

# GoCoBa: Interactive Installation Design Applied on Combination of Context and People

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**Abstract.** The combination of people and context is easy to be neglected in the Human-Computer Interaction (HCI). Context always affects unconsciously behaviors of people, and it is inessential for people. Though observing realistic environment and analysis, we aim to design a system for context, object, and space interaction in sports bar. We also search some interactive installation cases to find the related cases in order to understand the possible interactive patterns. According to case and behavior practice to design prototype, we made GoCoBa, an interactive design for bar goers to immerse in the context. To sum up, GoCoBa system using cup as physical computing and context computing help bar goers have interaction with the context.

**Keywords:** Interaction Design, HCI, Sports Bar.

## 1 Introduction

The combination of people and context is easy to be neglected in the Human-Computer Interaction (HCI). Context always affects people unconsciously behaviors, and it is inessential for people. Because context is unnoticeable, designers may not pay much attention to it while designing. Though HCI technology, designers can help people and context have combination, and build intelligent space which could display information, transfer data, and participate environment development. For people and object in the context, sensor of interaction design can sense and give feedback and help[1]. How can HCI help to integrate people and context is the main idea of this research.

### 1.1 People in Sport Bar

In this problem, we need to find a suitable context to explore the possible interaction. Sports bar is not only for sport enthusiasts to meet and enjoy the games, but also provides a space for people to relax, have drink, and watch sport games. Comparing with watching games at home; staying in the bar is more interesting because of the environment and atmosphere. In order to solve the problems between people and context, we observed the realistic environment to find the problems and possible solutions. We decided to adopt sports bar as the context of this research.

## 1.2 Physical Computing

For solving the interaction in a context that combines both people and surroundings, we adopt a computing technology called physical computing. In the context often search a real object in the sports bar as the computing object to collect physical interaction data. This object could be anything such as a chair, desk, floor, wall, or cup, and it will play an important role to identify relationship between people and context. In order to achieve this interaction design, we found cup is an ordinary but significant object in sports bar, and cup is often applied as a physical computing device, in many interaction design cases.

## 2 Finding the Problem

Whole the object is decided, the interaction between this object and people are identified as observation. Physical site we investigated with the focus on the interaction between people and their cups. Several instances appeared during the observation sessions, and the engagements of events are recorded for analysis.

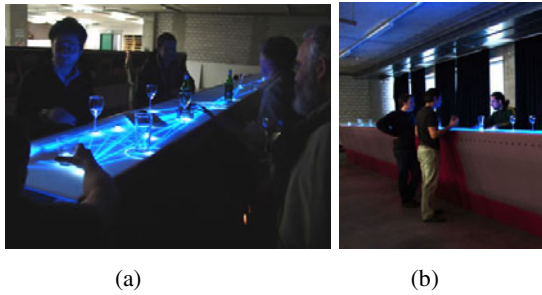
There are (a) Person A entered the bar, ordered a cup of drink, watched ball game alone, and sipped of the drink when the game was time out. (b) Person B and a friend went to the bar. Both of them ordered a drink individually. They watched the game together. They clinked the cups to cheer, whenever there was a beautiful play or score. (c) Person C entered the bar and ordered a cup of drink as well. Walking into people to have chat, Person C also clinked the cup when having good play in the game. In the observation, we found that people did not have much interaction, and the context did not emerge its specialty. Therefore, interaction technology might be a method to help people and context to have good connection, and it can also help bar goers have more chances to communicate with friends or strangers.

## 3 Case Studies

Though observing realistic environment and analysis, we aim to design a system for context, object, and space interaction in sports bar. We also search some interactive installation cases to find the related design cases in order to understand the possible interactive patterns.

### 3.1 iBar

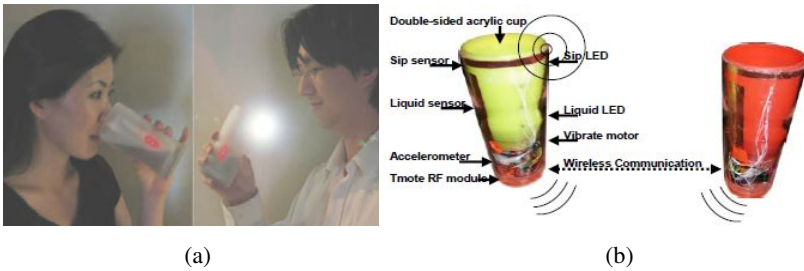
iBar (2007) by the Landon based company Mindstorm Ltd and its partners, is using a bar table as an interface. When some objects put on iBar, there will be some flame shown around the single object. Besides; objects and objects will be light connected. In the case, the light can catch people's attention, make people connected, and arouse bar goers' imagination and creativity. While drinking and chatting, people can also have abundant interaction[2], as shown in Fig. 1.



**Fig. 1.** iBar (a) Cups on the table having connection. (b) Bard goes having interaction though iBar.

### 3.2 Lover’s Cup

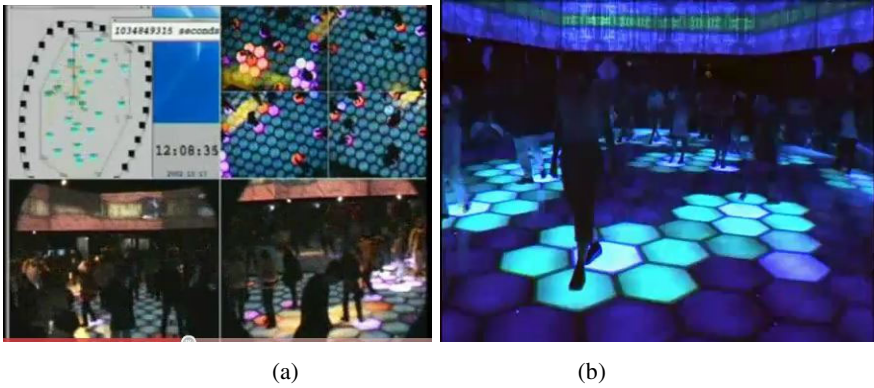
Chung made an emotional interactive installation device called Lover’s cup in 2006. Two cups used in two different places for lovers to receive the information of the other person though the action of using one of the cups. The sensor is installed in the device, once a lip touches one of the cups, the sensor will be active and sent information to the other cup. By the time the other cup receives the data, the cup will shin and the show the scale so that the user can easily understand the other one is currently drinking. This device Integrates into daily activity incidentally[3], as shown in Fig. 2.



**Fig. 2.** Lover’s Cup (a) Though interaction of Love’s cup, when one is drinking, the other cup will display the scale. (b) Diagram of Love’s cup device.

### 3.3 Ada-Intelligent Space

Ada-intelligent space is a case of interactive floor designed by Kynan Eng in 2003, using the pressure sensors on the floor. Whenever people step on, the hexagon-shape device will light up as feedback. This system covers four basic behavior interactions. The light will follow every users and focus of one of the users. Besides, the device gives users cuing, when the conditions are reached, the game will be start[4], as shown in Fig. 3.



**Fig. 3.** Ada-Intelligent Space (a) the left-top is the picture of computing; the others are bar goers in the context shot by camera. (b) The lighting is feedback from the floor.

### 3.4 Analysis

In the case of analysis, we found those designs have their disadvantages. iBar only benefits to people around bar, cannot cover the whole environment. Lover’s cup is mainly for lovers; its intimacy interaction pattern is not suitable for everyone in the bar. Ada’s interactive floor can be used for whole space, but it does not have much interaction system for users to connect each others. The cases analysis as followed the Table 1.

**Table 1.** Case analysis

Case	Context	Item	Behavior	Feedback
iBar	Bar table	Cup, hand, phone, cards, etc.	Put objects on the table	Table lights and focus the objects
Love’s Cup	None	A couple of cups	Drinking	Light spots on the cup to show the scale
Ada- Intelligent Space	Space	Floor	Step on the floor	Lights on the floor and reflex the position of people

By case analysis, we concluded the advantages of those three cases. We would like to have people join the interaction as Ada’s interactive floor did. We also took the concept of iBar, using light to direct people to have interaction. Moreover, we use cup as controller, like lover’s cup, using cup as an input interface to connect people’s behaviors.

## 4 The System: GoCoBa

According to case and behavior practice to design prototype, we made GoCoBa, an interactive design for bar goers to immerse in the context. The action of drinking enlightens our design interactive installation device. Bar goers can have interactive

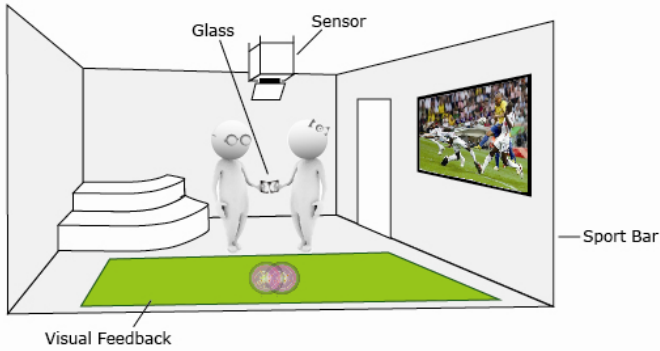


Fig. 4. GoCoBa interface diagram

communication in anyplace in the sports bar, and sending response feedback to the context. The Fig. 4 The diagram of GoCoBa interface to show interaction between people and context.

4.1 System Design

The system of GoCoBa is comprised of:(1) Input: receiving message by utilizing IR sensor, and transfer the message to computer.(2) Computing: the computer receive the message of light spots, and transfer them into location data, and finally categorizing in order the data into different database.(3) Output: projecting the processed message on the context as visual feedback.

When bar goers enter sports bar and take the cups, (input) the input sensor (IR sensor) will receive infrared rays from bottom of cup. (computing) This time information will be sent to computing unit to compute. To start with, the system takes information from bar goers and transfer into location data. And then, the location data will be saved in data base for loading. Finally, information from database sends to rule base to compare, and the result will export. (output).

Though generalizing from database, there are four outputs: Act 1, Act 2, Act 3, and Act 4. These four outputs correspond to situations of users, displaying different visual feedbacks, as shown in Fig. 5.

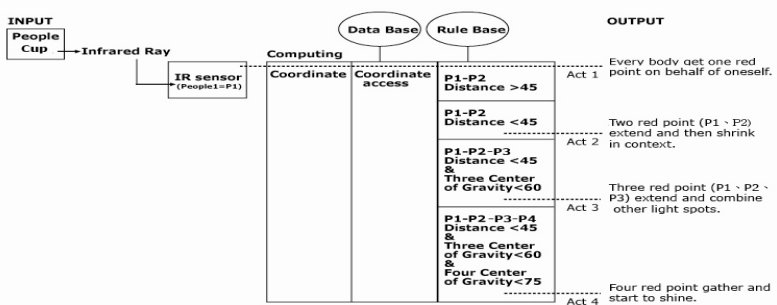


Fig. 5. System schematic diagram

### 4.2 Components

IR Sensor induces the IR signal from cups, and the infrared ray LED on the bottom of cup is the input of HCI. Infrared rays LED is not easy to be affected by environmental lights. Besides, infrared ray is small and light, so it is easy to be installed on the bottom of the cups. 12V LED as cuing light and battery are installed on the bottom of the cups. Bar goers can have informal interaction by the device, as shown in Fig. 6.

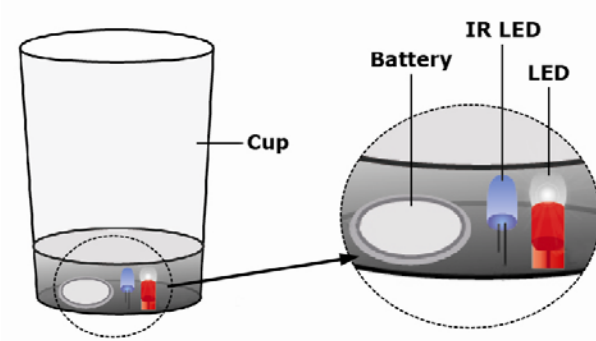





Fig. 6. Install IR LED light and 12V LED lights in the glass

### 4.3 The Interactions

If the distance of cups is different, the feedback will be different. We utilize projection on floor to provide feedback. According to analysis result, there are four kinds of responses as followed: (a) When there is only one point, the system will

Table 2. user behavior on the system input and output

People	Input	output	Condition
(a)One	P1	L1	Point
(b)Two	P1, P2 Distance => 45cm	L1, L2 (P1+P2)/2	
(c)Three	P1, P2, P3 Distance => 45cm Central =>60	L1, L2, L3 (P1+P2+P3)/3	
(d)Four	P1, P2, P3, P4 Distance => 45cm Central => 75cm	L1, L2, L3, L4 (P1+P2+P3+P4)/4	

P1, P2, P3, P4 = people coordinate  
L1, L2, L3, L4 = light coordinate

measure the distance. If the point is 45cm far way from other point, the point will have its own light spot. (b) If there are two points and their distance is less than 45cm, the light spots will extend and then shrink. (c) If there are three points and the distance between three points is short than 45cm and the distance is less than 60cm, the light spots will extend and combine other light spots. (d) When there are four points and the distance of four points is shorter than 45cm and the distance from center to each point is less than 75cm, the light spots will gather and start to shine, as shown in Table 2.

## 5 User Testing

Users' background description. (Table 3.)

**Table 3.** users' background

User id	Age	Gender	Bar experience	profession
User A	23	male	Yes	Student
User B	24	female	No	Student
User C	24	Male	No	Student
User D	34	Male	Yes	Student
User E	42	Male	Yes	Teacher
User F	29	Male	Yes	Student

### Testing progress

- (a) Bar goers enter the context.
- (b) Bar goers take interactive installation cup.
- (c) Bar goers had interactive behavior.
- (d) Take interactive result as feedback to the context.

Refer to Fig.7.



**Fig. 7.** GoCoBa interface prototype. People in context. Using interactive installation design. Interface of interactive installation design.

### Testing result

By the time we had 6 users tasted, we concluded the result. We found that because of the age and life experience difference, the responses of interaction are slightly unlike. Therefore, we also had interviews to have deeper understanding of users' feeling, as shown in Table 4.

**Table 4.** users’ testing result

	User A	User B	User C	User D	User E	User F
Progress (a)	Standing and watching game with F	Currently leaving this context	Sitting on the sofa and watching game with E	Watching game alone	Sitting on the sofa and watching game with C	Standing and watching game with A
Progress (b)	Holding a cup and finding the small red point following	entering the context and finding the small red point following	Holding a cup but did not notice the small red point	Holding a cup and finding the small red point following	Holding a cup but did not notice the small red point	Holding a cup and finding the small red point following
Progress (c)	Finding the small red point and having interaction	The small red point still following	The point of C interacting with the points of D and E	The point of D interacting with the points of C and E	The point of E interacting with the points of C and D	Finding the small red point and having interaction
Progress (d)	Chatting with F	Join the group C, D, and E and chatting	having interaction and chatting with the others	having interaction and chatting with the others	having interaction and chatting with the others	Chatting with A

**Interviews and commons**

- User A, F: While using GoCoBa system, the light on the floor chased me. I felt quite interesting. Besides, when I was chatting with F, mine light spot had interaction with F’s light spot. That was impressive.
- User B, D: When people gathered, light spots increased with the number of people. That made me wants to join the group of people to see the changes of lighting.
- User E, C: When D and E joined us, we became a big group. This time the lights seemed like telling people to join us.
- User C: Because of the cup movement, light spots moved around that were fascinating. If the lights can represent different personalities of different people, that will be more fun!
- User D: as far, GoCoBa is only projecting on floor, I wonder if it is possible to be shown on walls?
- User F: the sensors should not only be on cups, more cameras may add into the context to sense, and to diversify the effects.



## 6 What We Learned

Though prototype design and observation of its work, we found that:

- (a) bar goers using GoCoBa system in sports bar can immerse in the context and be willing to have more interaction with some other people.
- (b) People in general think interaction feedback of light spots is interesting, and some people even feel light spots like the eager emotional to have communication with other people. HCI help bar goers in the context have intimate atmosphere.
- (c) Because of the limited time, the prototype is still no perfect, and may have some problems need fixing. So far the context research cases are lack, and the ability of stimulation is deficient. Those should be considered into the following research.

## 7 Conclusion

To sum up, GoCoBa system using cup as physical computing and context computing help bar goers have interaction with the context. Though the computing, cups can play an important role of HCI in the bar to make people and context integrated together. The behavior of holding cup can be computed and give feedback to context to induce the action of holding cup have integration with context.

Context and people have interactive by using HCI is worth for researchers to pay attention. As we can see, HCI help people to immerse in the context; moreover, it is much easier to give people feedback from context. HCI makes more interaction actions happen between people and people, people and context.

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