

Friend*Chip: A Bracelet with Digital Pet for Socially Inclusive Games for Children

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ABSTRACT

Learning in groups have different potential benefits for children. They have the opportunity to solve problems together, to share experiences and to develop social skills. However, from teachers point of view, creating a safe and inclusive positive environment for children is not an simple task since each child has differences that represent a challenge for implementing effectively group dynamics. The focus of this work is the design of a system that motivates children to approach to others and create opportunities of social interaction. The system creates a fun and enjoyable situation that is always supervised by the teacher, who can monitor and change the group dynamics at any moment during the activity.

Author Keywords

Wearable device; persuasive technologies; group dynamics

INTRODUCTION

There are different benefits when children learn in groups. They can learn practical skills and put them in practice together, not only by doing but also by observing others. In groups, children have the opportunity to solve problems together, to share experiences, and to develop social skills. Teachers in elementary school face different challenges when trying to create safe and inclusive environment for children. In fact, children have different needs, personalities, and interests especially in developing ages. They exhibit different attention spans, intellectual maturity and social skills. Moreover, children might have different ethnic, religious, socio-economic and cultural backgrounds. These differences represent a challenge for implementing effectively group dynamics that actively involve all the children [1].

The term “group dynamics” refers to the way groups of people are formed. In the case of children, it requires an active effort from the teacher to manage a healthy interaction in the groups. These interventions include planning engaging activities to keep children interest, supervising the dynamic of

the group, and finally analyzing children interaction by paying special attention to those children who might be excluded from the group.

Persuasive technologies are those designed to motivate and influence users. In this research field, different studies are spending effort in designing technologies to encourage positive social behaviours [2, 4]. Moreover, technology have the potential not only to encourage children, but also to measure children behaviours, which represents valuable tools for teachers to better assess children performance. Persuasive sociometric technologies have showed the potential to encourage and measure children behaviours in real-time [3]. This sets the motivation of this project, which tries to design a system that engage children to interact with others.

The purpose of this research is to design and develop a system with two main requirements: 1) To engage children in activities in groups and 2) To provide teachers with data related to children performance during the activity, allowing to supervise and modify the group dynamics. To achieve this, we aim to create a fun and enjoyable environment, considering that children show more positive disposition on playful and unconstrained situations. Moreover, we intend to reduce as much as possible the teacher’s intervention and create situation where children naturally involve in the activity. The growing interest of children in computer and video games makes reasonable to implement a device as motivational element. In this paper we introduce the concept and framework of a novel wearable device, and discuss future challenges to address.

PROPOSED APPROACH

In order to tackle the problem we propose Friend*Chip (FC), a wearable device designed to motivate children to approach to others and create opportunity of social interaction. FC uses a combination of colored lights, and vibration patterns to make its user aware of other devices, and thus people. In addition, the device uses avatars – representing digital pets – that grow only by social interaction. This means that the more the child interacts with his/her peers, the more the pet will grow.

Device overview

Friend*Chip is an in-house developed wearable device that uses different interaction modalities to communicate with the user and other similar devices. The main way FC mediates

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people interaction is by the use of RGB LEDs (Wurth Elektronik 150141M173100) in combination with a vibration motor (ANDA-B1020). In addition to these simple visual cues, we embedded in FC a 16bit, 1.27" OLED screen (Adafruit OLED Breakout Board) used to show information of the virtual pet and to suggest interaction topics or activities when the users physically interact. In the current version, the interaction start-end detection is triggered by a pair of IR sensors (LITE-ON LTR-301, LTR-302). The main program is loaded on a micro-controller (Particle Photon) that also manages the communication, since it already embeds a Wi-Fi module. An overview of the inner components of FC is presented in Figure 1.

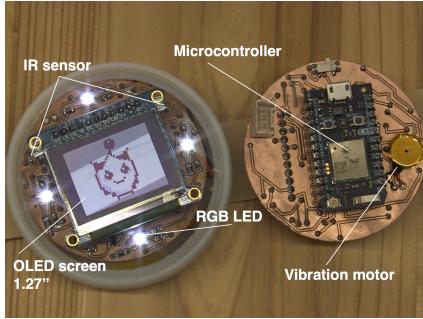


Figure 1. Inside Friend*Chip (FC). In the image the main components of FC are shown. In the current version, the device contains an OLED screen, RGB LEDs, IR sensors, a vibration motor, and uses a Photon as controller board.

The Playground with Friend*Chip

Each children in the group will wear one device, and they will start the activity with the pet avatar in level one. The group information will be displayed by a projector, showing the name of each participant and their respective avatar. The connection server randomly groups the devices, and the users can visualize this with colored lights (Figure 2). Once the groups are formed, children are asked by the pet to do a handshake with the other members in the group. Then, the pets suggest children to do one activity together (e.g. playing with the ball, drawing something specific, or assembling a puzzle). According to the activity, the device sets a random time between 3 and 10 minutes. When the time is up, a visual cues (blinking lights) will indicate the participants to look again to the screens in the device. Children will receive more instructions from the pet to do a goodbye handshake, and after that the pets level will increase. Only by completing all the steps in the activity, the pet will grow. The whole situation is monitored by the teacher that, assisted by the data collected by the devices, supervises the group dynamics. This data display how children were grouped, and if they finished or not the interaction steps in the game. The goal of the game is shared by all the participants, creating a collaborative situation where it is only possible to finish the game once all the pets grow to the maximum level.

CONCLUSIONS AND FUTURE WORK

In this paper we proposed a digital pet that grow with social interaction. After implementing this first prototype we observed some strong points as well as limitations. The devices

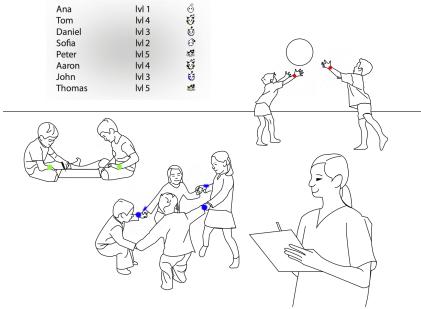


Figure 2. Possible application scenario. In a controlled environment, the system randomly creates groups of children that interact within each others. The supervisor can keep track of the group dynamics and modify them in case of need.

are small and light, and result visually attractive when lighted up. We also tested the device performance and communication and they worked fine for this application.

The main limitation is the lack of interaction information. In fact, the device can detect the initial and the final handshake that enclose the interaction, but there is no information about what is happening between those events. Children might only perform the handshakes and then do nothing until the time ends. For the device, these actions count as social interaction even if it was not. However, we expect that the collaborative nature of this game, will suffice to motivate children to engage in each of the proposed activities. Even if children might be focused on raising the pets, it does not change the experience of playing and enjoying with others. We expect that by creating opportunities for everyone to play together, those walls made by their differences will be reduced. Future work involve collecting insights and opinions from a group of elementary school teachers in order to improve the interaction scenarios using FC. After this, we plan to design an experiment that helps to understand the effect of the system on children interaction. In addition, we are working on a more advance pairing algorithm to promote more diverse grouping and actively help children to interact more.

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