

**Design Problem:** A Chicken Coop that is able to monitor environmental factors such as temperature, light presence, and food/water availability and actively act upon that information without human intervention is desired. Through this, human involvement can be limited to a subset of activities including replenishing resources and troubleshooting environmental issues of the system.

**How the problem was approached:** Before design and development, the overall requirements of the project were distinctly defined. This document outlined the overall goals of the system, and the precision that each of the features needed to accomplish. Afterward, the design process began, where the overall functionality of the system was broken down into six functional blocks. The interfaces for each of these blocks were clearly defined, with expected format for input and outputs. This allowed for these blocks to be developed in parallel and asynchronously. Since there were three members of our group, and each member owned and implemented two blocks of the system.

As depicted in the Gantt Chart below, development for each of the blocks each began with a research phase and an implementation phase. During the research phase, members of the group would collaborate with each other and find online resources on how to implement the functionality of their block. Regular check-ins and meetings were performed throughout the 10 weeks to ensure each member was on track to meet each milestone. Often, revisions needed to be made to accommodate design flaws that were discovered during implementation. For example, it was found that an ultrasonic sensor was unable to accurately determine the amount of food resources due to the concave shape of the chicken feed in the tube. It was through discussion and receiving feedback from other groups that the group was able to make the design choice to place a flat circular piece on top of the feeding tube.

**Key Lessons:** A big takeaway from this project was experiencing how to break a large, complex project into digestible parts that can be developed upon in parallel--greatly decreasing development time. This also emphasised the importance of being able to clearly define the interfaces in a design, and put time and effort into the design phase to allow for a cleaner and more efficient implementation. Furthermore, the remote collaboration of this project also emphasized the importance of communication to each other. Without constantly keeping each other up to date, it would have been difficult to have come so far in our project development.

## CHICKEN COOP GANTT CHART

PROJECT TITLE Smart Chicken Coop  
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