

A Robot "NORO" that Mimics the Dynamical Behavior of an Earthworm

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Abstract

In this project we developed a new propulsion mechanism for robots. The project started as a conceptual design for a robotic rover for the sampling of moon surface resources. The rover propelled itself by mimicking the functionality of an earthworm's spikes and muscles. Later in the project we focussed our efforts on this propulsion aspect of the robotic rover and we designed and built a working model of a robot with earthworm-based kinematics. The working model is an example of how the dynamical behavior (movement) of a biological system can be transferred to a mechanical system.

In our design process we incorporated mechanical engineering design methods within product design methods. A product design approach was used to experimentally determine the specifications for the robot, while mechanical engineering methods were used for producing and testing the robot.

Characteristic for the model is the controlled coordination of the spikes and muscles which move the worm forwards inside a tunnel. The earthworm robot consists of two fixation parts and a propulsion part which mimic the function of the spikes and the muscular contractions of an earthworm respectively.

Tests show that the robot moves forward inside a plastic pipe.

This shows that it is possible to mimic the dynamical behavior of an earthworm by a microprocessor-controlled mechanical system.

That result shows a case of designing a movement.

Keywords

Robot, Earthworm, Spike, Muscle, Shape memory alloy, Dynamical behavior, Designing a movement

A Study on Kitchen Design for Wheelchair Users

With a Comparison of the Kitchen Environment for Wheelchair Users in Korea and Japan

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Abstract

Wheelchair users find conventional kitchens are very inconvenient to use because most of them are designed for the general public. To address this problem, we have presented a study on the current kitchen environment. As part of a series of studies to establish kitchen design guidelines for wheelchair users, this study aims at identifying the differences and the problems common to the kitchen environments of Korea and Japan.

For this study, survey method was used. Out of 137 collected questionnaires, 114 valid data were used for final analysis. The respondents consisted of 84 Korean and 30 Japanese wheelchair users who do kitchen work on a regular basis. Comparisons between the two countries were made in kitchen spaces, kitchen works, remodeling cases, and the level of satisfaction on their kitchen environment. We visited 7 remodeled kitchens in both countries to review the benefits of remodeling and to interview on the problems related with kitchens.

As the result, we found that the satisfaction level of Japanese wheelchair users on conventional kitchens was higher than Koreans. Also, in the remodeling ratio of wheelchair users' kitchens in Japan were higher than those in Korea. Among the kitchen elements, the wheelchair users of both countries commonly had difficulties in using upper cabinets, sink, and range hood etc. After reviewing remodeled kitchen cases, we could make some recommendations for formulating kitchen design guidelines.

Keywords

Kitchen Design, Wheelchair Users, Kitchen Environment