLxMKgaArdqEALw_wcB)

[https://www.amazon.com/dp/B0786HDVHW/ref=sspa\\_dk\\_detail\\_10?pd\\_rd\\_i=B0786D5R6C&th=1](https://www.amazon.com/dp/B0786HDVHW/ref=sspa_dk_detail_10?pd_rd_i=B0786D5R6C&th=1)