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EDSGN 100  
December 12, 2013  
CAD design Project

## Space Garden

The design for the CAD project was a vegetable garden that is located in the International Space Station. This space garden will contain carrots, broccoli, and bok choy. The main purpose of this space garden is to keep the astronauts on board occupied with a project, and hopefully counter some of the psychological effects they may encounter in space. Humans are well adapted to life on Earth, so being in a low orbit for any period longer than a few weeks can take a toll on the human body. Giving the astronauts something to care for and see grow over time allows them to cope with these psychological effects such as depression, anxiety, and insomnia. There are also many secondary effects to having a garden on the ISS. Being able to produce their own food allows them to be more sustainable, and have less resources and supplies to be delivered to them. There is also an added benefit of the excess oxygen that the plants will require less use of the resources on board. In the vacuum of space, direct contact with sunlight will have hazardous radiation that can destroy almost any living thing. With the protection of the ISS, the garden will be able to survive but will lack the essential sunlight it needs to survive. To replace this sunlight, an artificial light source named grow light will be implemented. This light source will produce an electromagnetic that will allow the plants to grow. This light will require an electric power source, which it can easily obtain from the space station's power supply. Each of the vegetables that will be planted will can effectively use violet light, which contains a wavelength of 400 – 475 nm, red light which contains a wavelength of 650 – 700 nm, and a limited amount of green light which contains a wavelength of 475- 650 nm. Each one of these wave lengths can be assimilated by the grow light. In order to produce the correct amount of carbon dioxide the lights will be placed about 4 ft away from the garden. In exchange for their oxygen, the carbon dioxide produced by the crew members should be sufficient enough to sustain the plants. The next big challenge was to move the water throughout the plant system, which can be a difficult task in the microgravity of space due to pressure differences. Water cannot just flow freely, instead it must be forced into the soil via a simple pump mechanism that will be powered by the ISS. All of the water used is recyclable and must be used conservatively. The garden will contain a base of soil in which tubes will be throughout. These tubes will comprise of many hole in which the water can escape and be absorbed into the soil. The water is recycled by using the humidity in the room and going back into the purification process. This water is stored in one of many containers that are already on board. To keep the garden from floating around in the weightlessness of space, it will be tethered down into the cabin used well fastened latches. The temperature needed to grow each of these vegetables is the same comfortable temperatures for humans, which is around 65 and 72 degrees Fahrenheit. With the active thermal control systems that are currently in use, the optimal temperature will be regulated so the vegetables can thrive. Human nature needs variation in order to be satisfied. A changing object will provide an adequate hobby for each of the crew members. Having this garden will benefit the crew the most, since watching a project initialize and grow into its final stage will give them a sense of accomplishment and joy.

Statement of work: We have each completed this assignment equally, contributing to both the design report and CAD drawing.

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