world eco-tope

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1. Introduction

To feel the vicissitude of earth more intuitively, our biotope that represents the earth shows the weather of countries on the globe. There are no need to utilize expressions of letters, weather symbols, or voice of weather forecaster. You can see the weather of any locations including the ones you do not even know of, located at the remotest part of the world. And our biotope enables the experience of earth now and nature through the changing of weathers.

We emphasis on "intuitive" to design world eco tope, which is direct touchable manipulation of designating the location by globe and comprehensive of the weather by biotope. In the following, we describe architecture and detailed explanation of each module. There are some related works that reproduce experience of remote place. For the representative of those past works, Tele-present wind reproduces the wind status of distant beach by moving plant. However, it only reproduces wind status of a specific place [1]. Fig.1 shows the outlook of our world eco-tope.

Fig1. System architecture

2. The world eco-tope system

World eco-tope is a system that enable viewer to specify the location of interest using globe, and acquire weather information of the specified location from the internet, then the weather is reproduced in the biotope by controlling the strength of rain and wind or the lightness of sun or moon. The system consists of following four modules(Fig.2).

Input: Location designation module

To make viewer designate the desired location to see the weather intuitively, we make use of the terrestrial globe. The globe is the analogue device but is easy for all the viewers including children and elderly to designate the location(Fig.3). We embed circle shaped variable resistor and line shaped one to the bottom and bow of the globe respectively. Line shaped and circle shaped one can measure the longitude and latitude respectively (Fig.4 and 5). Acquired longitude and latitude are input to the Arduino.

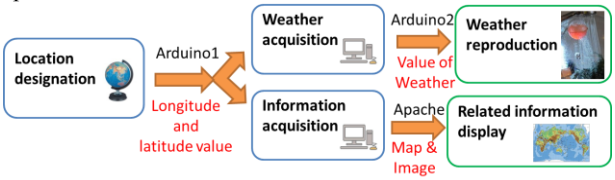

Fig2. The whole configuration of world eco-tope

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Fig3. With children

Fig4. Location designation by globe

Fig5. Register embedded to globe

Input: Weather acquisition module

This module acquires the weather at the designated location by using the Google Weather WebAPI. The API accepts the input of both longitude/latitude and city name. However, as the response coverage of longitude/latitude is small, we convert longitude/latitude to the closest city name, and use it as input to the API. There are 35 types of weather for the response.

Output: Weather reproduction module

This module reproduces the weather acquired in the biotope. The biotope has three devices that can reproduce rain, wind and light (sun or moon). We map each of 35 types of weather to the three parameters; strength of rain, wind, and lightness of the sun or moon. The example is shown in the table below.

	Rain	Wind	Lightness
CLOUDY	0.0	0.3	0.3
THUNDERSTORMS	1.0	1.0	0.1
WINDY	0.0	0.95	0.5

Rain device consists of shower head and pomp. Fig.6 shows the scene the rain is falling using the device. Wind device consists of motor and propeller. Light device consists of three colored LED, which we change the lightness and color according to the weather acquired from above mapping table and the time respectively. As for color, if the designated location is night time, the LED works as moon by coloring yellow, and if the designated location is day time, the LED works as sun. In addition to above output modules, we plant real plant in the content of biotope so as to reflect globe itself, the flow of the nature, which the plant glows and water circulate according to the change of weather.

Fig6. Rainy day at South America

Output: Related information display module

This module displays related information such as Google street view and Flicker pictures taken at the designated location (Fig.7). This function helps viewer understand far distant country easily.

Fig7. Example of Related information

3. Conclusion

We realized "World eco-tope" that viewer can experience the feeling as if the viewer is in the remote country by reproducing the weather of the location of interest in the biotope. In future, we enlarge the size so that people enjoy more the world weather inside, and increase the number of output devices so as to reproduce the weather more precisely such as snow and fog module.

References

[1] David Bowen, "Tele-present wind," Leonardo, Vol. 44, No. 4, pp. 358–359, 2011.