Optical Feedback Wearable 2 Executive Summary

Team 32

1. Design Problem

One of the guiding principles for the design early on was acceptance that over the course of a project complexity increases exponentially. A design project can go through multiple stages of revision and rework should the capacity of the team exceed the goals set early on, but moving backward to a place of less complexity can render unrecoverable setbacks. With that in mind, the group chose an easy audience to address, the student body, as endless feedback and user input could be obtained throughout design. The proposal for the project was open ended, with a few simple guidelines: that the team must produce a wearable, and that wearable must interact with the user. Students were polled on what they might want out of wearable technology and two simple features were selected from the results. The team would design a wearable with safety lights for traversing campus at night, and a heating pad for comfort and pain relief. A sweatshirt was selected to provide plenty of space to mount electronics with room to expand on the design.

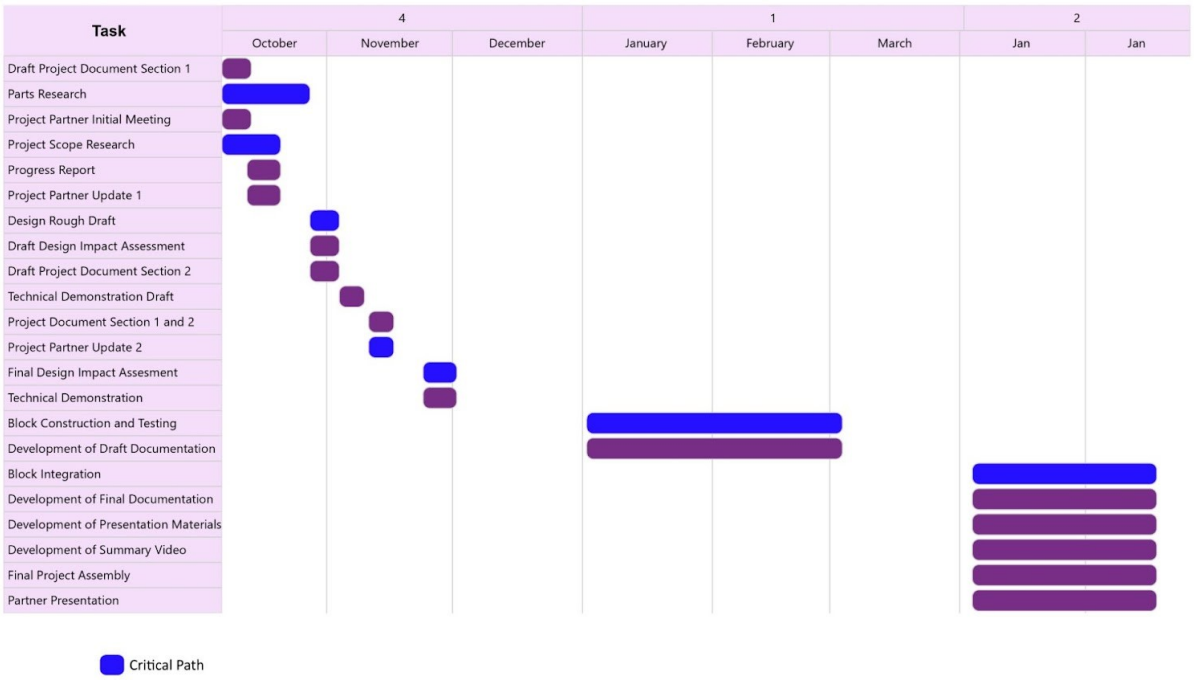
2. Progression of the Team and the Design

Initially the sweatshirt was intended to have two features which encased their own sensors and peripherals. A heat sensor would detect the temperature of the environment activate the heating pad. A light sensor would detect ambient light to activate the safety lights. Parts were sourced and schematics were drawn up to keep the design in a state of low complexity. When the team lost a member after the first term of the design course, this design was still simple enough to be completed by the remaining three. Blocks were completed to the best of each teammates' capabilities. Ultimately several blocks had to be redone as there was a range in the degree to which each block was designed to fulfill the requirements of the overall design.

Between the second and third term, team cohesion broke down. The work of aligning each block with the standards necessary to function within the system was not distributed evenly. The pressure to see the design completed pushed some teammates to resort to disrespectful and unacceptable measures to exploit others to compensate for the failures of their own blocks. The team ultimately split and a new team formed, comprised of just a single member.

At this late stage in realizing the design, the early decision to start with a simple design which could be expanded upon worked to the new team's advantage. Sensor input was substituted with full reliance on button actuation. This reduced the complexity of some blocks, but the project still required the generation of three new blocks and the full redesign of two others. Light, heat, and enclosure blocks were started from scratch. The power supply underwent an overhaul and the control block had to be remade from schematics with updates to the microcontroller code. No work completed by previous team members was used to complete the final project as the schematics and code that got reused were originated by the team member that had split off.

3. Project Timeline



4. Key Lessons Learned

On the outset of a project, the worst must be factored into plans. It's hard to imagine you'll be completing all of the work on a four person project alone, but this isn't outside the realm of possibilities. As long as doing so doesn't cut off the opportunity to expand on your goals later, accounting for even the most unlikely of risks is essential.

It can seem like an attractive idea to step back and let someone else take the reigns of a project. Maybe they seem better equipped, maybe they have a domineering attitude which makes it hard to participate, whatever the reason one cannot rely on that person to have your best interests in mind even when you have coinciding goals like a good grade on a group project. That person can let you down, or that person can break given the amount of pressure they've been put under. If you treat them like they're there to be used to make up for you haven't been able to accomplish on your own, they may just leave you to your own devices.

Some of the requirements and goals set for the project were useful in confirming that it worked, but did not address some of the most vital concerns for the potential audience. This would have been a more satisfying and effective system had requirements been selected which focused on the most meaningful assets of a wearable device. Compactness in electronics may have suited the project better than measuring the visibility of the safety lights for example. Focusing on waterproofing rather than removable parts and modularity to address goals for being able to wash the wearable may have resulted in a system more tolerant to a variety of environments. Some of these goals may have been more ambitious, but to have planned to meet requirements that create a better end product early on could have refocused the work to a more fulfilling end result.