

EXECUTIVE SUMMARY

When compared to the use of wires/tethers, wireless control allows for easy movement and mobility of robots, thus our sponsor, Shai Revzen Professor of Electrical Engineering & Computer Science at the University of Michigan, wants to use a “Wixel” wireless controller circuit board to control the robots in the Biologically Inspired Robots and Dynamical Systems lab. Therefore, the focus of our project is to design an enclosure to house both these wireless communication systems as well as the required batteries to power the robot. We began our investigation by noting many of the key features necessary for our design in currently available products. Some of these features include waterproofing, shock absorption, heat dissipation, and port access

After determining our design specifications, we begin concept generation by focusing primarily on small designs that were intended to fulfill specific sub functions of the design (i.e. to fulfill a single specification). From these generated concepts, we were able to perform a subjective ranking of these sub functions in order to decide what our best options were and create our first full design.

After this initial design, we then got feedback from our sponsor and went through a lengthy series of redesigns before we arrived at a new ‘final’ design. From this design, we has specific features that we needed to do an engineering analysis on in order to manufacture them correctly and be assured of their performance. Some of these analyses included the heat dissipation through the enclosure and the design of snapfit locks to close the enclosure. After we finished these analyses, we arrived at our final design and began prototyping.

From the prototyping design, several small design changes were made and we were able to create a functional prototype. Additional validation testing was performed on this prototype in order to determine what specifications were met. We determined that we were unable to fully meet some of our specifications (such as moisture resistance), and that further refinements should be made. We were able to create a partially functional prototype but, during the process of validation testing, some features of the enclosure were damaged and would have to be replaced in order to be functional again. Our team views this design as a baseline prototype that should be further refined into a final product. If the project were started over again with our final prototype as a beginning baseline, the overall performance and quality of the product could be improved dramatically. As such, our current design is functional but far from ideal.