

Universal Design Studio

● Outline

In Universal Design Studio, aimed at a variety of “people” (who use buildings), verification experiments for “Universal Designs” and “Barrierfree Designs” largely concerned with people’s residence and living, simulation experiments concerned with the safety in using buildings, for example, “countermeasure against accidents in the building” or “safe evacuation in an emergency,” are conducted.

The experiment on an appropriate height of rise of a step (Photo 2), which is aimed at elementary students, the verification experiment on a toilet booth corresponding to a user with the baby (Photo 3), and the simulation experiment on the evacuation activity in an emergency (e.g. fire) which intends to control a crowd (Photo 4-left) have been conducted. In addition, experiments on driving safety of a wheelchair, and motion analyses, such as standing up in taking a bath or using a toilet, aimed at elderly people, are also conducted (Photo 4-right).



(Photo 1) Universal Design Studio



(Photo 3) Verification experiment on a toilet booth



(Photo 2) Experiment on an appropriate height of rise of a step



(Photo 4-left) Verification for evacuation activity in emergency
(Photo 4-right) Verification experiment for standing up



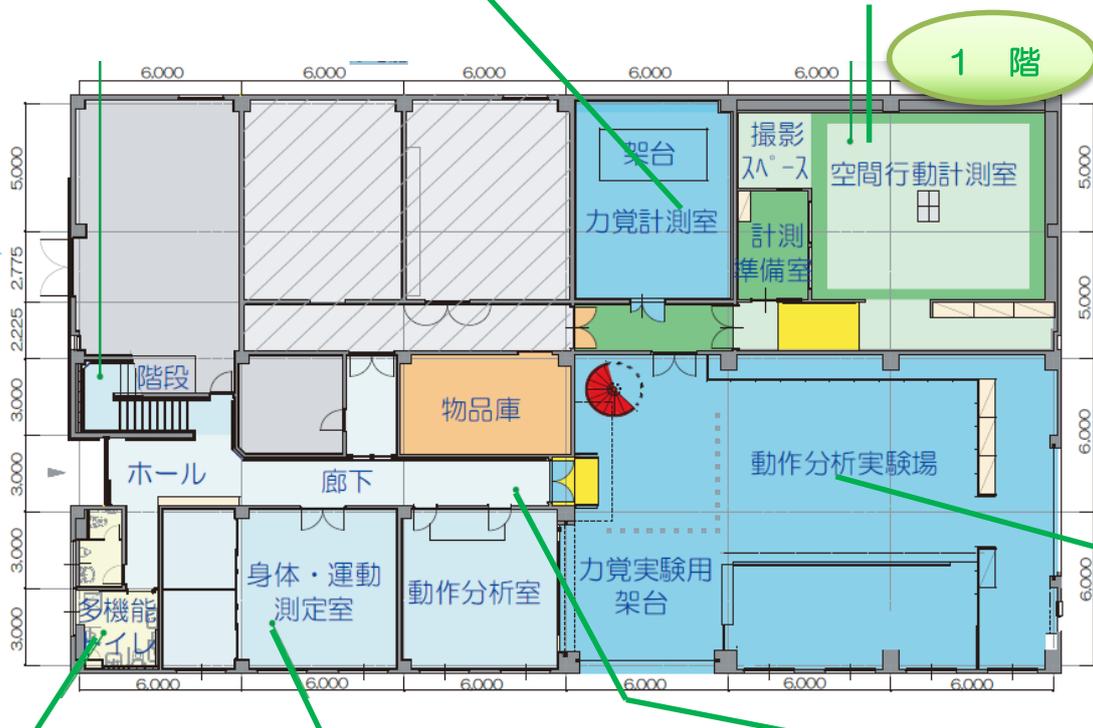
[Steps]
A ceiling prepared for setting lightings and cameras as a laboratory space. Stair-handrails partly arranged.



[Kinesthetic Sense Measurement Room]
Data about postural stabilities and rollover impact are acquirable by a force-plate.



[Spatial Behavior Measurement Room]
Range of body action and reach of upper limb in an architectural space are obtainable by retrieving human's action as 3D coordinate data.



[Multi-purpose Toilets]
Multi-purpose toilet based on the concept of Universal Design. It can be used as a laboratory space.

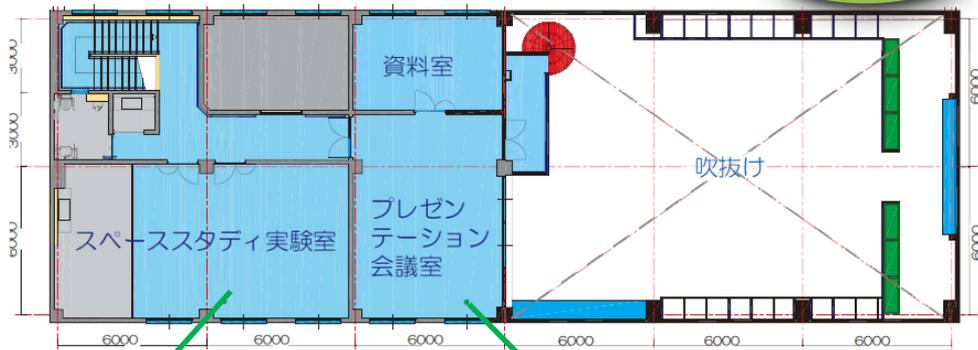


[Body And Motion Measurement Room]
The room is absolutely necessary for human-factor engineering experiments, such as measurement of human bodies or movement function.



[Hallway]
Stair-handrails are installed so as to be utilized as spaces for walking experiments with using a handrail.

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[Space Study Laboratory]

Utilized for mainly tests of the measurement of actions in a unit space, such as toilet, the calculation of spatial dimension required for the action, and the consideration of places to arrange handrails etc. As an example of supposed results, for dimensions and places of the equipment paying attention to physical characteristics of building users, the reference data are indicated with a range for each property.



[Presentation Meeting Room]

Functions as a main base of seminars or cooperative researches, and a presentation room when the facility opens to the public.



[Motion Analysis Room]

The room for experiments requiring a large spatial scale as follows; an experiment which intends to control a crowd; on a feeling of volume such as a ceiling height; for wheel chairs or walking. As an example of the supposed results, with respect to the crowd behavior experiment, it is possible to research the considerations of a walking speed in a case where the old and the wheelchair users exist together, and the prevention of wheelchairs' accidents at slopes.

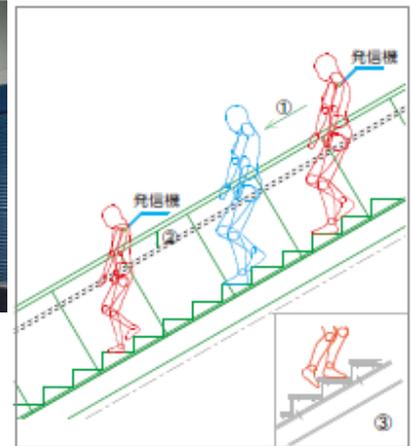


● Experimental Equipment

Variable Slope Deck

This deck can be set up to about 8 m in length, 2.5 m in width and at inclines of 50 degrees in a non-step manner. Finishing materials, including pavers, are laid and the load is designed such that a person can safely ride on it.

Also can be applied as an apparatus for stairs-tests by putting a stair tread on the apparatus.



Suspended Up-and-down Ceiling Apparatus



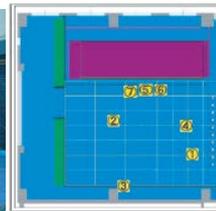
This baton can suspend a load up to 1 ton.

Measures 3D position of a tagged person with an ultrasonic reader set in Motion Analysis Room. Tags can be used up to 50.

Ultrasonic 3D Action Chasing System

Cradle for Kinesthetic Sense Test

Human power generated by activities of daily life, etc. (exert force) is obtainable in addition to time data by arranging a force-plate measurement system on the cradle.



Employing VR Technique in Spatial Behavior Measurement Room

In Spatial Behavior Measurement Room, a “motion-capture camera” and a “force-plate” are arranged. These apparatuses are made for analyzing human’s posture or 3D motions by applying VR (virtual reality) technique, often used in movies, etc. For example, the data obtained by these apparatuses are expected to be useful to develop bathtubs which meet the needs, such as prevention of drowning or ease of stepping over, and to design a toilet space suitable for assistance by analyzing 3D motions which were difficult to be recognized.

