

Being homesick is a feeling that no one wants to experience but for astronauts away from home for long periods of time can take a big toll on their mental health. Our team has designed the **bioArk**, a gardening device that will provide the astronauts with a pleasant reminder of what life is like on Earth.



### Design highlights

The bioArk uses rotational motion to resemble the force of gravity experience in Earth. Imagine whirling a bucket of water around your head. As the bucket whirls around, water will stay in the bucket as it travels due to the centripetal force. Using centripetal force, the bioArk keeps the dirt and plants in place in a simulated Earth's gravity field. Our design features a grate to protect the dirt and plants from falling out of the tub. The main device consists of several subsystems, including the control system for the device, a driving motor, a water delivery system, a seed placer system, a harvesting mechanism, artificial lighting, and an upkeep system. Once these systems are combined, the bioArk will provide astronauts with a variety of plants for their enjoyment and their well-being.

### Idea origination

This idea was generated through our first team meeting through a brainstorming session. Our rationale was based on alleviating the homesick problem experienced in space by astronauts.

### Potential benefits.

(1) Aromatic. Astronauts often complain in memoirs that the smell and taste on the ISS is bland. Growing herbs, spices and other plants can eliminate these issues. The natural smell of these plants will fill the section of the station, and as they are harvested, the smells will change due to the variety of plants present. The herbs and spices can easily be diced and added directly to their meals to give their food a better taste. Herbs and spices are small vegetables plants that regenerate quickly, allowing continual harvesting. In addition, since the device will be rotating at constant speed, it will produce a slow breeze to help spread the fresh aromas.

(2) Entertainment. A small garden provides a hobby for the astronauts and offers a simple reprieve from normal activities. Once the garden is fully developed, the bright colors of the plants provide a change in scenery from the station's metallic background.

(3) Filtering. The plants will help on maintaining a safe environment in the station by converting carbon dioxide into oxygen among filtering other particulates.



**Video.** Follow the link: <https://drive.google.com/open?id=0B8iCFmxa3JHXR08tejZkZURvake>

*“The bioArk garden will provide the astronauts with a pleasant reminder of what life is like on Earth.”*

Team Members:

Andrew Montalbano – DS ME

Zack Hewitt – BS EE

Yogesh Rana – BS ME

Cameron Johnstone – BS ME

Dr. Jorge Rodriguez – Faculty Advisor, ME/BIOE