MOSS-xels: Slow Changing Pixels Using the Shape of Racomitrium Canescens

Takaki Kimura*
Keio University

Yasuaki Kakehi†
Keio Universtiy

1 Introduction

In the city, there has been an increase in effort to embed plants on walls for architectural or spatial design or for the reduction of heat island. It is possible to design the plants appearance within the restriction of the time it takes for the plant to grow, by planning the area and arrangement of the plants. On the other hand, Digital signages which are capable of displaying digital information are installed in many areas of the city. Unlike posters or billboards, displays can dynamically change its content. However the luminous displays themselves stand out when placed in natural scenery which makes it difficult to integrate. In order to solve this problem there have been many attempts to develop displays without emitting light [Follmer et al. 2013]. In light of these situations, in this paper we propose a media that has both qualities of greening and presenting information. This novel display, called MOSS-xels (Figure 1), is a media that presents information slowly and dynamically in between two time resolutions: A few weeks to a few months it takes for a plant to transform and milliseconds it takes for an electronic display to process. By leveraging the attributes of plants and computationally and gently controlling their behavior, we aim to develop a novel information representation that can blend in with the natural environment.

2 MOSS-xels

In MOSS-xels, we use blocks of moss called Racomitrium canescens as pixels. This is a type of moss which is resistant to environmental change, in particular dry environments. Without water it closes its leaves and enters into a state of suspended animation. When water is absorbed the leaves instantaneously open and as the moss dries the leaves will slowly close. When the leaves open and close the moss provides a light and dark contrast in appearance (see Figure 2). By utilizing this attribute, in MOSS-xels we control the timing of water provided to the arranged blocks of moss and with this process of watering we create various patterns of appearances.

This system consists of Racomitrium canescens, pumps, fans and microcontrollers. In the following, we will describe the technical contributions of this study. The first contribution is the development of the hardware to control the appearance of the Racomitrium canescens. For changing the state of Racomitrium canescens, we provide water with the pumps and blow air with the fans as shown in Figure 3. The moss opens when the water spreads through the cloth, and closes when the cloth is dried by the wind. After water is provided, it takes approximately 5 minutes for the Racomitrium canescens on one unit to open. Once the water has fully spread, it takes from 40 to 60 minutes for the open leaves to dry and close.

As for the second contribution we propose the software-based control of opening and closing the moss units to create patterns, and their capable expressions. By arranging several units, we simultaneously open and close the alternate columns of Racomitrium canescens to create a difference in appearance. The surface of open Racomitrium canescens shifts as time elapses. In this way, the opened and closed Racomitrium canescens create a gradation pattern that shifts with time. The MOSS-xels can be implemented as various applications. For example, by arranging twelve units of moss and applying water in a different unit every hour it indicate time, or by attaching the units of moss to the walls of a caf and opening the Racomitrium canescens according to how long or where the customers sit it can become an expression of slow interactions.

Figure 1: *MOSS-xels.*

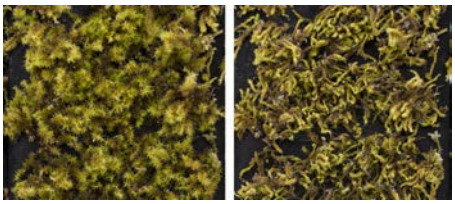

Figure 2: *When water is absorbed the leaves instantaneously open and as the moss dries the leaves will slowly close.*

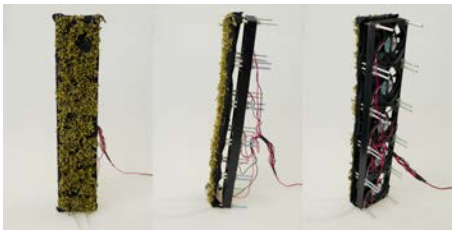

Figure 3: *Hardware Structure of the Moss Pixel.*

References

FOLLMER, S., LEITHINGER, D., OLWAL, A., HOGGE, A., AND ISHII, H. 2013. inFORM: Dynamic physical affordances and constraints through shape and object actuation. In *Proceedings of the 26th Annual ACM Symposium on User Interface Software and Technology*, ACM, UIST '13, 417–426.

*e-mail: chimera.the.3rd@gmail.com
†e-mail: ykakehi@sfc.keio.ac.jp

SIGGRAPH 2014, August 10 – 14, 2014, Vancouver, British Columbia, Canada.

ACM 978-1-4503-2958-3/14/08