Development of Augmented Reality System to Support Gardening Beginners

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Abstract— **Gardening has positive effects on people mentally and psychologically. However, it is difficult for beginners to imagine how the flowers they bought will grow in their own garden. We have developed a system to support them so that they can easily start gardening. Our system not only shows the growth processes of flowers in Augmented Reality, but also can promote the growth of the flowers by replanting or adding compost.**

Keywords— *Augmented Reality (AR), Support System for Gardening Beginners, Growth Processes of Flowers in Augmented Reality.*

I. INTRODUCTION

In recent years, gardening has been attracting attention for its various relaxing effects. It is difficult for gardening beginners to imagine how to care for flowers according to their growth process and make them bloom. In addition, it is necessary to search for information and learn knowledge about flowers such as tools and fertilizer necessary for planting and growing flowers, but complicated and difficult.

In this paper, we use augmented reality (AR) technology to display 3DCG flowers. We propose a system that allows even beginners to easily enjoy gardening by checking how 3DCG flowers grow after being planted. Since our system is referring to commercial websites specializing in gardening [1][2], information and knowledge on tools and care required to grow flowers can be shown according to the season.

II. AR SYSTEM TO SUPPORT GARDENING BEGINNERS

We have developed an AR system to support gardening beginners. Gardening requires various information and knowledge about flowers: when to plant flowers, how flowers grow, how to take care of flowers, what tools are needed to take care of them, what kind of flowers bloom when, etc.

However, it is difficult to envision how flowers grow by simply obtaining such information and knowledge. To solve this problem, we developed an AR system that allows users to hold their smartphones over actual pots and pots to see how flowers are growing even before they purchase them.

Since gardening requires tools such as pots, we made it possible to see descriptions of the tools (Fig.1(a)). One type of flower is planted for one pot at a time. It is displayed in AR as a 3DCG flower (Fig.1(b)). Its growth process is also displayed interactively (Fig.1(c)). Related information and knowledge about the flowers and how to grow them were also made available for viewing when selecting flowers (Fig.1(d)). Information on flowers is referred to Sakata Seed's "Engei Tsushin" [1] and LOVEGREEN [2].

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(a) Explanation on Tools (in Japanese)　(b) 3DCG Flower　(c) Growth Process of 3DCG Flower　(d) Explanation on 3DCG Flower (in Japanese)

Figure 1.　Growth Process of 3DCG Flower

III. EVALUATION OF OUR AR SYSTEM

After using our AR system, the following questionnaire was given to 10 subjects. The results are shown in Table 1. According to the results of the questionnaire, the user interface, the function to see the growth process of flowers, the information and knowledge itself about flowers and tools for raising them, and the function to display them were well received. However, the realism of the flowers will be improved in the future.

TABLE I.　RESULTS OF A SURVEY ON THE USABILITY OF THE SYSTEM

Questionnaire (5-point scale)		Average
(1)	Did the flowers seem realistic?	3.2
(2)	Is the screen easy to see?	4.8
(3)	Was it easy to operate?	4.1
(4)	Was the amount of explanation of tools and flowers appropriate?	4.7
(5)	Were the explanations of tools and flowers easy to understand?	4.8
(6)	Did you feel the need to display the growth process?	4.4
(7)	Do you think it is supportive of gardening?	4.7

Subjects were asked to answer on a 5-point scale ranging from "not at all good" 1 to "exactly good" 5 for each questionnaire.

IV. CONCLUSION

We have developed an AR system that can be of interest to gardening beginners. It will be expected to arrange and grow multiple types of flowers in one planter in the future.

REFERENCES

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