2020-2021 City Model Slideshow

School/Organization: **Mount Aviat Academy**

Educator Name: **Teri Hanby and Erin Dymowski**

Future City Team Name: **Lunatura**

Delete all PURPLE text before submitting the slideshow for judging. Keep text that is black.

Deliverable Details

- This slideshow is your chance to present your model. Whether your team created a single model or multiple segments, here is where you show off the future city you designed to the judges.
- Choose photos of the various segment(s) that best show the requested content.
- Do not change the size of text boxes in this template. All written text must fit within the boxes and *cannot* be smaller than size 14 in Calibri (or equivalent) font.
- When finished, save the slideshow as a PDF and upload to the Online Portal at FutureCity.org.

Section I

CITY DESIGN

Residential Zone

What is important for the judges to know about your residential zone?:

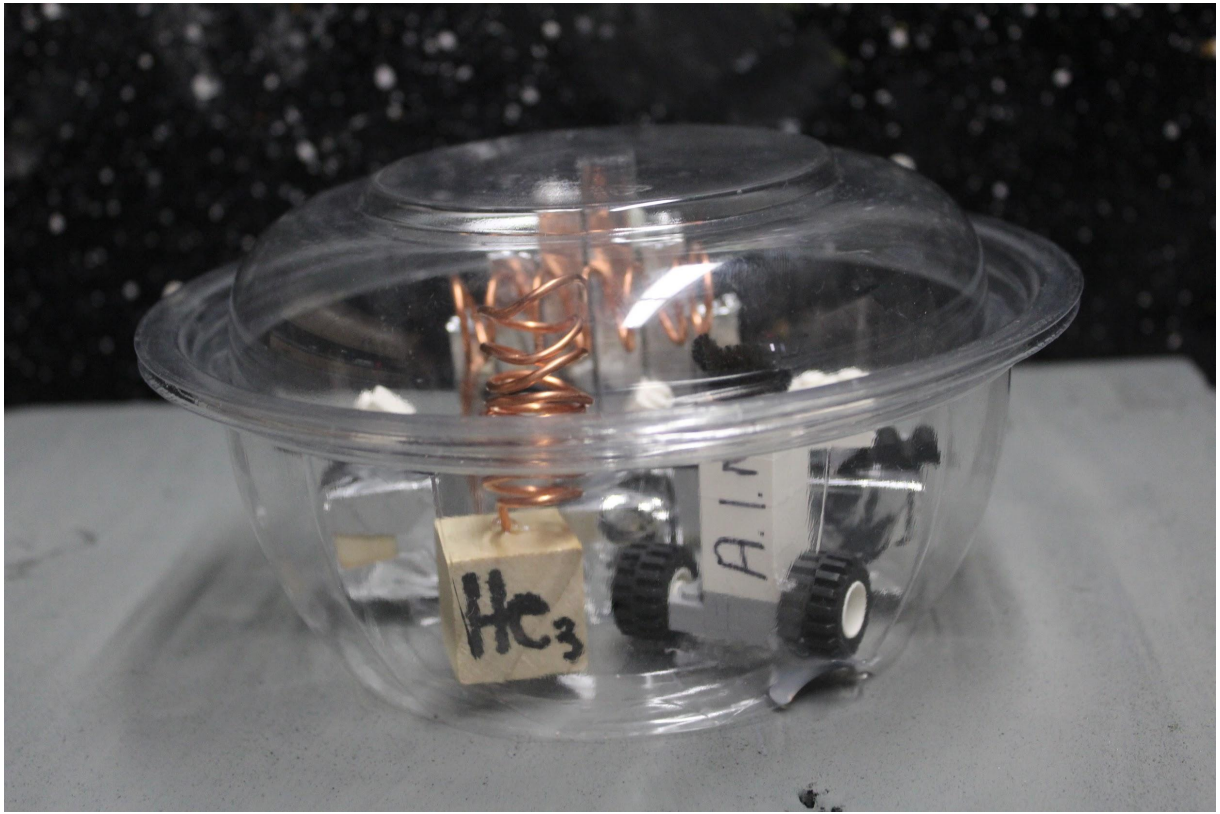
Our two main LunarPods house half of our 5,000 residents each. Our residential LunarPods also function as a democracy. Our residential pod is mixed with the commercial stores for easy access. The residential LunarPods include gyms, hospitals, restaurants, schools, apartments, grocery stores, parks, business buildings, retail stores, malls, and office buildings. Since we are on the moon, we cannot go outside. So our people can travel from pod to pod to get to their jobs via the Lunar Express. They can use SolarCycles for short trips inside the LunarPods for recreation.

Commercial Zone

What is important for the judges to know about your commercial zone?:

In our agriculture pod, Lunatura uses vertical farming developed by agricultural engineers for our plant-based food products. In our mini biospheres, we provide protein to citizens with shrimp, fish, mealworms, grasshoppers, chickens, and ducks. The T.O.E.S (Transportation of Egg System) transports our animal supply in egg form, packed in a cushioned substrate of mycelia which can also replenish our fungal dome architecture. Lunatura also has honey bees to produce honey and beeswax, and pollinate our crops for a balanced ecosystem.

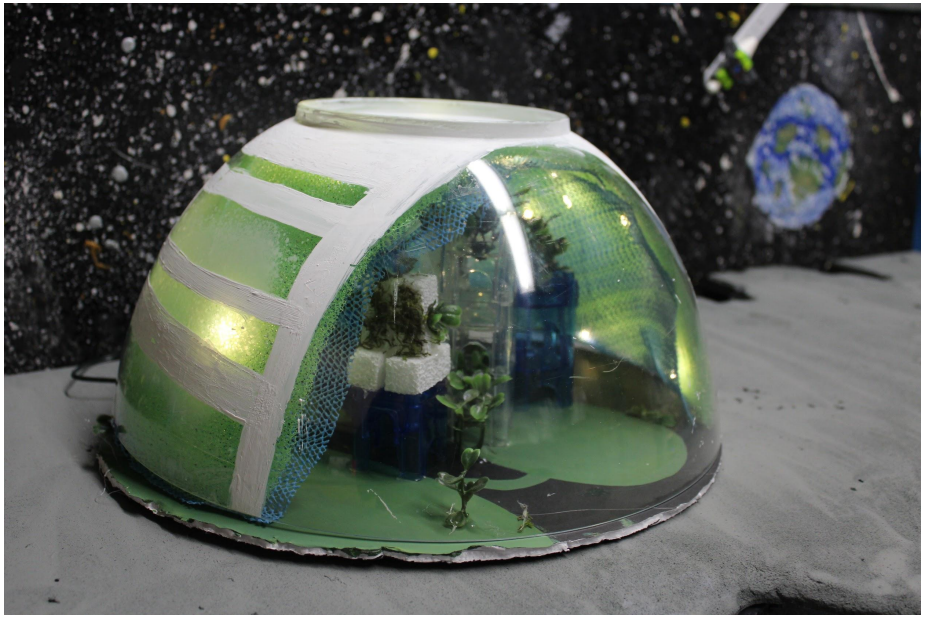
Industrial Zone



What is important for the judges to know about your industrial zone?:

The industrial LunarPod houses essential processes like manufacturing A.I.M.S. robots, packaging Helium-3, C3R, and the atmospheric and thermal systems that support life in Lunatura. The essential process of controlling our water cycle also undergoes in this pod. The industrial LunarPod is essential to supporting life on the moon.

Infrastructure Example 1: Fungi Architecture



What type(s) of infrastructure are shown here (water, power, utilities, etc.)?:

Flame-retardant, insulating, and self-repairing, fungi architecture allows us to build a livable and sustainable environment on the Moon.

How are these related to the realities/challenges of living on the Moon?:

Fungi architecture can be molded into versatile blocks to build a variety of materials, which range from leather to building blocks. The three-layer dome blocks radiation, takes the sunlight and water from the ice layer to photosynthesize, creates oxygen for inhabitants and nutrients for the innermost layer, mycelia. Finally, the mycelia layer grows into a sustainable biosphere.

Infrastructure Example 2: LunarLift

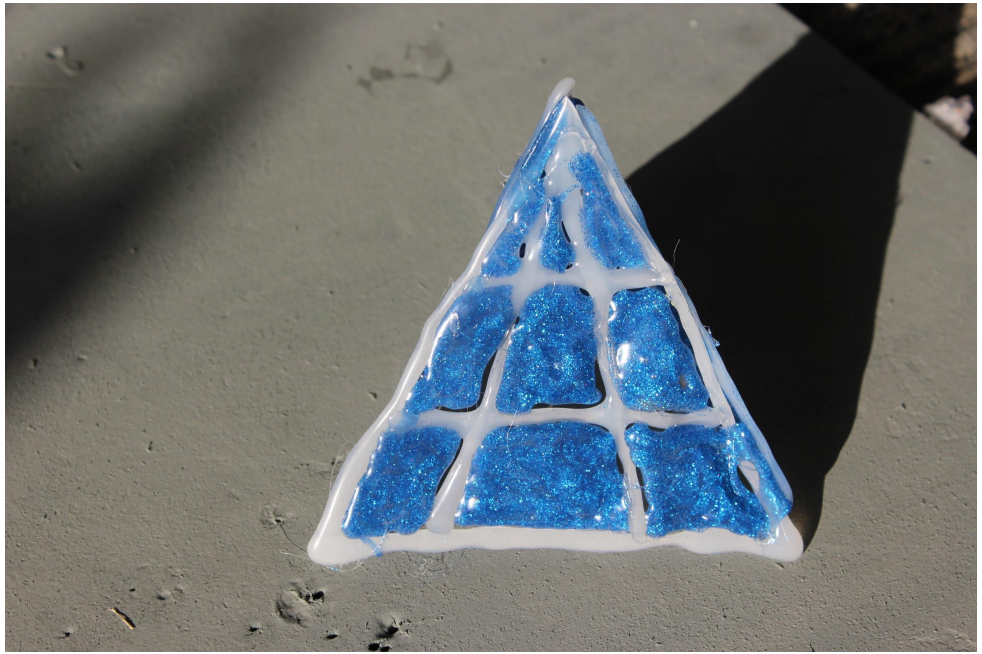
What type(s) of infrastructure are shown here (water, power, utilities, etc.)?:

The LunarLift System secures our LunarPods and our citizens from environmental and system disasters.

How are these related to the realities/challenges of living on the Moon?:

Our LunarPods, bio-engineered domes that protect us from the lack of oxygen, radiation, low gravity, and the asteroids that may hit our location, are critical to our success. Sensors in the LunarPods detect danger and alert the citizens to move underground using the LunarLift safety system. The LunarLift transports the entire pod below the moon's surface until the danger has passed.

City Services Example 1: SolarScreen



What type(s) of city services are shown here (health, education, etc.)?:

The Solarscreen is used for educational purposes.

What do you want the judges to know about your city's operations?:

Grades Kindergarten through twelfth focus on engineering and technology to provide Lunatura with highly trained personnel. In each LunarPod, there is one school that broadcasts teachers from Earth. Students use Solarscreens, a Rubix-cube-sized pyramid that projects a virtual touchscreen, for their school work. The Solarscreens are made of graphene, which is the strongest and thinnest material known to mankind.

City Services Example 2: City Services Complex

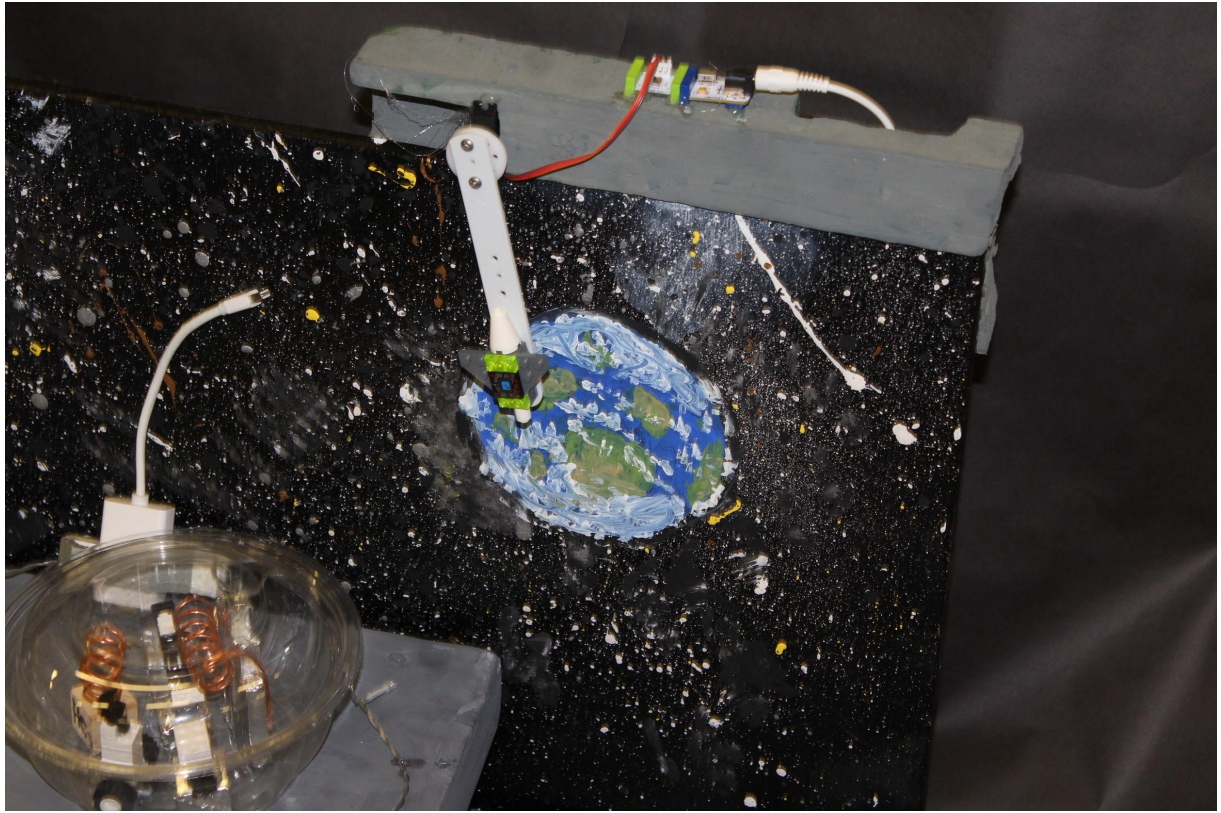
What type(s) of city services are shown here (health, education, etc.)?:

The City Services Complex is an important part of our commercial and residential pod.

What do you want the judges to know about your city's operations?:

All of our fundamental social services are located within our city services complex. Essential services include hospitals, fire, police, government services, and our academy which focuses on engineering and technology to provide Lunatura with highly trained personnel. Hospitals located in each LunarPod also function as a doctor's office. Additionally, the best doctors on Earth are available to perform surgery remotely using robots.

Transportation Example 1: Lunavator



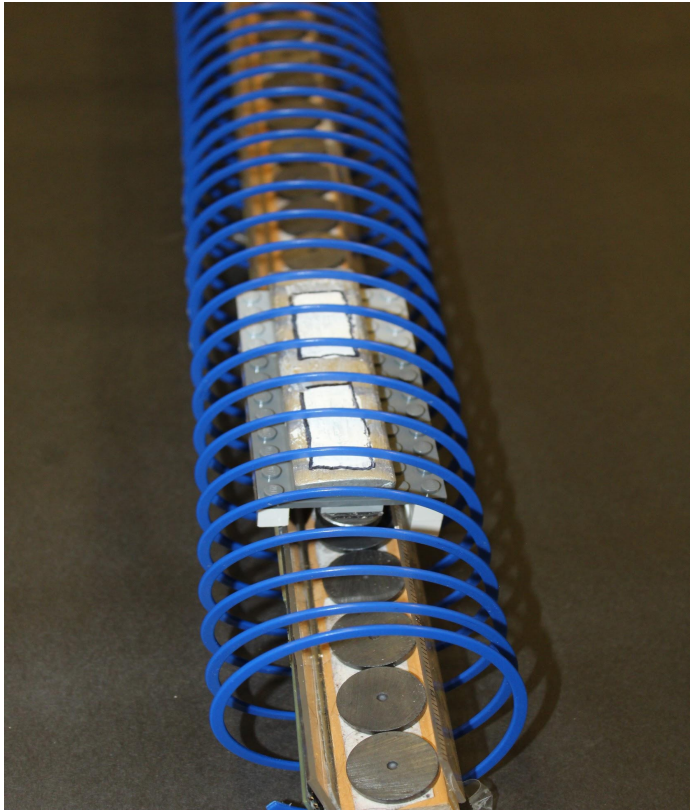
What type(s) of transportation systems are shown here?:

This is our city's way of transporting people and goods back to Earth.

What do you want the judges to know about your transportation system(s)?:

To transport passengers and cargo from the Earth to the moon, we save rocket fuel through our LunaVator, an innovative cable climbing spacecraft. This ensures an inexpensive flight from the Earth to the moon and cost less than $1 billion dollars. One key element is a cable that would be anchored to the moon and to a point above Earth's surface. The cable of a lunar space elevator can't be anchored to Earth's surface because the relative motions of the moon.

Transportation Example 2: LunarExpress



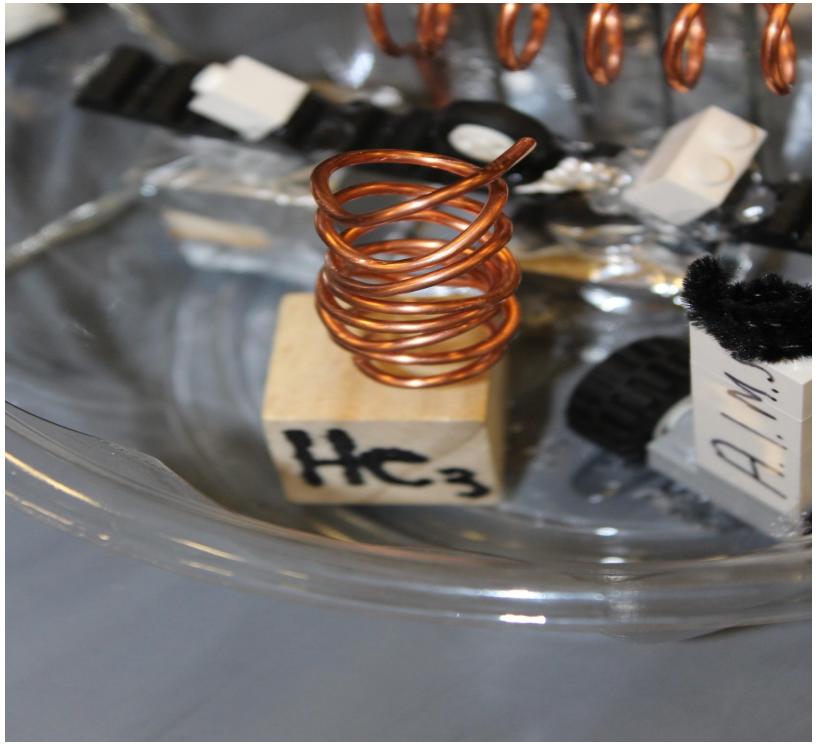
What type(s) of transportation systems are shown here?:

The LunarExpress is a magnetic, levitating train that transports people from one pod to another.

What do you want the judges to know about your transportation system(s)?:

LunarExpress, a magnetic, levitating transportation system, efficiently and quickly transports people, goods, and equipment between LunarPods. It is an environmentally friendly way to transport because they can accelerate and decelerate much faster than most trains. The LunarExpress is a dual rail that uses electrodynamic suspension which is strong permanent magnets that create a magnetic field which pushes and pulls the train to its destination.

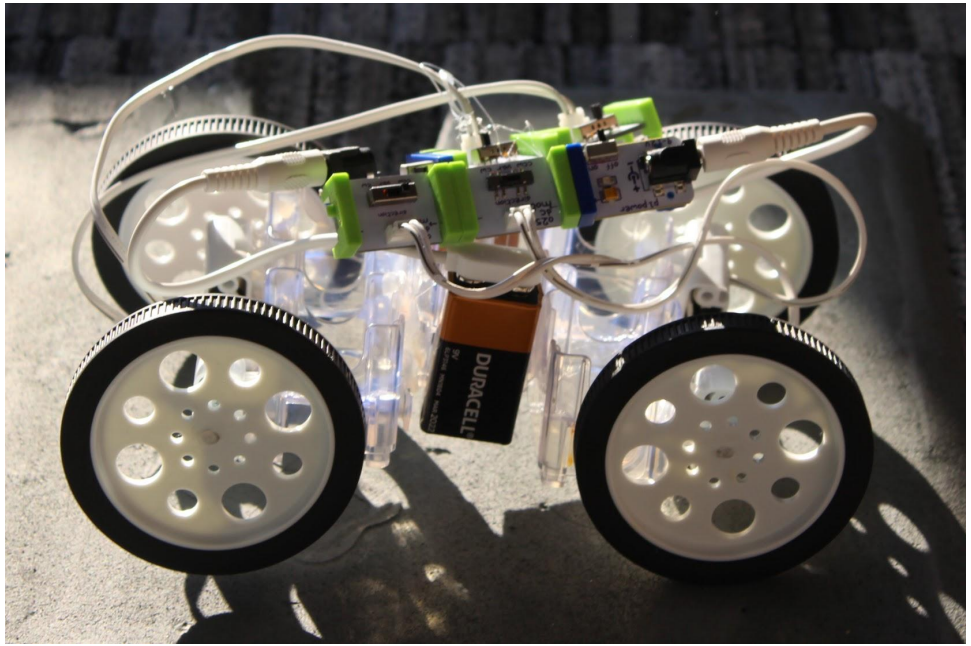
Living on the Moon (Resource #1) He3 Industry



What is important for the judges to know about this element of your model?:

Helium-3, mined from regolith, is a lunar resource critical to Lunatura's success, because it's worth $40,000 per ounce in its original, mined state and is one of our main industries. After the extraction, R.E.S.T transports the Helium-3 to the industrial LunarPod where it's heated to 600^{o} C and becomes a superfluid. In our supersafe and environmentally friendly aneutronic nuclear reactor, Helium-3 absorbs water, produces steam, and powers the turbines. This energy is then distributed by underground cables throughout the LunarPods. Additional Helium-3 is packaged and exported to Earth.

Living on the Moon (Resource #1)
Example 1: Helium 3 R.E.S.T.



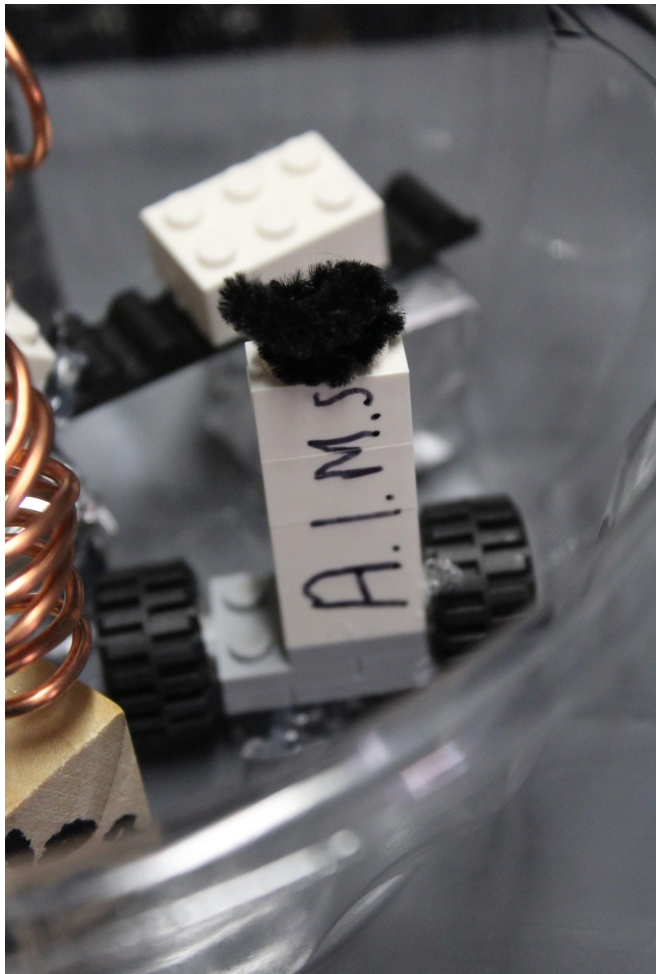
Identify the Moon resource shown here:
snown nere:

Shown here is the R.E.S.T. (Regolith Extractant System Transport)
To see it in action, Regolith Extraction System Transport R.E.S.T.

What is important for the judges to know about this resource within your city?:

R.E.S.T. stands for Regolith Extractant System Transport. This robot moves across the moon's surface via wheels and sucks up the moon dust through a vacuum. The vacuum uses less power than on earth because of the low gravity. The robot has solar panels for its source of energy. This lets the robot move for several days. After the dust has been extracted, it is stored in a storage container. Once this container is full, the robot travels back to our factories to be heated. The factories receive the Helium 3 and put it in a furnace. Once the helium transforms into superfluid, it is taken and put into falcon tubes. It is then ready for whatever our city needs.

Living on the Moon (Resource #2) Ice A.I.M.S.



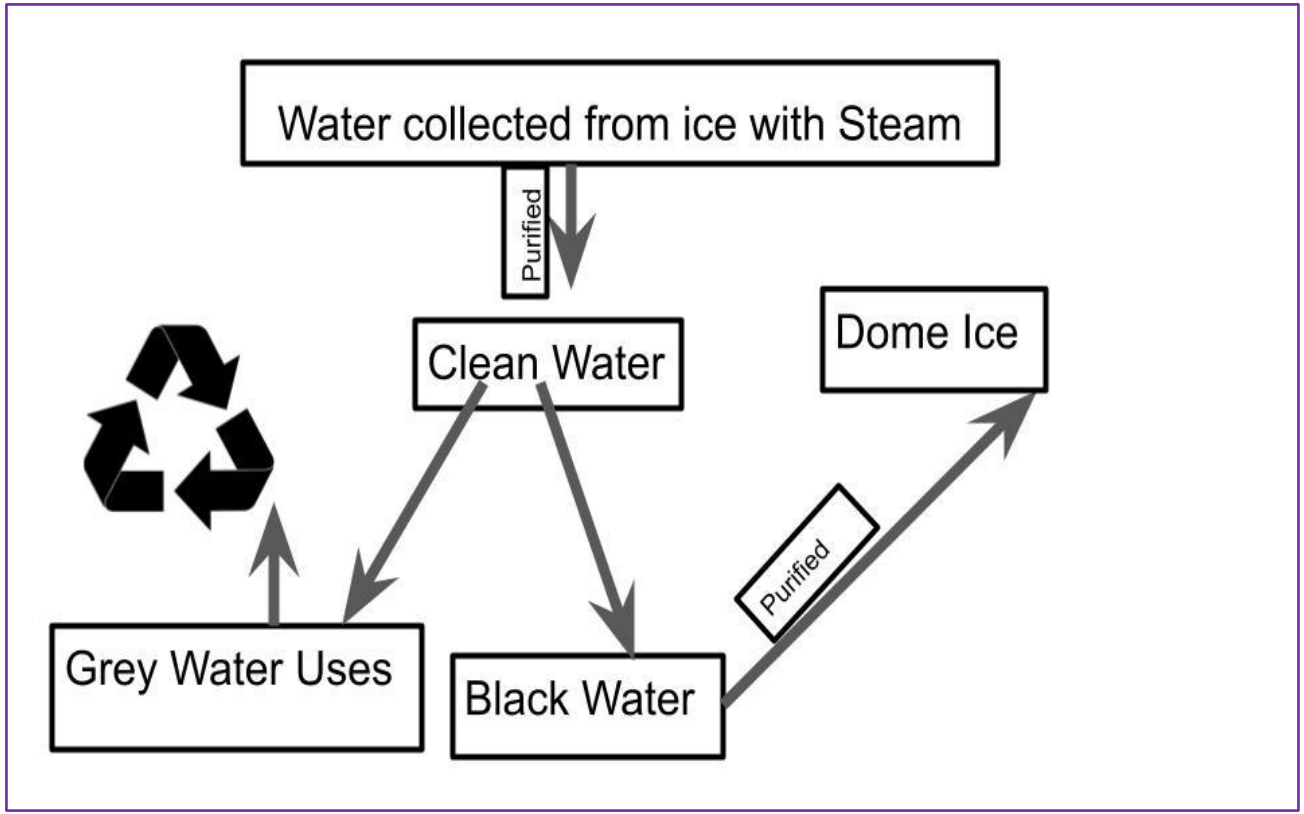
Identify the Moon resource shown here:

A.I.M.S., (Automated Ice Melting System), is a steam-powered robot that mines, purifies, and melts ice to make steam that powers the robot and thus creates a water supply.

What is important for the judges to know about this resource within your city?:

A.I.M.S.harvests water by heating some of the 7-8 billion gallons of water embedded as ice in the craters to make it storable and drinkable. A.I.M.S. travels to the nearby ice deposits using short thrusts and hops and harvests water from ice. Manufacturing and selling A.I.M.S robots are one of Lunatura's main industries.

Living on the Moon (Resource #2) Water Cycle



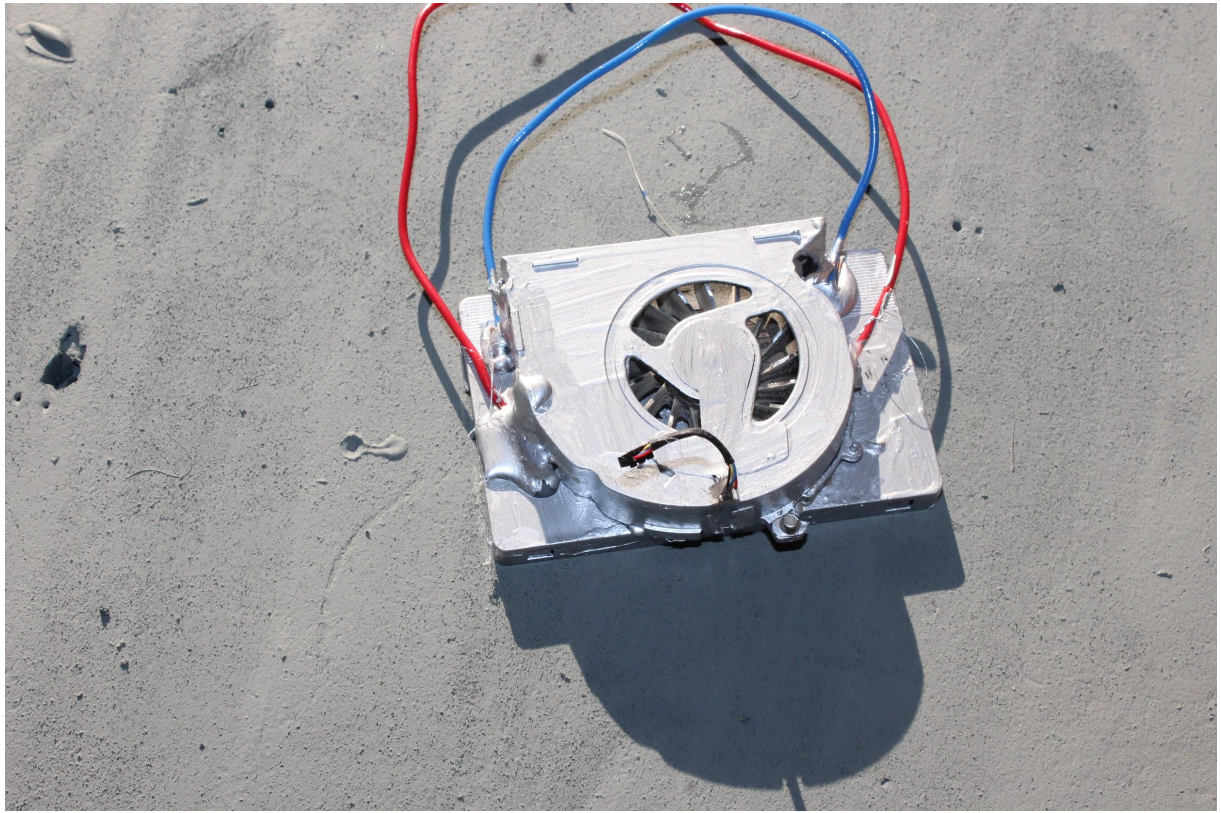
What is important for the judges to know about this element of your model?:

Our water cycle starts with our A.I.M.S. It takes the water from ice deposits and stores it. The water is transported to our citizens after purification. Our grey water is utilized for our vertical farming and to resupply our reservoirs.. After that it is cycled through the biosphere from plants to atmosphere and back again.Greywater is used for irrigation. It is also purified and used for household purposes. Our blackwater is used to replenish our ice dome. It is purified through our fungal architecture. Our waste system collects the black and grey water and leads it to our advanced purification system and then our reservoirs as part of our biosphere water cycle.

Section II

BUILD IT: QUALITY, SCALE, AND MATERIALS

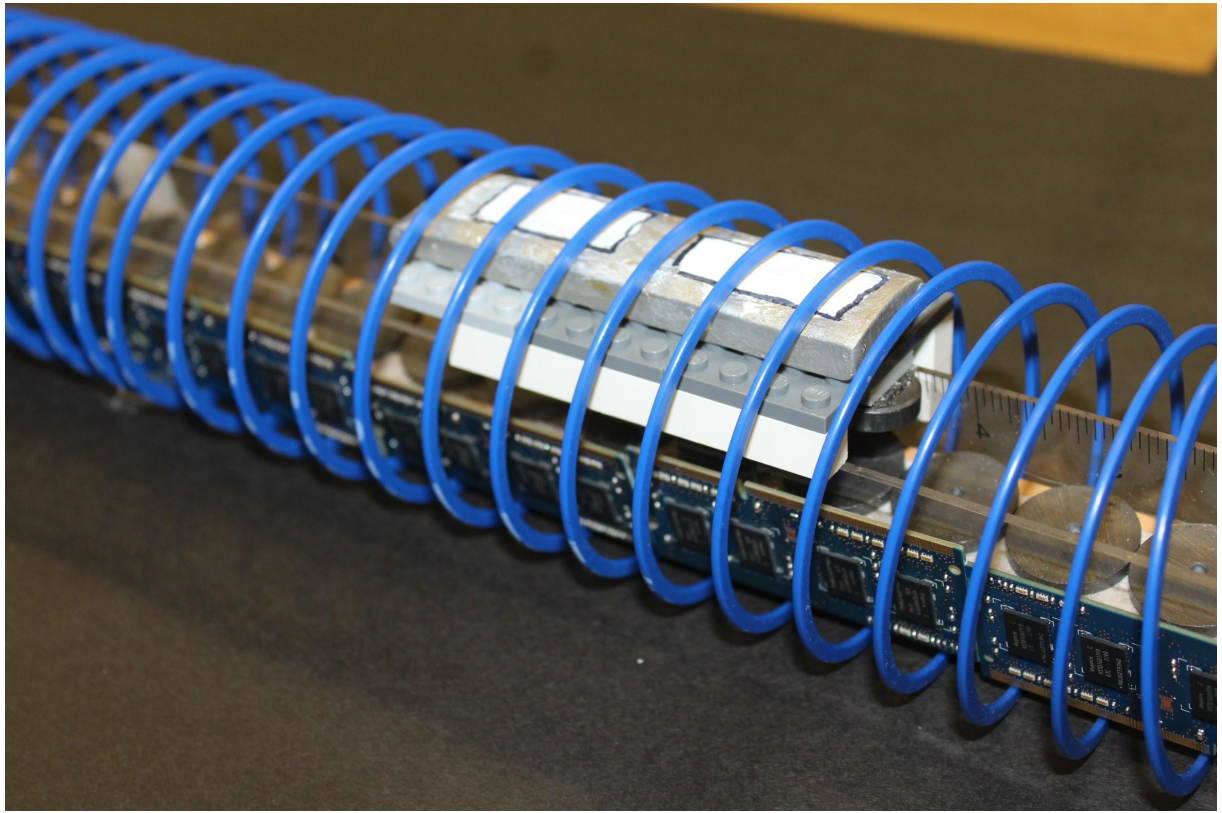
Innovative Material & Use Example 1: C3R



Choose one recycled or reused item and describe how you used it creatively in your model:

Our goal as a team was to reuse old technology. We had a donated computer that we took apart to use the cool pieces inside on our model. When imagining the C3R, we decided to use an old cassette tape and an old fan from inside of the computer. We used the tape inside of the cassette tape to create the lava field which is observable on the lower level of the model. We feel like our recycle materials were perfect to create the Counter-Rotating-Reactor- Recuperator (C3R) which uses the carbon dioxide that is exhaled and heats it to 1500°C and returns O2 and C to the biosphere, a process easier on the moon because of the exposure to the sun.

Innovative Material & Use Example 2



Choose another recycled or reused item and describe how you used it creatively in your model:

Another goal was to reuse old toys in addition to old technology. In the case of our LunarExpress we reused a slinky and motherboards to give our maglev train a more futuristic appearance. For this model, we also reused magnets from the Future City Engineering Fair. The donated LEGOS and rulers were used to create the train and the tracks. There are many other examples of our recycled materials all over the model which include old computer disks and CDs (see the spaceport), old toys (see the lunar escape pod), and

Innovative Material: T.O.E.S.

Choose another recycled or reused item and describe how you used it creatively in your model:

Our TOES, or transporting of eggs system, is how we safely transport the eggs we need to the moon. We use fungal architecture substrate to safely encase the eggs. All eggs from shrimp to chickens to fish travel to the moon this way. The lunavator assists in this system to get to the moon quickly and effectively. For the model of this important system, we cut a row of egg carton slots off. We found furniture feet and placed them around the inside of egg carton slots to represent the fungi. We used clear pebbles to represent the eggs.

Example of Scale: Spaceport and LunarPod

Scale used in model (e.g., 1”= 10’, or 1”=22’):

Structure 1

What type of structure is this?:

Lunatura’s Spaceport

What size is the structure on the model?:

This structure is 5 inches.

What size would this structure be in real life?:

This structure would be 500 feet like the world’s largest airport.

Structure 2

What type of structure is this?:

This is a LunarPod.

What size is the structure on the model?:

The LunarPod is 3.5 inches.

What size would this structure be in real life?

This structure would be 350 feet, similar in size to the largest airport in the world in Malaysia.

Moving Part

URL link to team's moving part video:

[Lunavator]

Section III

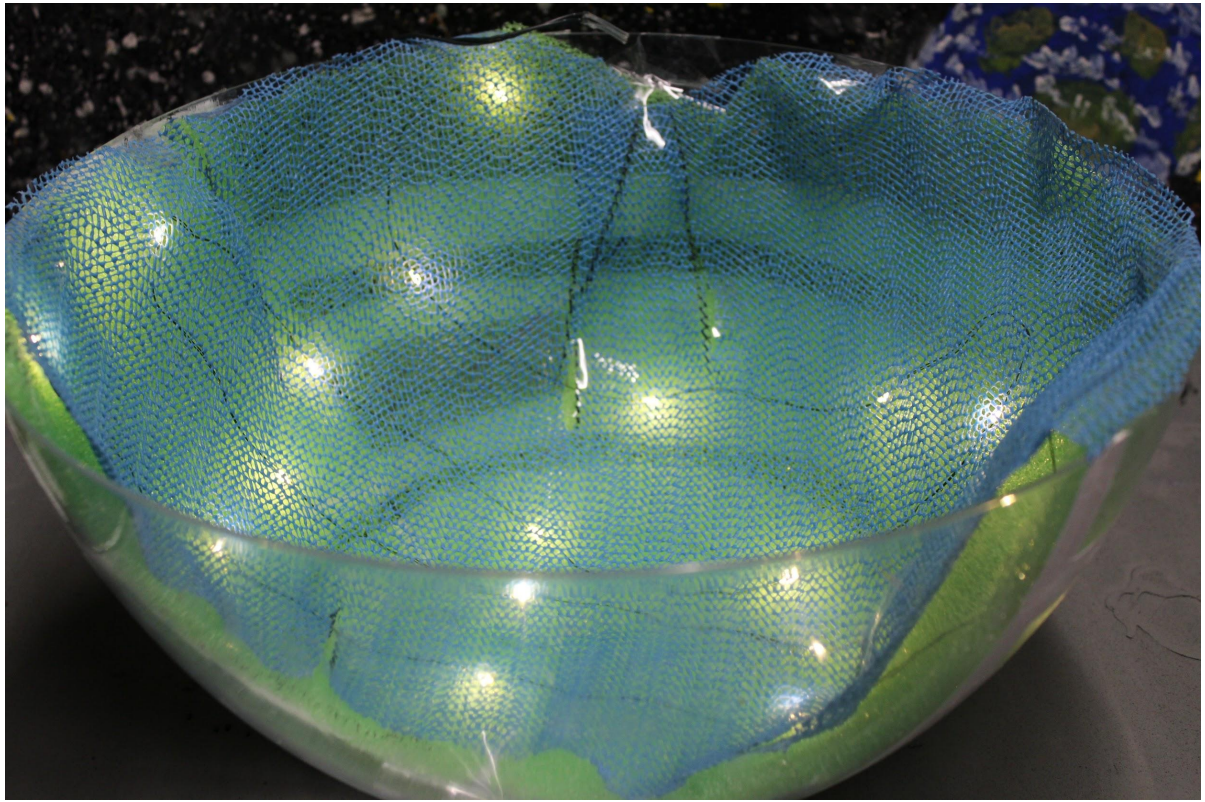
JUDGE ASSESSMENT OF MODEL

Futuristic Technology Geoloops

What is important for the judges to know about this example of technology?:

Our Geoloop geothermal heating and cooling technology provides environmental temperature control to Lunatura's LunarPods. Heat exchange tubes near the moon’s lava tubes and similar tubes located in the crater near the ice zones bring us hot and cool air, respectively. The thermal liquid-filled coils exchange heat with the atmosphere inside the Lunar Pods.

Futuristic Technology: Homefield



What is important for the judges to know about this example of technology?:

Using the engineering process, our materials science engineers developed a metal composed of charged magnets to maintain a suitable gravitational field that keeps Lunatura's citizens healthy. This metal is formed into rods that are used as another layer of the LunarPods. These charged particles carry momentum and produce a gravitational field, otherwise known as the Homefield. Our goal in making the model was to reuse old building materials. We reused fairy lights to make the homefield creative and futuristic.