2021-2022 Wash Effectiveness Test

**Pre Experimental Design Written Premise**

The purpose of testing the effectiveness of a wash process is to determine how foriegn substances are removed from a clothing item. With this in mind, the cleaning capability of a machine could be measured by determining how much foreign material is present in a clothing item before the wash process, and then after. While it is hard to accurately determine the amount of contaminants in a clothing item, by knowing how much of a contaminant was added to a clean shirt before the experiment, and then how much was present in the wash water after, it could be determined how much is left in the clothing. The amount of contaminants not in the clothing can be determined by taking the water removed after these processes and extracting out the contaminant being tested with. This value could be compared with other prototypes to determine their viability.

A potential procedure for this experiment of this using salt would be:

1. Dissolve 50 grams of salt into water.
2. Roll up the shirt being tested, and pour salt solution over the center of the rolled shirt such that nowhere on the shirt is wet.
3. Leave the shirt to dry.
4. Run the desired washing function with the shirt.
5. Remove shirt and collect wash water.
6. Boil wash water until all water is evaporated leaving dissolved salt.
7. Weight the salt from washed water, compared to the mass of salt added initially.
8. Repeat for each trial.

Alongside the washable marker test, a similar experiment should be conducted if the design of this washing machine is to be furthered in the future.

Contaminants in clothing could include numerous types of materials. It would be worthwhile to test a machine's ability to remove these contaminants from clothing. Specific types of contaminants and potential anologs for testing includes but is likely not limited to:

* Water-soluble liquids (Corn Syrup)
* Insoluble liquids (Vegetable Oil)
* Water-soluble solids (Table Salt)
* Insoluble solids (Sediment or Sand)

Not all contaminants can be accounted for in this way, as an example, there might be residue left in the machine afterwards. These data points can also be found and used to measure the washing machine viability among others.

Determining Experimental Error: This can be found by mixing the contaminants in a washing machine prototype in the same amount of water as in the experiment. Upon removal of the water, the contaminant is extracted using the same means. The error can be derived by taking the amount inputted into the system and the amount successfully extracted from the system and calculating the discrepancy.

Determining How Much of a Contaminant to Add to a Clothing Item: This is an unexplored part of the design. This could be determined through research of what a common amount and type of contaminant might be present. Another method might be to find the maximum amount of a substance that can be dissolved into the predetermined amount of water for water soluble contaminants. More work needs to be done to determine this.