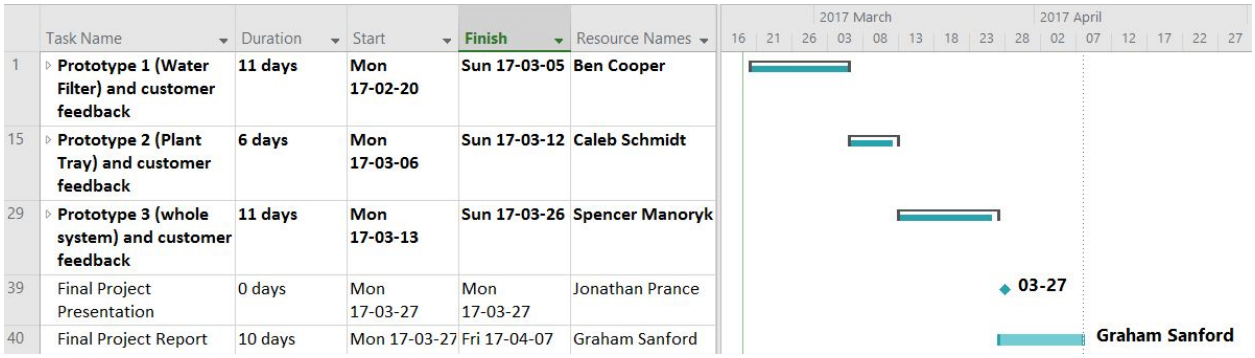
Project Plan

Big Picture Project Plan



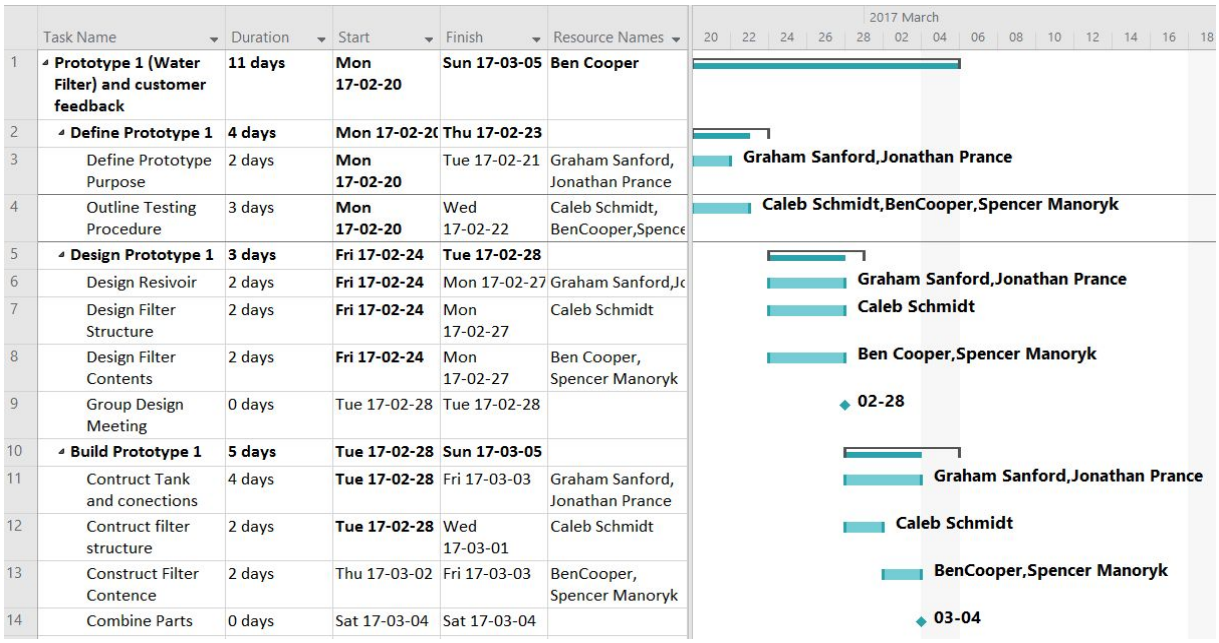
	Task Name	Duration	Start	Finish	Resource Names
1	**Prototype 1 (Water Filter) and customer feedback**	**11 days**	**Mon 17-02-20**	**Sun 17-03-05**	**Ben Cooper**
15	**Prototype 2 (Plant Tray) and customer feedback**	**6 days**	**Mon 17-03-06**	**Sun 17-03-12**	**Caleb Schmidt**
29	**Prototype 3 (whole system) and customer feedback**	**11 days**	**Mon 17-03-13**	**Sun 17-03-26**	**Spencer Manoryk**
39	Final Project Presentation	0 days	Mon 17-03-27	Mon 17-03-27	Jonathan Prance
40	Final Project Report	10 days	Mon 17-03-27	Fri 17-04-07	Graham Sanford

Above you will find the plan for when we will be working on each task. The above model also outlines who will be responsible for organizing the work to be done, submission, and updating the project plan for that task particular task. As outlines become available, each task will be broken down into subtasks by the respective task planner. Each member of the team will be task manager for one of the five remaining deliverables.

Prototype one:

For the first prototype materials required to build the concept will be gathered from things that are easy to get and cost very little. The main idea for this prototype is to see how well the water will be filtered and be controlled. For the filtration system a plastic bucket will be used to hold the rocks and sand. The bucket can be held or placed on a higher surface to test how well gravity works for moving the water. Water will flow through a hose and will be controlled by a tap that is placed into the bottom of the bucket,using washers to prevent leaks. PVC pipe will be used as a medium for the water and nutrients to flow through. The holes will not be cut into the piping for the plants to go in until the second prototype. At the end of the PVC pipe will be another tap to contain the water in the pipes and provide a way to drain it once it gets too dirty.

Many of these materials are items that can be found around the house, be purchased for very little, or be reused for the other prototypes. The PVC piping can be reused for the other prototypes so will be bought. Hoses and taps could be found around the house or if need be bought for very little and be reused in other prototypes if they work well . Rocks and sand are free and can be reused if it is found that they work well for filtrating grey water. A container of some sort to hold the rocks in can be found around the house or be purchased for very little.



	Task Name	Duration	Start	Finish	Resource Names
1	**Prototype 1 (Water Filter) and customer feedback**	**11 days**	**Mon 17-02-20**	**Sun 17-03-05**	**Ben Cooper**
2	**Define Prototype 1**	**4 days**	**Mon 17-02-2(**	**Thu 17-02-23**	
3	Define Prototype Purpose	2 days	**Mon 17-02-20**	Tue 17-02-21	Graham Sanford, Jonathan Prance
4	Outline Testing Procedure	3 days	**Mon 17-02-20**	Wed 17-02-22	Caleb Schmidt, BenCooper,Spence
5	**Design Prototype 1**	**3 days**	**Fri 17-02-24**	**Tue 17-02-28**	
6	Design Resivoir	2 days	**Fri 17-02-24**	Mon 17-02-27	Graham Sanford,Jc
7	Design Filter Structure	2 days	**Fri 17-02-24**	Mon 17-02-27	Caleb Schmidt
8	Design Filter Contents	2 days	**Fri 17-02-24**	Mon 17-02-27	Ben Cooper, Spencer Manoryk
9	Group Design Meeting	0 days	Tue 17-02-28	Tue 17-02-28	
10	**Build Prototype 1**	**5 days**	**Tue 17-02-28**	**Sun 17-03-05**	
11	Contruct Tank and conections	4 days	**Tue 17-02-28**	Fri 17-03-03	Graham Sanford, Jonathan Prance
12	Contruct filter structure	2 days	**Tue 17-02-28**	Wed 17-03-01	Caleb Schmidt
13	Construct Filter Contence	2 days	Thu 17-03-02	Fri 17-03-03	BenCooper, Spencer Manoryk
14	Combine Parts	0 days	Sat 17-03-04	Sat 17-03-04	

The prototype 1 task has been broken down into subtasks and low level tasks to complete the subtasks. Each low-level task will be put together to complete a subtask and those subtasks will be put together as a complete task. Each low-level task has allocated resources indicating that it is that individual's responsibility to complete that low-level task and report its completion to the larger task manager. In the case of prototype one, the larger task manager would be Ben Cooper and the tracking of this task's progress would fall onto this his responsibility.

For this prototype there are some risks in how we are building it. One problem is the filtration system of rocks and sand could not work as well as hoped and in that case would have to be replaced with filter that would be bought. If the filling of water manually with the bibb does not work well, the arduino and float idea can be used to automatically fill the PVC when the water level gets too low. Another problem that could occur is the water and nutrient mixture might not flow too well through the hose with only gravity and so another material might have to be used such as more PVC pipes.

Material	cost
4 inch x 2 ft pipe	$8.97
½ inch x 10ft end pipe	$2.94
1-1/2 in. PVC DWV Hub x SJ Trap Adapter' 1-1/2 in. PVC DWV Trap Adapter 1-1/2 in. PVC DWV Coupling	$1.36 $1.76 $0.78
HDX 5/8 in. Dia x 15 ft. Remnant Garden Hose	$7.97
3/4 in. Brass FPT x MHT No-Kink Hose Bibb 5/8 in. Metal Female Mender	$3.94 $3.47

15 Gallon plastic drum	$52
Estimated total	$80.65

This is a worst case scenario on how much these things will cost for the first prototype because many of these things can be found around the house. Also all of these things can be reused for other prototypes if they work well.

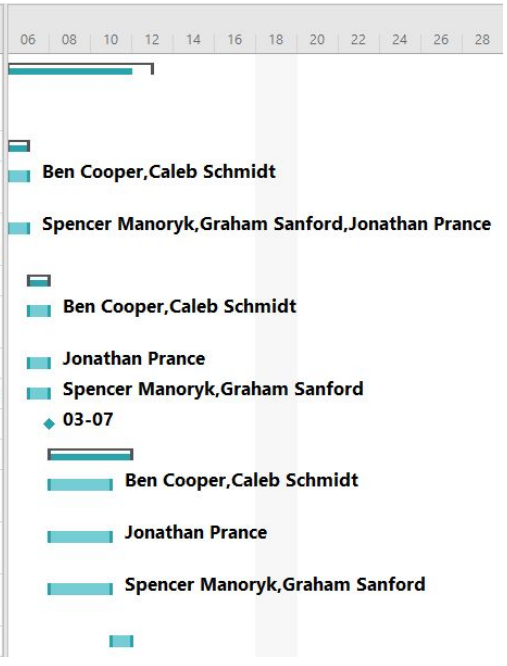
Prototype 2:

The idea for the second prototype is to ensure that the water trough for plant growth is fully functional. We will design this critical subsystem by converting the ½ in. x 10ft PVC end pipe into the water trough. Holes will be cut into the top of the PVC pipe to allow room for the placement of the plant holders. There is a risk in performing this action as the holes must be cut the appropriate size to allow the plant holders entrance. If they are cut too large the pipe will become useless. At the beginning of the PVC pipe, we must install the receiving end for the garden hose. This must also be done with care as any leaks in the system will cause water to be wasted.

The plant holders will be designed using solidworks, and 3D printed in the makerspace laboratory. The plant holder's will be designed to be of a web pattern. This pattern allows the plants roots to attain access to the water in the trough, while still providing the support required to contain the soil/dirt medium. Design failures must be anticipated, and additional time must be allocated to ensure redesigns and tweaks can be done to perfect the plant holder.

With this prototype we intend to have a fully functional water trough for plant growth. This entails both an in source and outsource of water without leaks, and the 3D printed plant containers that allow roots access to water while containing the growing/stability medium. This prototype is critical to the hydroponics system as it is the fundamental pillar of the entire design. If this subcomponent does not work, the entire hydroponics system will fail. This is why we are choosing to focus so heavily on the perfection of this design.

	Task Name	Duration	Start	Finish	Resource Names
15	**Prototype 2 (Plant Tray) and customer feedback**	**6 days**	**Mon 17-03-06**	**Sun 17-03-12**	**Caleb Schmidt**
16	**Define Prototype 2**	**1 day**	**Mon 17-03-06**	**Mon 17-03-06**	
17	Define Prototype Purpose	1 day	**Mon 17-03-06**	Mon 17-03-06	Ben Cooper, Caleb Schmidt
18	Outline Testing Procedure	1 day	**Mon 17-03-06**	Mon 17-03-06	Spencer Manoryk, Graham Sanford,Jo
19	**Design Prototype 2**	**1 day**	**Tue 17-03-07**	**Tue 17-03-07**	
20	Design PVC system	1 day	**Tue 17-03-07**	Tue 17-03-07	Ben Cooper, Caleb Schmidt
21	Design plant holes	1 day	**Tue 17-03-07**	Tue 17-03-07	Jonathan Prance
22	Design plant cups	1 day	**Tue 17-03-07**	Tue 17-03-07	Spencer Manoryk,(
23	Design Meeting	0 days	**Tue 17-03-07**	Tue 17-03-07	
24	**Build Prototype 2**	**4 days**	**Wed 17-03-08**	**Sat 17-03-11**	
25	Build PVC system	3 days	**Wed 17-03-08**	Fri 17-03-10	Ben Cooper, Caleb Schmidt
26	3D print palant cups	3 days	**Wed 17-03-08**	Fri 17-03-10	Jonathan Prance
27	Cut plant holes	3 days	**Wed 17-03-08**	Fri 17-03-10	Spencer Manoryk, Graham Sanford
28	Combine Parts	1 day	Sat 17-03-11	**Sat 17-03-11**	

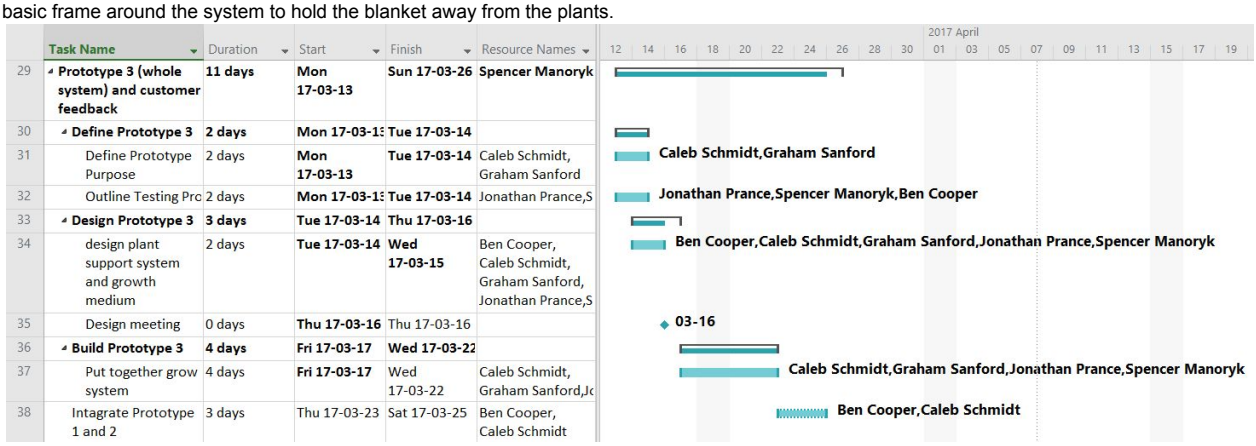


Based on what we already know about completing the second prototype this has also been planned by the task manager Caleb Schmidt. Lower level tasks have been allocated to team resources and as with prototype 1 the progress will be tracked by the task manager, in this case Caleb

Schmidt. Lower level tasks were allocated to team members by the task manager based on previous experience performing related tasks and also by engineering discipline.

Prototype 3:

The third prototype's purpose is to comprehensively demonstrate our system. This prototype has to demonstrate that we have designed a hydroponics system with various subsystems that meet the laid out design criteria. This would effectively be combining the two previous prototypes. Water flows through the filter into the drum, from here the water runs through the valve (when opened) into the PVC pipe, which fills with water until there is enough water to submerge the roots of the plants. Liquid nutrients are also added here. A risk here is that the concentration of nutrients will be incorrect in the system. To mitigate this problem, we plan to adjust the flow of water and nutrients with their respective taps until the desired mix is achieved. The plants, held by the 3D printed lattice, have their roots submerged in the water to receive the nutrients needed for growth. A possible concern for this step is that the lattice containing the growth medium will allow the medium to pass into the water, thus causing the system to require cleaning maintenance, and also causing potentially unstable plants. Our contingency plan for this is to redesign the lattice cups in solidworks until we have a suitable design, or implement coffee filters inside the lattice cups in order to better contain the contents. One last problem that could occur is the mylar thermal blanket not being able to sit on top of the plants. Our contingency plan for this is to add some kind of basic frame around the system to hold the blanket away from the plants.



	Task Name	Duration	Start	Finish	Resource Names
29	**Prototype 3 (whole system) and customer feedback**	**11 days**	**Mon 17-03-13**	**Sun 17-03-26**	**Spencer Manoryk**
30	**Define Prototype 3**	**2 days**	**Mon 17-03-13**	**Tue 17-03-14**	
31	Define Prototype Purpose	2 days	**Mon 17-03-13**	**Tue 17-03-14**	Caleb Schmidt, Graham Sanford
32	Outline Testing Prc	2 days	**Mon 17-03-13**	**Tue 17-03-14**	Jonathan Prance,S
33	**Design Prototype 3**	**3 days**	**Tue 17-03-14**	**Thu 17-03-16**	
34	design plant support system and growth medium	2 days	**Tue 17-03-14**	**Wed 17-03-15**	Ben Cooper, Caleb Schmidt, Graham Sanford, Jonathan Prance,S
35	Design meeting	0 days	**Thu 17-03-16**	Thu 17-03-16	
36	**Build Prototype 3**	**4 days**	**Fri 17-03-17**	**Wed 17-03-22**	
37	Put together grow system	4 days	**Fri 17-03-17**	Wed 17-03-22	Caleb Schmidt, Graham Sanford,Jc
38	Intagrate Prototype 1 and 2	3 days	Thu 17-03-23	Sat 17-03-25	Ben Cooper, Caleb Schmidt

Cost

Item	Source	Quantity	Cost ($)
4 in. x 2 ft pipe	Home Depot	1	8.97
1/2 in. x 10 ft end pipe	Home Depot	1	2.94
1/2 in. PVC DWV Hub x SJ Trap Adapter	Home Depot	1	1.36
1/2 in. PVC DWV Trap Adapter	Home Depot	1	1.76
1/2 in. PVC DWV Coupling	Home Depot	1	0.78
HDX 5/8 in. Dia x 15 ft. Garden Hose	Home Depot	1	7.97
3/4 in. Brass FPTxMHT No-Kink Hose Bibb	Home Depot	2	7.88
5/8 in. Metal Female Mender	Home Depot	1	3.47
15 Gallon Plastic Drum	Uline	1	52
PVC cement	Home Depot	1	3.49
Plumber's putty	Home Depot	1	3.99
1L container	Scrap	1	0
Plant Containers	3D Printer	5	0
Mylar thermal foil	ebay	1	5
TOTAL			99.61