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Mrs. Flahavan

Science Fair 25-26

17 December 2025

**Evaluating Multi-Stage Filtration Efficiency in a Low-Cost Solar Powered Water Filtration System**

11/1/2025: 10 AM – 1 PM; Location – home workspace

Conducted research for the research plan

11/2/2025: 10 AM – 1 PM; Location – home workspace

Wrote research plan along with risk assessment paper

11/16/2025: 10 AM – 1 PM; Location – home workspace

Goal: Understand the equipment needed for this project by conducting research and buy the equipment needed to start prototyping.

I conducted research on the equipment needed for this project, bought materials, and made a PowerPoint outline. I also made a schematic of how equipment will be connected.

12/6/2025: 2 PM – 8 PM; Location – home workspace

Goal: confirm the layout of my design and ensure all parts are ordered

I finished ordering the materials needed to build my design and finalized it by drawing out the structure and fixing issues. I also made my Bill of Materials to keep everything in order.

A drawing of a machine

AI-generated content may be incorrect.

12/11/2025: 7PM – 8PM; Location – home workspace

Goal: Connect Vinyl tubing

Connected 3/8” Vinyl tubing to the diaphragm pump, 3/8” Vinyl tubing to the sediment filter, ¼” vinyl tubing to the Sawyer mini, and finalized my design for the power system. I am using solar panels with a lead battery backup.

12/13/2025: 12PM – 5PM; Location – home workspace

Goal: Finalize setup and start construction

Used pliers, crimpers, and wire strippers to build the electrical portion of the system. Connected the charge controller to the solar panel and diaphragm pump.  
Researched female spades and application to battery.  
Finalized system setup by making a drawing.

A hand holding a red and black wire

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12/15/2025: 3PM – 5PM; Location – home workspace

Goal: Finish construction of filtration system

Connected ½” tubing to the source water tank, put 3/8” tubing inside to connect to the diaphragm pump. Connected 3/8” tubing to the output of the diaphragm pump and connected RO tubing using push-to-connect connectors. Tested the suction of the system in air (functionality test 1).A blue and green container with a blue hose and a green plastic container with wires

AI-generated content may be incorrect.

12/16/2025: 7PM – 11PM; Location – home workspace

Goal: ready for testing

I created CAD Models of all parts of the prototype. I have also prepared the prototype for testing. However, a few leaks occurred along the NPT Threads of the Sediment Filter Container. Tomorrow, I will be getting PTFE Tape to solve this issue and conduct testing.A computer keyboard and boxes

AI-generated content may be incorrect.A computer screen shot of a computer program

AI-generated content may be incorrect.

12/17/2025: 3PM-11PM; Location – home workspace

Goal: Finish Project

I used the PTFE tape to seal the NPT threads that were leaking yesterday. I tested the filtration with tap water first to let the filters get wet, then went outside to start trials. I completed trials 1-5 of prototype 1, then (Design Iteration #1 → #2) iterated and added a cloth to the top of prototype 2 to remove debris. I then completed trials 1-5 of prototype 2, then conducted analysis according to the results.

I finalized PowerPoint, Abstract, and Research Log.A close up of a plastic container

AI-generated content may be incorrect.A plastic container with liquid in it

AI-generated content may be incorrect.A hand holding a device in a glass

AI-generated content may be incorrect.A water filter in a container

AI-generated content may be incorrect.A screenshot of a phone

AI-generated content may be incorrect.

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