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地に足がつかない高校生活（物理）

High School Life Without Ground (Physics)

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1. Introduction

In this session, this paper studies the functional requirements for LEO habitation systems to implement perfect high school life. The systems below are necessary technologies and utilization methods to achieve ideal functions. We are very happy if JASMA professors would kindly give us many suggestions.

2. Activity

2.1 Relaxation System

- A space bath system

The function which cleanse the body by water and foam automatically is suggested. It gives off foam from both sides and water from above. According to the Russian space station Mir, the splash is a critical problem. Thus, to solve this problem put an absorber and the air circulator on the floor. This bath system can be controlled by voice. Water will be purified and reused for various purposes. The material of foam and the way to generate it are going to be researched by looking to nature for ideas (For example: spittle insect).

2.2 Illuminations System

Illumination in space should use sunlight as much as possible.

- Sunlight in space includes strong radiation and ultraviolet rays. So, they should be cut by window glasses. When the sun hides behind the earth, reflected sunlight with geostationary satellites or constellation satellites can be used.
- The LED lighting that can produce pseudo sunlight should be developed.

Thinking of the relationship of circadian rhythm, the light is adjusted according to daily life and situations.

About the directions of illumination, the relation to the gravity should be considered. For example, the light should indicate the gravity direction (i.e. from ceiling and illuminate overall if in zero gravity) .

2.3 Flying Object System

In order to produce new style Spacesuits by referring to the functions of anime superheroes. Gecko can move comfortably on the vertical wall. This mechanism is Van der Waals force. So, using this power on shoes and gloves, let astronauts move comfortably. Spacesuit should be stored compactly as small as a suitcase. For long time outside work, unmanned aerial vehicle will carry water, food and oxygen.

Of course, this suit should be cool and stylish.

2.4 Gravity generation System

Gravity control is essential for every part of high school life in space. Even on the current space station, it is too inconvenient to live in high school if all living spaces are weightless. Therefore, we hypothesized that it would be possible to create artificial-gravity by centrifugal force in some areas, and studied the advantages and applications of a system that

can change the magnitude of the force going to the floor freely.

In addition, researcher should be able to conduct experiments under low gravity for future lunar and Mars missions, such as lunar vehicles and robotics. In an environment where the acceleration of gravity can be varied, it is convenient to be able to experiment of the same weight and under the equal condition without increasing the mass.

The table below shows an example of changing the gravitational acceleration of space depending on which application it is used for.

Table 1 Trade study of various gravity utilization

	<u>地球 0g</u>	<u>地球 1g</u>	<u>地球 1/6g</u>	<u>地球 2g</u>
学習	グラウンド(3D サッカー)	体育館	寮	体育館(バスケ)
		教室	自習室	体育館(バレー)
		自習室	音楽室	ウエイトリフティング
		書道室		物理室
		化学室		
店	図書館	病院	倉庫	ジム
	ヨドバシカメラ	飲食店	工務店	漬物屋
	パン屋さん	美容室	百貨店	植物園
	コンビニ	和菓子屋		
	洋服屋(男の夢)	写真屋		
		雀荘		
娯楽	ゲームセンター	観覧車	ゲームセンター	ジェットコースター
	カラオケ	ボーリング	買い物(移動)	コーヒーカーブ
		ホール	カラオケ	クレーンゲーム
		映画館	ボルダリング	
緊急時	火事			
	通路			誰もいない倉庫

2.5 School planning

Classroom in space

Table 2 necessary elements

	interaction	convenience	Unique feature
Ground type	○	○	×
Private room type	×	○	△
Floating box type	○	△	○

1, Ground type

Like classroom on Earth, desks and chairs are lined up regularly on a side.

2, Private room type

Each private room is small, the same size as shower room.

3, Floating box type

In a large room, boxes in which each them has a chair and a desk are connected to a wall by an arm which is like a dental articulated light. By regulate the arm, people can move around in a classrooms space. Collision between boxes will be avoided by cancers attached to each box.

4, Special

Turn the arm into a tube for power supply, and attach air thrusters to boxes to move around and use automatic stationary system. Make boxes be like a drone, and completely separate from the wall.

3. Discussion and future works

In this issue, as part of the MEXT Super Science High School Program (SSH), we reported on the results of studies in five technical fields

To make use of the latest technology and materials, we would be grateful for the guidance of JASMAC researchers in various fields.

we would also like to ask the junior researchers to take over this research for further development into other fields. We would like to devise a high school-operated experiment facility with various functions to contribute to the development of technologies for the Moon and Mars exploration.

4. Reference Documents

- 1). JAXA SpaceLifeStoryBook
- 2). NASA SSP 5000E INTERENATION SPACE STATION FLIGHT CREW INTEGRATION STANDARD
- 3). NASA SSP50008, INTERNATIONAL SPACE STATION INTERIOR COLOR SCHEME
- 4). NASA SSP50313, DISPLAY AND GRAPHICS COMMONALITY STANDARD, INTERNATIONAL SPACE STATION PROGRAM



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