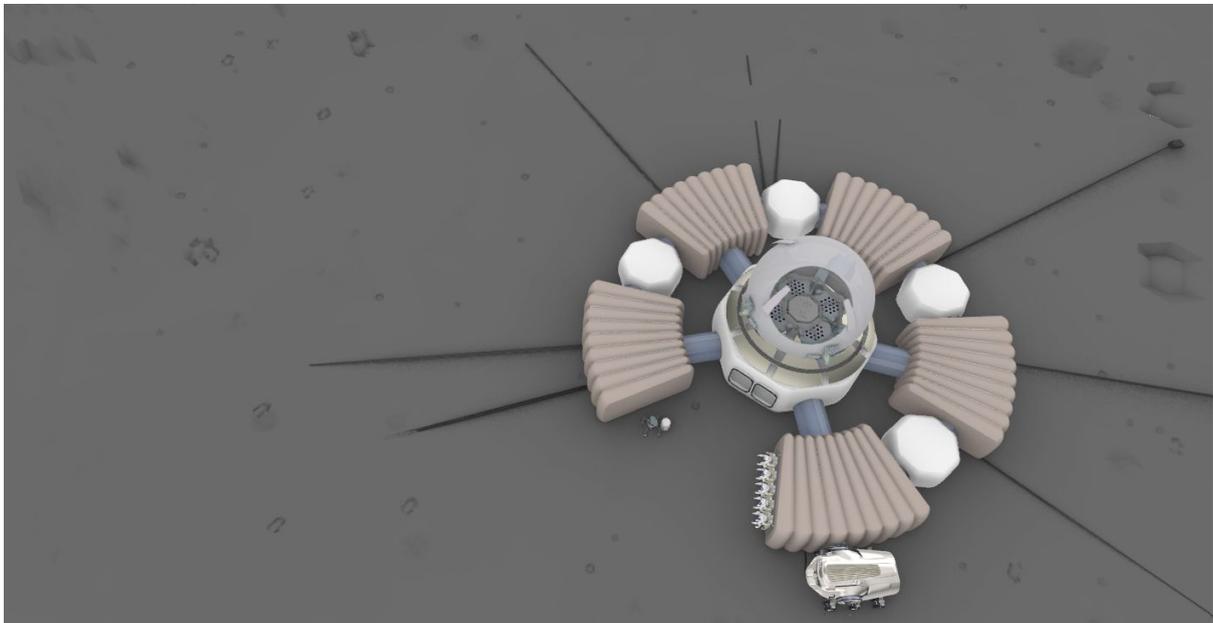


LIFE ON THE MOON
FALL 2020
INSTRUSTOR: MELODIE YASHAR
PROJECT DESCRIPTION/ PUBLICATION
TONG SHEN

PROJECT HORUS:

a lunar based planetary defense and asteroids research compound



EXTERIOR VIEW

INTRODUCTION

For thousands of years, mankind has never stopped their desire to explore deep space. Exploring the universe is both exciting and terrifying. However, the earth is the cradle of humanity, but mankind cannot stay in the cradle forever. According to Stephen Hawking in his book <The Brief Answer to the Big Question>, the moon is a perfect location to serve as a transition spot for human beings to land on Mars and explore into deep space. The technology developed and habitat built on the moon can transfer to planets like Mars or other Earth-like planets. A lunar outpost meets many different scientific research purposes, the transportation is convenient in both ways, and it could be a transition station to travel to the rest of solar systems. Rising temperatures, reduction of the polar ice caps, deforestation, over-population, disease, nuclear war threat, lack of water, there are many signs showing that Earth needs our protection while we seek another home. Among those concerns, one of the biggest threats is asteroid collision which will possibly lead to a distinction which we have no defense.

MOON: THE PROTECTOR OF EARTH

The Moon has guarded the earth for billions of years. and it has made the Earth a more livable planet by moderating our home planet stays on its axis, leading to a relatively stable climate. It also causes tides, creating a rhythm that has guided humans for thousands of years. Moon has been protecting us for 4.5 billion years, and now it can protect us in a different way.



RESEARCH01: TECHNOLOGY

As mentioned before, asteroid impact events are often considered as one of the biggest threats that can cause severe casualties, and possibly can cause the end of human civilization. To protect the earth from an asteroid impact, the scientists have developed several methods to wipe out the threatening asteroids. among these methods, The most likely and safe way is proposed by a research team at UC Santa Barbara: to use a high energy laser device. It converts solar energy into a destructive laser beam and shoots it towards the incoming celestial body, causing the celestial body to drift from its orbit, or directly "evaporate" in space.

RESEARCH02: PROJECT HORIZON

Project Horizon is the US Department of War plans to use the moon as a base for nuclear bomb launches as a nuclear deterrent. The plan began in 1959, when it was expected that the facility would begin to reach the moon in January 1965; in April of the same year, two astronauts landed and the construction of an outpost was started; in November 1966, an outpost with a capacity of 12 was completed; from December 1966 to In 1967, the lunar outpost began to operate and 64 rockets were ready. At the same time, there is defensive equipment in place prevent Soviet attacks. Defensive equipment includes the David Crowe recoilless gun-used to launch small-ton nuclear bombs at close range; at the same time, M18A1 broadsword mines are deployed for anti-infantry operations.

RESEARCH03: MORAL PROBLEMS & SOLUTIONS

However, when weapons are involved, especially in outer space, it makes people nervous and more concerned, although the sole agenda is for protecting the earth, it might still get dangerous. It is necessary to think about the moral issue that comes with it, so I looked into some treaties to find out if there is any regulation. The Partial Test Ban Treaty, <Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water>, was signed in 1963 Moscow by 113 countries, prohibited all test detonations of nuclear weapons except for those conducted underground.

To have global agreements in place is necessary, through the United Nations for example, that would determine the rules and codes of behavior, such international agreements currently exist on earth for occupation of the Antarctic, which might provide a model to follow.

THE NECESSITY OF RESEARCHING ASTEROIDS

In the meantime, the asteroid brought to the earth is not entirely a disaster. An asteroid with a radius of 1 mile and containing superior nickel and iron can bring up to 4 trillion dollars in assets. In addition to a large amount of nickel and iron, some free asteroids may also be rich in gold, platinum, and The value of rare elements such as iridium cannot be estimated. Researching older asteroids may also lead us to the truth of the universe, to find out the origin of life.

RESEARCH04: PREPARATION ON COMET LANDING

NASA and their research team is aiming to land on an asteroid in the future. In order to land on a near earth asteroid, NASA's special team NEEMO (NASA Extreme Environment Mission Operations), is sending groups of astronauts, engineers and scientists to live in an undersea research station called Aquarius, and the habitat and its surroundings provide a similar low gravity environment for space exploration.

As NASA is planning for human landing on a asteroid, a robotic lander has successfully achieved a touchdown on an asteroid by shooting anchor(harpoons) and screws to the surface of the comet to set the lander, and that's the same method for human to land in the asteroid in the future. Through the osiris collector, collecting samples was done robotically from the comet bennu and the collector will return to earth in 2023.



CONCEPT & MISSION

With the technologies, methods and desires, I named this planetary defense base PROJECT HORUS. The project name comes from the Eye of Horus, which means the eye that sees everything in ancient Egyptian myth, it's the symbol of protection and royal power. Asteroid impact is one of the biggest threats to earth and could lead to a catastrophic result to all humankind. In the meantime, researching older asteroids may also lead us to the truth of the universe, to find out the origin of life. We need an eye that sees all the incoming threats to protect us, and sees through the mystery of our cosmos that enlightens us to become a better human civilization.

The mission of PROJECT HORUS is to establish a lunar based planetary defence and research for asteroids. The modular system facility offers researching, observing, identifying, cataloging and tracking potentially threatening near-Earth objects. Provides storage for researching and analysing samples collected from as-teroids, and laser equipment in order to terminate potential threat to earth.

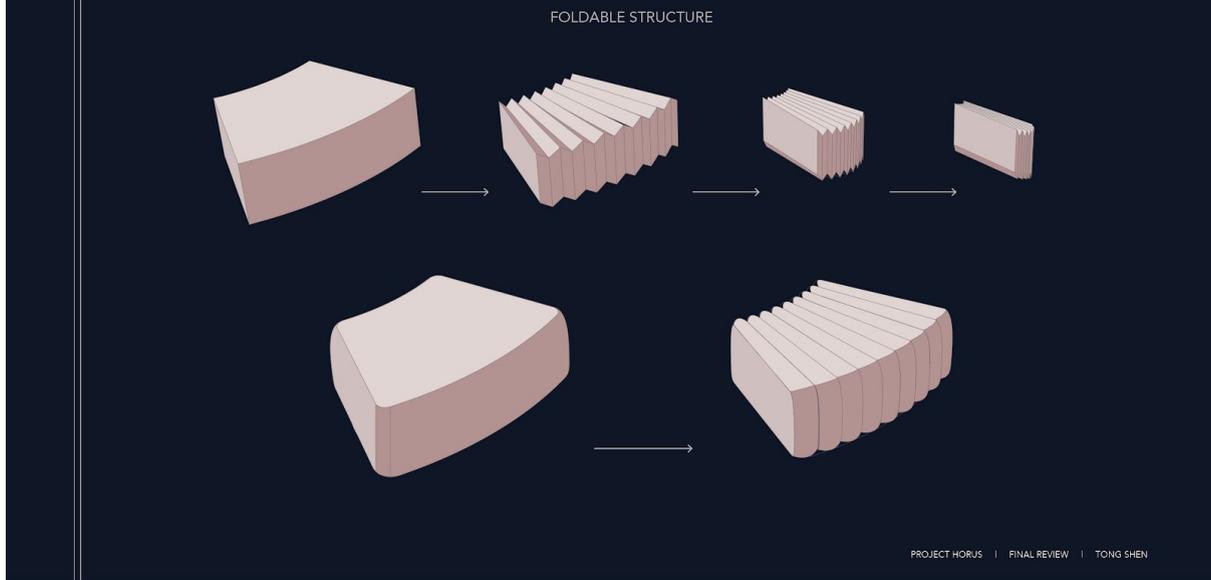
SITE STRATEGY

The site is the Grimaldi Basin, a crater located near the western limb on the near side. and provides uninterrupted data transmission. To have it located on the nearside can provide a very wide range that covers the majority of earth's atmosphere.

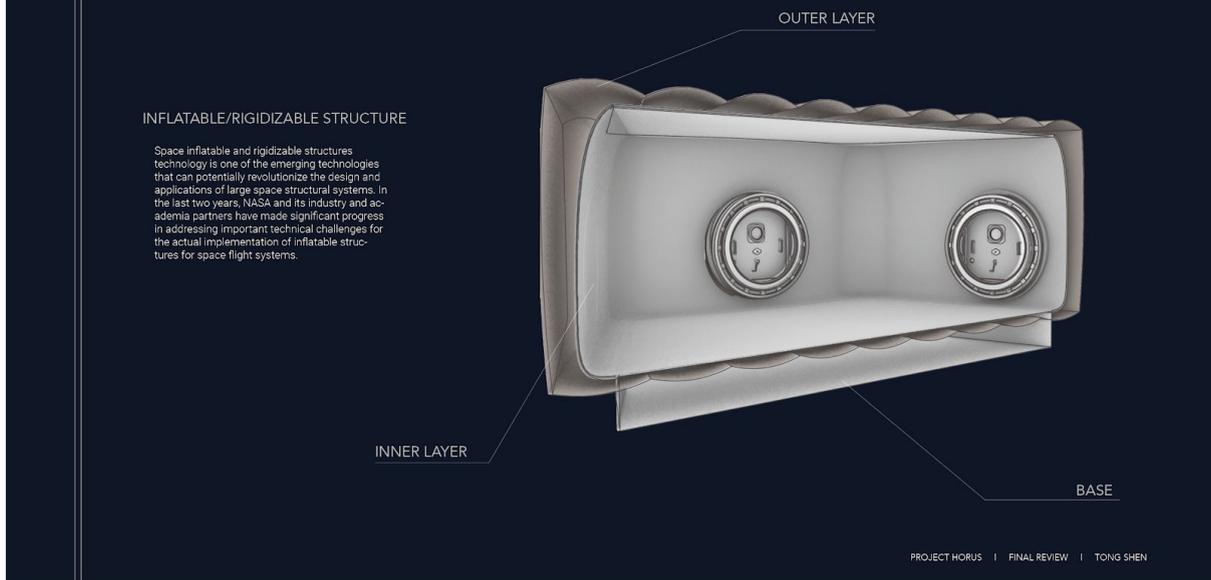
EMERGENCY LEVEL

Based on how close the asteroid is approaching earth, there are three levels of emergency, code red, code yellow and code blue.

18 CONSTRUCTION



19 CONSTRUCTION



CONSTRUCTION & STRUCTURE

The establishment is a modular system facility, where each module is connected to the operation room to provide fastest and shortest transition. There are 5 main modules and 4 connecting module. from the axon, these modules are mission prep, medical module, living module, exercise and hygiene, material lab and operation center. and the section shows how they are connected to the center, and the structure for each module is foldable and inflatable, considering the transport can be super expensive, and this is easier to transport and setup, and the two layers provide protection for solar radiation and extreme weather.

PERSONA

Our crew members are from all over the world. A diversity is needed to make the right and rational decisions. There are 5 crew members resident in the base from the U.S, China, Europe Russia and India. They are outstanding soldiers, astronauts, scientists, and represent authorities of their own country.

21 WALK THROUGH



- LIVING
- sleeping
- kitchen
- lounge
- relaxation

PROJECT HORUS | FINAL REVIEW | TONG SHEN

21 WALK THROUGH



HAND GRIP:
For faster movement in low
gravity environment

PROJECT HORUS | FINAL REVIEW | TONG SHEN

HUMAN-CENTERED DESIGN APPROACH & DECISION MAKING PROCESS

The flow and circulation of the space is designed around the crews' perspectives. In my design process, I imagine myself as one of the crew members, think about what's the fastest and the most convenient movement in between the modules, create storyboards, and design

the space around the scenario. The story comes before the form of the structure, therefore the flow and connection of the space is what makes the most sense for the crew members.

CONCLUSION

As we explore space and develop more possibilities of space settlement, humanities and love will always be the center. Design to solve and to build a space habitat while maintaining the functionality is our next step to take. Space is a dark and dangerous place, psychosocial problems occur in every isolated and closed environment. While our brave pioneers are out there protecting us, designing a warm and comfortable home for them is what we can do as designers to contribute to our precious planet.