
Augmenting Circle Dance with Physical Computing

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ABSTRACT

Pusing Tiang (Malay; loosely translated as Round-a-Pole) is an installation that augments circle dance by turning it into a game. It was pilot tested in a school among 16 primary schoolchildren. The results show that the installation encourages schoolchildren to synchronise their movement through play. The installation matches CHI 2019 theme of weaving the threads of CHI and playing the game at CHI symbolises the Celtic knot logo of strength and friendship.

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AUTHOR KEYWORDS

Circle dance; gamification; mimicry; synchrony.

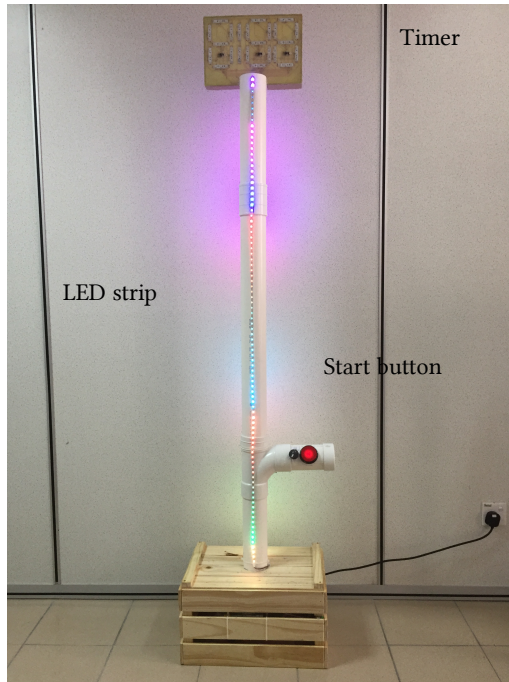
ACM CLASSIFICATION KEYWORDS**Human-centered computing~Empirical studies in interaction design**

Figure 1: Pusing Tiang is made using ready-made materials to enable inexpensive replication.

INTRODUCTION

In line with CHI 2019 theme of ‘Weaving the threads of CHI’ and the Celtic knot logo as a symbol of strength and friendship [7], Pusing Tiang is an installation inspired by circle dance – a form of dance practised in almost every culture [4]. Human culture has long leveraged upon mimicry and synchrony of movement through dance and songs to foster social cohesion [6]. The installation is designed to encourage schoolchildren to move in synchrony, and by doing so, also mimic each other’s actions. Synchrony and mimicry have been shown to increase empathy [2]. Essentially, Pusing Tiang is technology-augmented circle dance. The form of mirroring in circle dance has been used in dance movement therapy to improve empathy [3], foster mentalising (making inference about the mental states of others) [1], and to improve empathy and well-being for adults in the autism spectrum [5].

Pusing Tiang is made to be easily transported from one school to another, and using ready-made materials, it can be replicated quickly and inexpensively. As a gamification of circle dance, it is designed to fulfil the following design criteria, which fits into the context of Malaysian primary schoolchildren’s playing behaviour during recess:

- Games may be designed as variations of previously known and popular games among schoolchildren.
- Games may be designed to be played for 15 to 20 minutes, which is the time the schoolchildren have to play after their meal during recess.

PUSING TIANG (ROUND-A-POLE)

Pusing Tiang (Figure 1) consists of a base made from IKEA wooden box, which contains Arduino board and a motion sensor. A pole made of PVC pipe is erected from the centre of the box. LED strips are attached at two sides of the pole (Figure 1 only shows LED strip on the front side). At the top of the pole there is a timer. To play Pusing Tiang, schoolchildren have to hold their hands and make a circle around the pole. To start the game, one of them has to press the red start button, and the timer would start a countdown. Once the countdown ends, the timer starts, and the schoolchildren can start moving in circle around the pole whilst holding hands, like playing round-a-rosie.



Figure 2: Pusing Tiang can be disassembled into three parts for easy transportation.



Figure 3: Pusing Tiang installed at a school for pilot testing. The border lines on the floor denotes a no-go area for the players.

A trigger of the motion detector will light up one LED light starting at the base of the LED strips. As Pusing Tiang detects more movement, more LEDs will light up until it reaches the top of the pole. The faster the children move around Pusing Tiang, the faster the LEDs will light up and reach the top. The game ends when all the LEDs on the strips are turned on. The timer will display the time the players took to turn on all the LEDs on the strips. A knob next to the start button controls the difficulty level of the game. A low difficulty level requires less movement detection to light up all the LEDs compared to a high difficulty level. Pusing Tiang can be disassembled into three parts to ease its transfer from one school to another (Figure 2).

PILOT TEST OF PUSING TIANG

Pusing Tiang has been installed at one school and was tested among 16 primary schoolchildren aged seven and eight. The border lines on the floor (Figure 3) denotes an area which the players were not allowed to enter during gameplay for safety reasons. Only one player was allowed to enter the area to press the start button.

The schoolchildren were instructed on how to play the game. They were told that the faster they move the faster the LEDs will light up to the top of the pole. If they crossed the no-go area or if they break the circle by letting go of their co-player's hands, they have to start again. In the first round of playing, they played without singing, and in the subsequent rounds, they were told to sing a popular children's song while circling the pole. A class teacher was present during the pilot test.

RESULTS AND DISCUSSION

The pilot test shows that Pusing Tiang gameplay enforces the schoolchildren to coordinate their movement with their co-players in order to move fast around the pole without letting go of their co-player's hands. It was observed that if the players synchronised their movement, they can light up the topmost LED faster and end the game. This means that the design is successful in enforcing mimicry in of actions and synchrony of movement. It took about one minute and five seconds at the lowest difficulty level for the fastest group to end the game. However, the schoolchildren have to be coached about how to synchronise their movement.

Since boys did not want to play in the same group with girls and vice versa, the schoolchildren were divided into two groups of eight boys and eight girls. Girls were observed to be able to be synchronised and cooperated better than boys. Girls were also less likely to let go of the hands of their co-players when they tried to move faster. The class teacher managed to coax the schoolchildren to make a group of 10 which consisted of boys and girls, and it was observed that the more players play at one time, the less time it took them to finish the game at the same difficulty level. Therefore, Pusing Tiang may encourage schoolchildren to cooperate in a large group in order to win the game.



Figure 4: Schoolchildren playing Pusing Tiang during the pilot test

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CONCLUSION

Pusing Tiang demonstrates that interactive technology does not have to be complicated to augment and gamify human practice of synchronising movement to strengthen social bonds and friendship through dance. As children already enforces the rules of play when playing among themselves, technology does not have to take away this role. In its simplicity, the design of Pusing Tiang has been shown to encourage players to synchronise their movement and turned circle dance into a physical computing game. It would be interesting to see if a sense of competition between groups will bring adults together into circle dance if Pusing Tiang were installed at CHI 2019.

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