

Laughter Blossom: A Prototype of Laughter Interaction Design

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Abstract: In this paper, we propose and evaluate a design prototype, called *Laughter Blossom*, which interacts through laughter. It is an artificial plant whose blossom recognizes and acts upon laughter. Laughing positively impacts the human mind and body since people become happier as they laugh. To detect a smiling face as an indicator of laughter, facial expression recognition technology has already been popular in HCI. It is broadly applied in areas such as service design, product design or media art. However, laughter itself has not been researched sufficiently. We conducted an ideation workshop for laughter interaction design, by distinguishing our approach from that of smile recognition. Based on the findings of the workshop, we developed the idea of a design prototype. Through user studies that focused on group and individual use situations, we identified four issues for the future development of *Laughter Blossom* including (1) simultaneous responses with the user, (2) recording laughter, (3) interruption of the moment, and (4) sympathy with the user.

Key words: *Laughter Interaction, Interactive Flower, Emotion, Sonic Interaction Design*

1. Introduction

Recently, Design for Well-Being is gaining more attention and importance. In particular, laughing is regarded as an important factor to improve mental health and Well-Being. For example, laughter has shown to reduce stress hormones and serve as a natural pain reliever [9]. Laughing has two main components; one is the facial expression of smiling and the other the vocal expression of laughter. To detect a smiling face as an indicator of laughing, facial expression recognition technology has already been applied in areas of HCI such as service design, product design, or media art [3,5,11]. In contrast, the study of laughter itself is still in its early stages [8]. In addition, sound is becoming a more important design factor for interaction design as it can be witnessed in the emerging multidisciplinary field of sonic interaction design [4].

In this paper, we propose and evaluate a design prototype, called *Laughter Blossom*, which interacts through laughter. It is an artificial plant whose blossom recognizes and acts upon laughter. We conducted an ideation workshop for laughter interaction design, by distinguishing our approach from that of smile recognition. Based on the findings of the workshop, we developed the idea of a design prototype. Through user studies that focused on group and individual use situations, we identified four issues for the future development of *Laughter Blossom*.

2. Related Work

There are various studies on smile detection. *HappinessCounter* is a smile-encouraging appliance to increase positive mood for a single person [11]. *Mood Meter* is a system that encourages, recognizes and counts smiles [5]. *Emotional Flowers* is a game in which a user can grow flowers by smiling in game system [3]. Other than smile

detection, there are studies on plant-like interaction design prototypes. A plant-like prototype is a familiar feature in everyday life. *LaughingLily* is an artificial flower responding with size to its surrounding conversation [2]. *Infortropism* which is a robotic plant imitates a phototropic response in order to convey information [6]. *Plantio* is an interactive pot which realizes hybridization between plants and electronic computing system to create an intimate relationship between human and plants [7].

Our contribution is to search the space of laughter interaction design and combine a plant-like prototype with laughter interaction.

3. Laughter Interaction Design

Laughter interaction design considers the sound of laughter as the main component of interaction, and thereby distinguishes itself from smile recognition. We investigated a general direction of laughter interaction design through an ideation workshop. Based on the findings, we made the design prototype, *Laughter Blossom* and evaluated it.

3.1 Ideation Workshop

3.1.1 Workshop Description

The purpose of the workshop was to explore opportunities and implications for interacting through laughter. Participants included four graduate students, two male and two female, aged $M=24.75$ ($SD=0.5$), with a background in industrial design. The workshop lasted an hour. Participants were encouraged to speak their minds freely on anything related to laughter interaction design.

3.1.2 Workshop Findings

Through the workshop we collected various ways of application. As a result, we collected many scenarios, which could be grouped into two main directions. In the first direction laughter is the direct input factor of interaction design. For example, participants mentioned an alarm, which can be stopped through laughter, a toy interacting with laughter, and a camera which can take a photo by laughter. The second direction deals with the way in which laughter input is collected to be interpreted according to the specific context of laughter. In this case, participants described a joyful video recommendation service that is based on the highest frequency of laughter elicited by each video, and an outdoor display that can show the level of indoor happiness through laughter detection.

3.2 Laughter Blossom

In this research, we created and evaluated a design prototype named *Laughter Blossom* which uses laughter as the main interaction factor.



Figure.1 Laughter Blossom

3.2.1 Design Concept

Laughter Blossom is an artificial plant which can visualize laughter. It is a design prototype, which can detect the laughter sound from the surrounding area and which has flower bloom in response. The shape of a flower embodies the Korean metaphorical phrase ‘to blossom a laughter-flower,’ which describes how people laugh happily in pleasant situation.

3.2.2 Implementation

Laughter Blossom consists of two parts. One is the detection part of laughter, the other is the representing part to visualize laughter. These two parts were implemented with Max/MSP and Arduino [10,1]. As Max/MSP detects the laughter, a signal is passed on to Arduino, which then actuates a servo motor that lets the blossom bloom. This happens as the motor pulls a lever, which opens a paper pop-up flower.

Laughter Blossom gradually opens within one second of laughter detection, stands by for further 10 seconds, and gradually closes within 5 seconds. If another laughter is detected when the flower is already blooming, the standby time is extended for a further 7 seconds. The extension only sets in once. After that the flower first closes and re-blooms with a newly detected laughter.



Figure.2 Flow Diagram

3.2.3 Evaluation

We evaluated our design prototype for general comments and for suggestions to improve our design. The evaluation was conducted with seven graduate students. Three of the participants individually watched a 20 minutes sitcom while the *Laughter Blossom* was set up on a table in front of them. Four of the participants watched the same sitcom as a group. Other than testing for individual and group interactions the rest of the test conditions were the same. After watching the sitcom, we conducted interviews.



Figure.3 Individual Evaluation

3.2.4 Findings

Participants reported that the first the impression of *Laughter Blossom* was fun and positively startling. But rather than just having one action, in which the flower blooms and fades, they described that it could be better if the prototype had more varied and stronger actions depending on different situations. Moreover, participants found that the feature of *Laughter Blossom* could have a fun factor all by itself without signifying an explicit input.

We identified four key findings from the participants including (1) simultaneous responses with the user, (2) recording laughter, (3) interruption of the moment, and (4) sympathy with the user.

Simultaneous Response Four participants commented on the speed of blooming when detecting laughter. At the moment when *Laughter Blossom* reacts to laughter it blooms gradually within one second. However the gap of the time period made participants feel uncomfortable as it caused a negative sense from the discordance between the participant's laugh and the reaction of *Laughter Blossom*.

Record of Laughter Three participants were concerned about the time of fading. They reported that if a flower is blooming for a long time, they could notice their memory of laugh for a while.

Interruption of the moment Two participants said that when someone laughs, it means he or she is in the peak of experience. So they added that if the *Laughter Blossom* works at that moment, it can interrupt the flow of a situation.

Sympathy with user Two participants described that they did not feel good when they saw the flower fading and that they felt good when they saw the flower blooming.

4. Discussion

Laughter Blossom, regarded as a recorder of laughter, takes on the functions of an ambient display. As such, the prototype takes advantage of the fact that in the moment of laughing people are fully immersed in a situation. In this engaged situation, the *Laughter Blossom* can act in two different ways. On the one hand, it can consciously impact the flow of the laughter experience, on the other it can go by unnoticed as the attention is focused on the situation or context of laughter. Thus, interruption and timing is a crucial point in the application of laughter interaction design.

Secondly, in this paper, we conducted the experiment watching a sitcom, because of the difficulty to induce natural laughter without any stimulation. However, the participants expected that *Laughter Blossom* was meant to support communication between people, rather than being just a companion for watching TV. Here, we found that

it is necessary to observe various conditions and environments that might induce laughter, in which the prototype may take on more active roles such as mediating instead of just signifying communication.

5. Conclusions

In this paper, we conceptualized an approach to interaction design, which focuses on laughter. We conducted an ideation workshop to find directions for laughter interaction design. Based on one of the emerging directions, we developed and evaluated the design prototype, *Laughter Blossom*. As the key result, people reported on their positive feelings enabled by the prototype and mentioned the four quality factors of simultaneous response with the user, recording of laughter, interruption of the moment, and sympathy with the user.

Since this experiment was based on a short-term evaluation there is a need for further long-term studies about how users feel when having their laughter recorded and embodied in an interactive object. Therefore, we plan to focus our further study on self-recognition of laughter through a long-term study with *Laughter Blossom*. Finally, we will explore not only a flower form but also other shapes for laughter interaction design and extend this study to ways of health care related to improving the user's laughter through concept prototypes of laughter interaction design.

6. References

- [1] Arduino <http://www.arduino.cc/>
- [2] Antifakos, S. and Schiele, B. (2003) *LaughingLily: Using a flower as a real-world information display*, In Proceedings of Ubicomp, Vol. 32003, pp. 161-162
- [3] Bernhaupt, R., Boldt, A., Mirlacher, T., Wilfinger, D. and Tscheligi, M. (2007) *Using emotion in games: emotional flowers*, In Proceedings of the international conference on Advances in computer entertainment technology, ACM Press, pp. 41-48
- [4] Franinovic, K., Hug, D. and Visell, Y. (2007) *Sound Embodied: Explorations of sonic interaction design for everyday objects in a workshop setting*, In Proceedings of the 13th Intl. Conf. on Auditory Display (ICAD)
- [5] Hernandez, J., Hoque, M. E., Drevo, W. and Picard, R. W. (2012) *Mood meter: counting smiles in the wild*, In Proceedings of the 2012 ACM Conference on Ubiquitous Computing, ACM Press, pp. 301-310
- [6] Holstius, D., Kembel, J., Hurst, A., Wan, P. H. and Forlizzi, J. (2004) *Infotropism: living and robotic plants as interactive displays*, In Proceedings of the 5th conference on Designing interactive systems: processes, practices, methods, and techniques, ACM Press, pp. 215-221
- [7] Kuribayashi, S., Sakamoto, Y., Morihara, M. and Tanaka, H. (2007) *Plantio: an interactive pot to augment plants' expressions*, In Proceedings of the international conference on Advances in computer entertainment technology, ACM Press, pp. 139-142
- [8] Lewis, M., Haviland-jones, J. M., and Barrett, L. F. (2008) *Handbook of Emotions*, 3rd Ed., The Guilford Press, New York, pp. 205-206
- [9] Martin, R. A. (2002) *Is laughter the best medicine? Humor, laughter, and physical health*, Current directions in psychological science, 11(6), pp. 216-220.
- [10] MAX/msp <http://cycling74.com/products/max/>

- [11] Tsujita, H. and Rekimoto, J. (2011) *HappinessCounter: smile-encouraging appliance to increase positive mood*, In PART 1-----Proceedings of the 2011 annual conference extended abstracts on Human factors in computing systems, ACM Press, pp. 117-126