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GRASS: INTERACTIVE TANGIBLE ART TO EVOKE OLDER ADULTS' NOSTALGIA

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Resumen

Grass es un proyecto de planta interactiva que explora el incremento de serenidad y apego emocional que se genera a través del tacto meditativo de plantas con audio-visualizaciones interactivas. Investigaciones anteriores mostraron sistemas interactivos que utilizan luz y sonido podían ayudar a las personas mayores de diversas maneras favoreciendo el tacto humano. Muchos artistas / investigadores interesados en el contacto meditativo se han centrado en los potenciales relacionados con la salud. *Grass* investiga cómo las plantas interactivas táctiles pueden evocar la nostalgia y la forma en que afecta a las personas mayores para mejorar su calidad de vida a través de recordar el pasado. De nuestro estudio preliminar usando *Grass* con personas mayores, se observó que algunos de los ancianos comenzaron compartir su experiencia con otras personas y hablaban de sus recuerdos relacionados con la luz, jardinería, naturaleza, etc. A partir de este estudio, nos enteramos de que la hierba evocaba respuestas positivas en los participantes y les ayudaba a recuperar sus recuerdos felices. Los estudios mostraron que las plantas interactivas tenían potencial para crear interacciones saludables, fomentando en los adultos mayores en un centro de asistencia a través de la exploración táctil. La reacción deseada de calma y la sensación tranquila se ve sobre todo en las personas mayores.

Palabras-clave: PLANTA INTERACTIVA, INTERACCIÓN TANGIBLE, INTERFACE NATURAL, NOSTALGIA, PERSONAS MAYORES, REMINISCENCIA

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Abstract

Grass is an interactive plant project that explores serenity and emotional attachment through meditative touch of plants with interactive audio-visualizations. Prior research showed that interactive systems using light and sound invited human touch to help seniors in various ways. Many artists/researchers interested in meditative touch have focused on health related potentials. *Grass* investigates how touch-sensitive interactive plants can evoke nostalgia and how that affects seniors quality of life through reminiscing. From our preliminary study using *Grass* with seniors, we observed that some of the seniors started sharing their experience with others and talked about their memories related to light, gardening, nature, etc. From this study, we learned that *Grass* evoked positive responses from the participants and helped them to recall their happy memories. The studies showed that our interactive plants had potential to create healthy interactions, encouraging older adults in an assisted living facility through tactile exploration. The desired reaction of calmness and feeling at ease was mostly seen in the elderly.

Keywords: INTERACTIVE PLANT, TANGIBLE INTERACTION, NATURAL INTERFACE, NOSTALGIA, OLDER ADULTS, REMINISCENCE

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1. INTRODUCTION

The study has been designed to explore how interactive plants with audio-visual reponses can evoke older adults' nostalgia and generate an emotional attachment with human in senior housing. Grass is an interactive plant project that explores serenity and emotional attachment through meditative touch of plants with interactive audio-visualizations. The human touch is no stranger to interacting with nature. Feeling the grass beneath our feet or hand leaves behind a sense of relief and allows for individuals to just concentrate on touch. It is considered that gardening related activities are therapeutic and reduce negative arousal levels which leads to an improvement in health and allowing a number of positive changes to take place (Etherington 2012). However those who are unable to benefit from the activities, such as the mentally and physically disabled or hospitalized children are stripped of the leisure. We approached older adults in an assisted living facility because it is known that this group has limited access or have barriers to nature but they still would like to enjoy. This paper focuses on the older adults' experiences with Grass. Grass investigates how touch-sensitive interactive plants can evoke older adults' nostalgia and help them to feel healthy.

2. BACKGROUND

2.1. IMPORTANCE OF TANGIBLE INTERACTION FOR OLDER ADULTS

Prior research showed that interactive systems inviting human touch helped participants in various ways. Artists / researchers have focused on tangibility in terms of the educational relevance as well as health related potentials. In clinical research, therapeutic touch is beneficial to many populations including children with autism and seniors. Especially it is pertinent to older adults in senior housing (nursing homes, assisted living, etc.) because multiple studies showed that isolation, loneliness, and depression are pressing concerns for such populations (Fessman, 2000, Jongenelis, 2004). Field et al. described that seniors who volunteered to give massage to infants had less anxiety and depression in comparison with seniors who massaged themselves (Spitz, 1946). Touch based interaction could benefit many computer based applications dealing with familiar design objects.

2.2. NATURAL/ORGANIC INTERFACE

Horticulture therapy employs plants and gardening activities in therapeutic and rehabilitation activities and could be utilized to improve the quality of life of the aging population. In horticultural therapy, plants are utilized to engage and improve cognitive, physical, social, emotional and spiritual well-being by caregivers or therapists. Prior studies have reported the benefits of horticultural therapy and garden settings in reduction of pain, improvement in attention, lessening of stress, modulation of agitation, and lowering of as needed medications (Detweiler, 2015). However nature is not readily accessible to certain populations including homebound kids, immune compromised children, elderly in nursing homes, mentally and physically disabled individuals, and the incarcerated. The concept of natural interface in Interactive Art has been explored by artists examining different organic materials. Akousmaflore[1] is an interactive garden composed of living musical plants, which react to human contacts. Each plant reacts in a different way to contact by producing a specific sound. The artist tried to create a plant concert by participants. Botanicus Interacticus[2] is another interactive plant aimed to design highly interactive responsive environments based on plants, developing new forms of organic, living interaction devices as well as creating organic ambient and pervasive interfaces. These works delve into experiential, entertainment and aesthetic uses using responsive plant systems.

2.3. REMINISCENCE

In many assisted living facilities for seniors, there is an activity called "reminiscence" to recall past experiences or events and it is often considered nostalgic. Nostalgia was originally

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described as a "neurological disease of essentially demonic cause" by Johannes Hoffer, the Swiss doctor who coined the term in 1688. Military physicians speculated that its prevalence among Swiss mercenaries abroad was due to earlier damage to the soldiers' ear drums and brain cells by the unremitting clanging of cowbells in the Alps. Nostalgia has been shown to counteract loneliness, boredom and anxiety. It makes people more generous to strangers and more tolerant of outsiders. Couples feel closer and look happier when they're sharing nostalgic memories. On cold days, or in cold rooms, people use nostalgia to literally feel warmer. Grass was created to evoke pleasant memories of the life from tangible interaction with real and artificial grass pots.

Fig. 1. Real Grass (Top) and Fiber Optic Grass (Bottom)

3. DESIGN

Grass investigates how touch-sensitive interactive plants can evoke an emotional attachment with the user and how the relationship affects their quality of life. Since *Grass* used real grass as well as a designed grass, we carefully chose plants based on scientific evidences and aesthetic qualities. We aim for the level of touch to be not only beneficial to human as it generates soothing feelings but also beneficial to plants as it generates plant defense system to be more alert to foreign pathogens.

We have been compelled by the beauty of reflected moonlight on a grass field harmonizing with the fluctuation of the grass by wind. This kind of experience with nature is quite relaxing and meditating. Grass (Figure 2) includes two touch responsive installations (real grass and fiber optic grass). For the real grass, we connect the pot to a control board and produce sounds when the grass is touched by human. The fiber optic grass consists of a field of fiber optic strands that looks like grass and electronic components including a microcontroller, RGB LEDs and speakers in the base container. Users can explore different nature sounds (water, wind, birds, and crickets) and LED light patterns projected on the tips of the optical fibers by gentle caressing. We focused on the development of a tactile interface, using flexible, conductive materials and hand gestures (touching, stroking, and caressing). Grass enhances the multi-sensory experience, provoking participants' memories or imaginations through soft-computational/electronic technology.

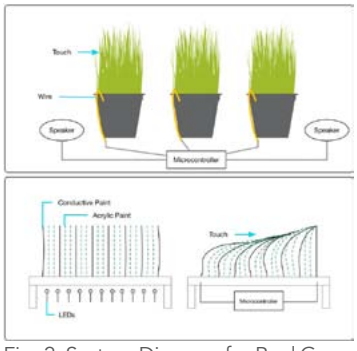

Fig. 2. System Diagram for Real Grass (Top), Fiber Optic Grass (Bottom)

4. IMPLEMENTATION

4.1. SENSING HUMAN TOUCH

Since Grass is developed for older adults in senior housing, we experimented with multiple techniques and chose simple a electronic method to help caregivers to maintain the interactive plant easily. Touch Board3 and conductive materials were utilized. A bobby pin with a wire was pushed into the soil, near the roots, allowing for the grass to be conductive without harming the actual plant. *Touch Board* is an Arduino-compatible device that can connect anything conductive to one of its 12 electrodes and trigger a sound via its onboard MP3 player, play a MIDI note. Fiber optic Grass was made out of over 2000 strands of fiber optics. To create a grass field as a big touch or stroke sensor, we used a soft-circuit technique inspired by Hannah Perner-Wilson's stroke sensor (Perner-Wilson,2011) (See Fig. 3, bottom).

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4.2. ACTUATIONS

Fig. 4: Fiber optic bundles (left), LED matrix (middle), Light Pattern on Fiber optics (right)

Generally we installed three pots and sounds from nature, environment and human, were assigned to each grass pot. Each real Grass pot was connected with a different sound. A RGB LED matrix was used for LED patterns, with 60 RGB LEDs connected to 60 small bundles of fiber optics (Figure 4, left). Light patterns are projected to the LED matrix connected to one end of the fiber optic bundles (Figure 4, middle). The lights on the tips of the fiber optic grass are illuminated depending on the way how participants touch Grass (Figure 4, right).

5. REMINISCING

We conducted a preliminary study with older adults. We visited one of the local assisted living facilities in Bryan, Texas. We summerize our results with three visits to the facility. Each visit, the audience was 5-7senior citizens. Some were on wheelchairs, while others used walkers. For this study, we could use only sound feedback from Grass because the environment was too bright for LED patterns to be appreciated properly. The elderly required simple instruction in order to perform the interaction. As well, due to the project being propped on a table, those that were in wheelchairs were at a disadvantage and were difficult totouch Grass freely. Since Grass had only sound interactions, the general setup was just fine for senior residents.

Fig. 5: Older adults in an assisted living facility experience real Grass (top) and fibr optic Grass (bottom).

Older adults in an assisted living environment approached our projects with almost no hesitance and became more engaged with them. Average interaction time per person was about 5 minutes but they stayed with the projects for 20-30 minutes waiting for other people. When a sound was triggered by their touch, they were so engaged and expressed happiness. In addition, they tried different things without asking. Most participants spent less than one minute to figure out the interaction. Once they understood how Grass works, they freely touched the plants to explore different qualities of the sounds. After experiencing the interactive plants, some of the seniors started sharing their experience with other residents and talked about their gardening related memories.

6. CONCLUSION

The studies showed that our interactive plants have potential to create healthy interactions, encouraging children with autism in pregress as a separate study and older adults in an assisted living facility through tactile exploration. The desired reaction of calmness and relaxation was mostly seen in the elderly group. We would like to explore interactions with other

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plants in different size and tactile characteristics.

References

Detweiler, Mark B. et al. 2012. "What Is the Evidence to Support the Use of Therapeutic Gardens for the Elderly?" *Psychiatry Investigation* 9.2: 100–110. PMC. Web. 15 June 2015.

Etherington, N. 2012. *Gardening for Children with Autism Spectrum Disorders and Special Educational Needs: Engaging with Nature to Combat Anxiety, Promote Sensory Integration and Build Social Skills*. Philadelphia: Jessica Kingsley Publishers

Fessman, N. and D. Lester. 2000. "Loneliness and depression among elderly nursing home patients". *International journal of aging and human developmen*t, 51(2).

Jongenelis, K., A. Pot, A. Eisses, A. Beekman, H. Kluiter, and M. Ribbe, Prevalence and risk indicators of depression in elderly nursing home patients: the AGED study. Journal of affective disorders, 2004. 83(2).

Perner-Wilson, Hannah; Buechley, Leah and Satomi, Mika. 2011. "Handcrafting Textile Interfaces from a Kit-of-No-Parts", in Fifth international Conference on Tangible, Embedded, and Embodied interaction. New York: ACM.

Raina, P., Waltner-Toews, D., Bonnett, B., Woodward, C., Abernathy, T., 1999. "Influence of companion animals on the physical and psychological health of older people: An analysis of a one-year longitudinal study". *Journal of the American Geriatric Society*, 47(3).

Notes

1 Akousmaflore. http://www.scenocosme.com/akousmaflore_en.htm
2 Botanicus Interacticus Available from: http://www.ivanpoupyrev.com/projects/botanicus.php
3 Touch Board. http://www.bareconductive.com/shop/touch-board/

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