App Supported Demonstration Design on Reuse of Areca Catechu Tree

Fanglin CHAO and Yu Chueh Wong
Department of Industrial Design, Chaoyang University of Technology, Taiwan, R.O.C

Abstract – When Areca catechu is chopped down and left in the wild, they become an extra burden to the local environment. Reuse opportunities were collected in Blog, and an App was built to enhance the interactive participant and dissolve in the audience. Sets of LED which placed on samples of areca tree are controlled by the App to the relevant information content. Information and the physical specimen can be linked through the user interaction between the App and LED indicator. The combination of physical and virtual display performs better than general internet information search.

I. INTRODUCTION

Scientific demonstration focus on information display which attracts people to further exploration. The static exhibition design utilized object items and display panel to the audience. The more attractive approach provides not only the facts but also users' interaction with the information or objects.

Mobile devices extended the learning environment beyond classroom walls [1] and provided a new delivery mechanism to overcome traditional learning [2,3]. By shifting some information to user's mobile phone, we can change static exhibition to a more interactive way. This situation can be accomplished with the Blog design [4] and pass structuralized information to the audience. In this study, we further organize the physical samples of the Areca Catechu tree and use an App to connect information with those samples; it is possible to "provide at the right time and in the right place" customized learning experience.

Areca catechu [5], often known as betel nut tree, can be commonly found in Taiwan and Asia. Though the specific ways of consumption of its fruit. The medical agency announces betel nut [6] inhere cancer-causing characteristic. The land conservation agency indicates the tree cause the landslide in a mountain area. Many Areca Catechu tree is chopped down and left in the wild and became an extra burden to the environment (Fig. 1). Re-utilizing the trait can transform waste into resources. Many objects had designed mainly using leave and fruit (Fig. 2) [7]. Taiwan's betel leaf leaves are reclaimed in the midsole and are naturally dry, comfortable and wear-resistant. Combining aboriginal weaving and designing betel leaf weaving slippers with a local cultural atmosphere. Leaf sheaths are hung on shelves. Drying before the production can control the moisture level and fixed shape for follow-up processing. Through exhibition design, we hope local people and students can know more about the relationship between the plant and our living surroundings.

Fig. 1. Areca catechu and burden to the local environment.

II. DESIGN CONSIDERATIONS

The information technology gives demonstration design forms a channel to pass information to individual people, such as biology, culture and scientific facts. The physical samples of areca catechu were broken down into four parts:

1) Leave: sheath, body, and buds,
2) Fruit: ripe and unripe,
3) Trunk: from inside to outside,
4) Root: Radial extension root with enlarged nodes.

To better display different parts of the plant, we use several transparent acrylic pipes to show various parts of the plant. We placed LED indicators which allow audience connect those samples (Fig. 3) put in separate sections with App.

Fig. 2. The reuse of the different parts of the plant [7], where the carpet usage from unripe fruit, the light design also by using leave sheath.

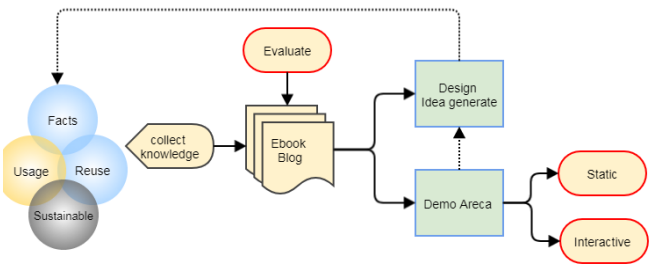

Fig. 3. The exhibition design support by Blog. [3]

III. DEMONSTRATION SUPPORTED BY APP

Exhibition design Combined App allow virtual or physical interaction. The user first uses an App to familiar with the tree, the reuse procedure, and design details. Then, the user touches a button to control LED in samples display. We added switches in the physical display (Fig. 4). Through the inquiring with the user, the facility switches increase the complexity of facility wiring and disturbing the samples; the facility switch is temporarily stopped using. To better display different parts of the plant, we use a transparent acrylic pipe which places the example of leaves (sheath, body), buds, fruit (ripe and unripe), a section of trunk, and root. The physical exhibit samples let students observe and understand different parts of the plant to activate possible reuse design idea.

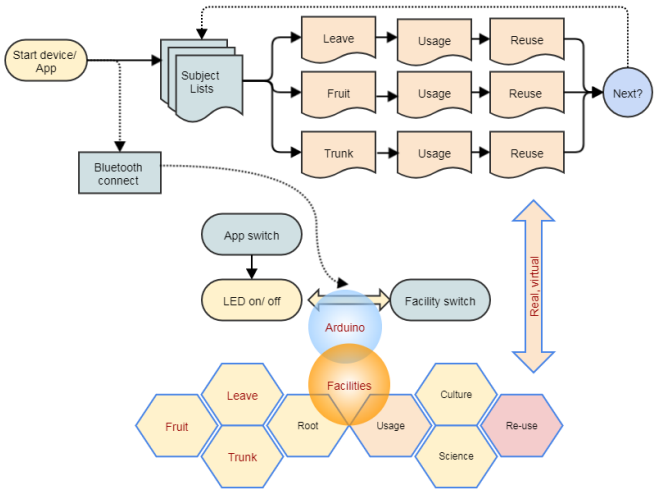

Fig. 4. App link with physical exhibition in sample container.

The app provides examples and information, and sample container offers a physical presence. In the beginning, the audiences use app that he or she wants to look. As inside the app, picture and text saved in a List, and index points to different facets of information such as history, structure, reuse cases and so on. As the app is demonstrating, the user can activate corresponding parts in physical display, allowing a user to engage further. These interactions between virtual and physical space can deepen user's immersive experience.

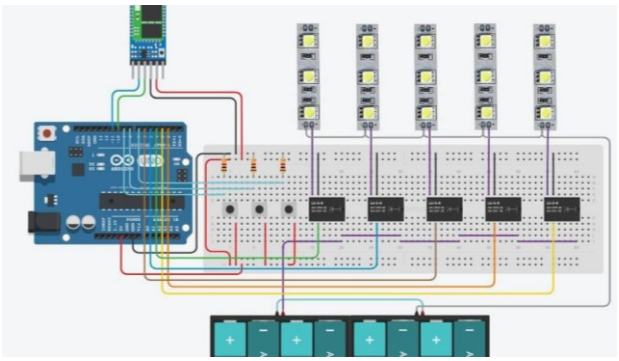

Fig. 5. The app controls several sets of LED. The separated relay and switch made it easier to manage.

IV. IMPLEMENTATION

The MIT App Inventor II and Arduino (with Bluetooth module, Fig. 5) were used as the prototyping tool. Arduino board uses the LED and switch in the digital output during the connection. The index of a list is used to direct to display the relevant part of the list in App. Some difficulties were found with App implement. There is less search ability for directly handling, while the cases or lists growing the programming adjusting might take time. App Inventor II has constraints on pages swap control and data retrieval within simple Tiny Database.

Currently, only a limited amount of scholarly articles related to areca catechu tree exist. We tried to compare the user perceived depth and breadth of information regarding tree and betel nut, with only using Google search to acquire knowledge of the subject, and experiencing our demonstrating design supported by App. The combination of physical display performs better than general internet search. This is because even though internet search can provide a vast amount of information, they are often repetitive. But through the use of the app's systematic information and the collected physical display, the spontaneous accessing is enhanced.

V. CONCLUSION

Scientific demonstration focus on information display which attracts people to further exploration. The demonstration design does not only give the facts but also users interaction during the information access process. Reuse opportunities were collected, and App was built to enhance the people and designer's awareness to extend possible of further utilization. Information and samples can link through LED indicator which controlled by the App. This approach increases users' information access.

REFERENCES

[1] M. M. Organero, P. J. M. Merino, and C. D. Kloos, "Adapting the speed of reproduction of audio content and using text reinforcement for maximizing the learning outcome through mobile phones," *IEEE Trans. Learning Technol.*, Vol. 4, no. 3, 2011, pp. 233–238.

[2] C.-C. Chen and T.-C. Huang, "Learning in a u-museum: developing a context-aware ubiquitous learning environment," *J. Comput. Educ.*, Vol. 59, no. 3, 2012, pp. 873–883.

[3] G.-J. Hwang, C.-C. Tsai, and S. J. H. Yang, "Criteria, strategies and research issues of context-aware ubiquitous learning," *J. Educational Technol. Soc.*, Vol. 11, no. 2, 2008, pp. 81–91.

[4] F.L Chao, "Demonstration on Areca Catechu Tree Reuse with Supporting with Information Technology," 2017 International Conference on Sustainable Development and Green Technology (SDGT 2017), Nanhua University, Taiwan, October 2017.

[5] Areca catechu, https://en.wikipedia.org/wiki/Areca_catechu

[6] Areca catechu – Betel Nut, http://entheology.com/plants/areca-catechu-betel-nut/

[7] Reuse report, https://udn.com/news/story/7266/2456169