

# Interactive Installation

Interacting with the Past: Creating a Time Perception Journey Experience  
Using Kinect-based Breath Detection and Deterioration and Recovery  
Simulation Technologies

## Mao-Kung Ting cauldron(vessel)

- A ritual bronze vessel dating back to 800 B.C
- The 500 characters cast on this ancient Chinese bronze are the precursors of modern Chinese characters.

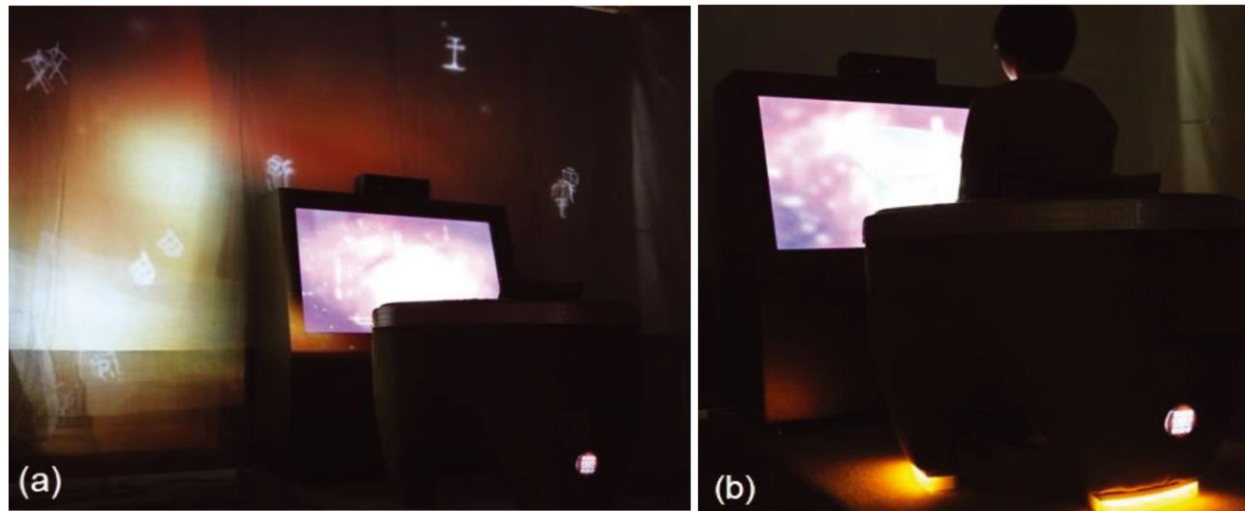


## Relative Studies

- CNN [2008] reported that virtual heritage recreates ancient heritage sites and enables people to experience sites by employing historically authentic digital media.
- Valtolina [2005] conducted a case study of a virtual reality system of an Italian theater during the 19th century. Users could explore the virtual space by using a joystick as the interface. Lei and Xu [2009] used hybridized rendering techniques to display a photorealistic virtual environment.
- Providing an experience of "being there" is necessary so that users can feel they are in the historical setting. The study focused on exploring, "**How can we create a sense of being there?**"

## Time Perception Journey Application

- An application that allows a museum audience **to interact with the past** and to appreciate the value of antique objects through multimedia installations.
- The main contribution of this work is the analysis of **design concepts, design decisions, and evaluations** in a museum setting
- The research team has created a time perception journey experience to facilitate a **natural interactive experience**.
- Exhibited at Chienkuo Technology University Collection Hall



## Breath-based Biofeedback

### Plethysmography (OEP)

optical movement detection system that measures various thoracic and abdominal breathing volumes.

### Heart Rate Variability (HRV)

Drives the respiration status.

### Respiratory Inductive Plethysmography (RIP)

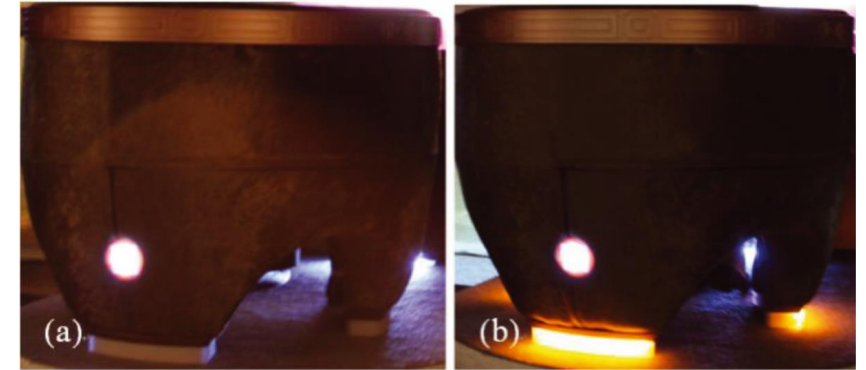
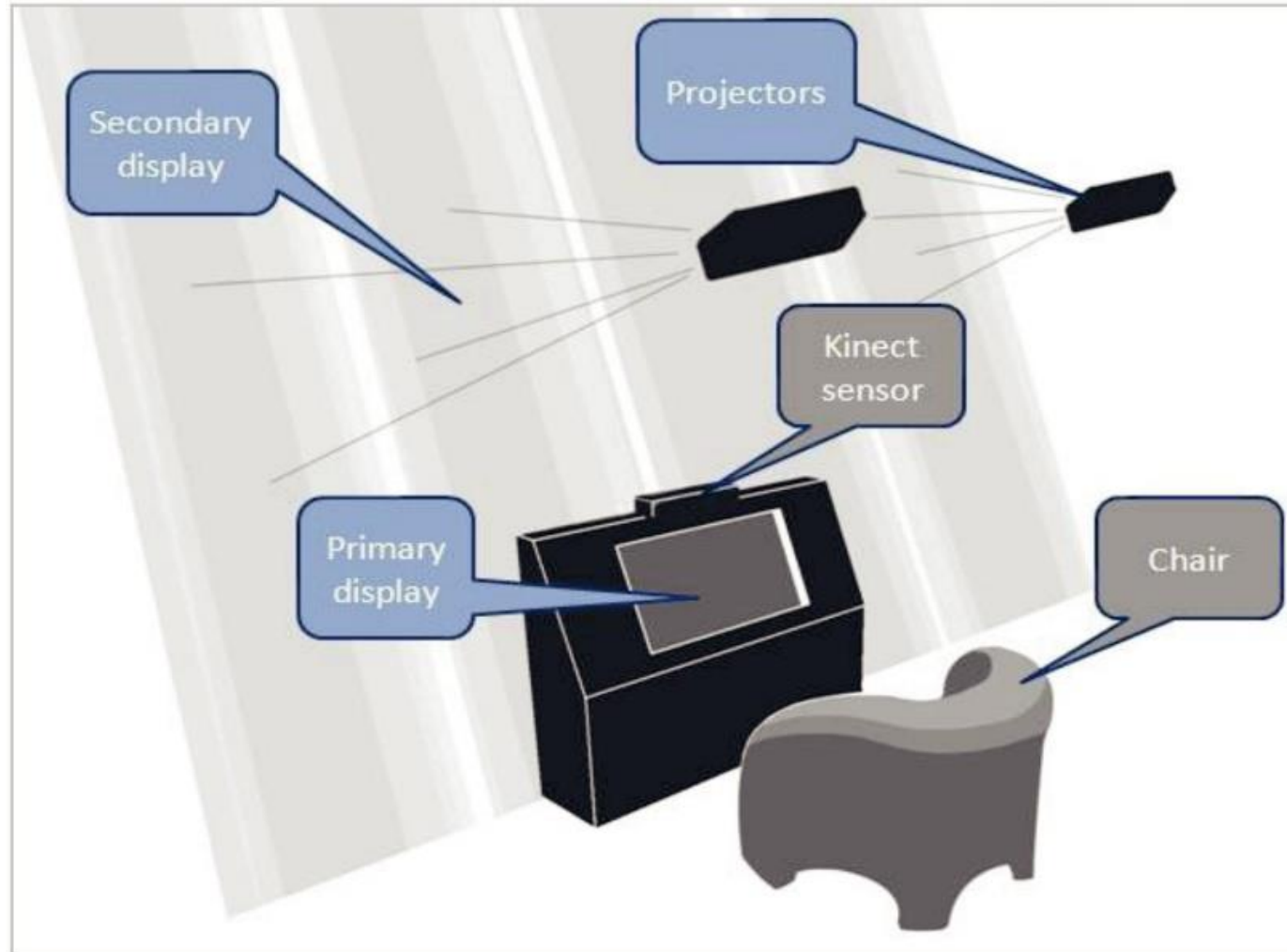
UWB

Kinect-based method

## Conventional Graphical (Mouse-based)

Control group method

# System design



- Kinect sensor
- pressure sensor
- Touch screen
- Projector
- Chair

# EVALUATIONS

- Quantitative (Questionnaire survey) and Qualitative (Observation)
- Participants
  - 130 people - 62 men and 68 women
  - 32 participants were younger than 19 years
  - 46 participants were between the ages of 20 and 29 years
  - 31 participants were between the ages of 30 and 39 years
  - 21 participants were older than 40 years.
  - 66 participants were frequent visitors
  - 64 participants were not visitors

# EVALUATIONS

## Procedure

Control group

Conventional Graphical (Mouse-based)

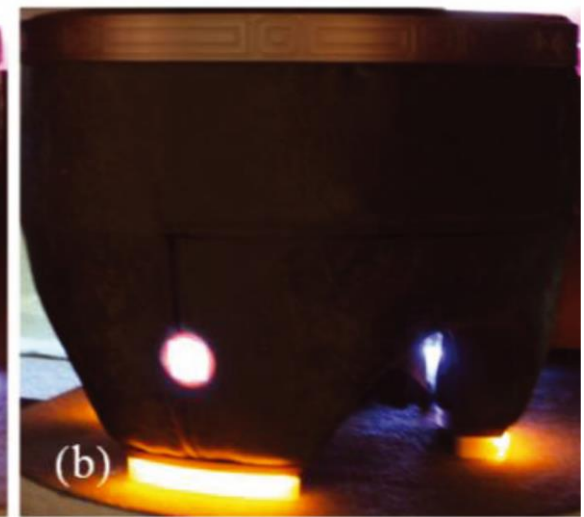
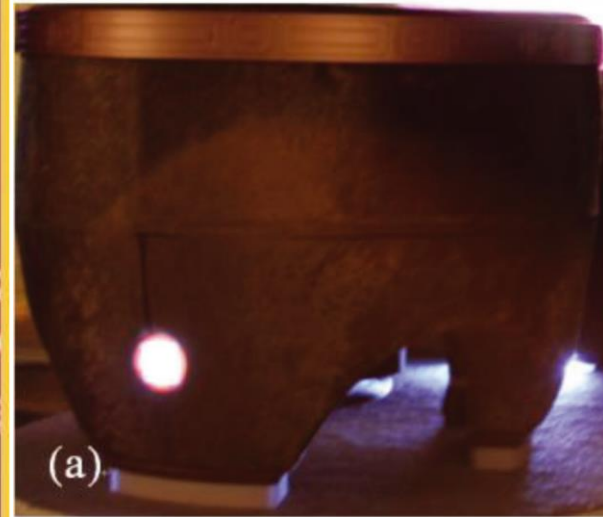
Experimental group

Breath-based Biofeedback

This evaluation was conducted **over 2 days**



# EVALUATIONS



1 to 7 (strongly disagree, dis-agree, somewhat disagree, neither agree nor disagree, somewhat agree, agree, and strongly agree).

# EVALUATIONS

## Questionnaires

- (1) I would like to understand the object Mao-Kung Cauldron.
- (2) Exhibiting Mao-Kung Cauldron using a digital method is attractive to me.
- (3) Exhibiting Mao-Kung Cauldron using a digital method helps me understand the object.
- (4) I think experiencing the deterioration and recovery simulation process of the object is interesting.
- (5) I think experiencing the simulation process of deterioration and recovery of the object helps me understand the historical value of the Mao-Kung Cauldron.

# Responses to survey

When experiencing the simulation process of deterioration and recovery of the object, user felt that they was traveling through thousands of years.

- When experiencing the simulation process of deterioration and recovery of the object, They accepted the simulation of traveling through time for thousands of years.
- User think adapting the ancient Chinese philosophy of Qi concept that allows visitors breathing synchronously with the object is interesting.
- User think adapting the ancient Chinese philosophy of Qi that allows visitors breathing synchronously with the object is suitable for interpreting the feature of the cultural object.
- User think adapting the ancient Chinese philosophy of Qi that allows visitors breathing synchronously with the object is useful for enabling visitors to understand the history of Mao-Kung Cauldron.

# Results for Research

Interacting with the Past: Creating a Time Perception Journey Experience

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Table II. Results for Research Item A

Survey item	Group	Percentage of participants giving the highest ranking (5, 6, or 7)	Avg. ranking
1	Experimental group	89.2%	5.72
	Control group	90.8%	5.80
2	Experimental group	89.2%	5.85
	Control group	93.9%	5.97
3	Experimental group	89.2%	5.92
	Control group	89.2%	5.85
4	Experimental group	84.6%	5.72
	Control group	76.9%	5.54
5	Experimental group	76.9%	5.57
	Control group	75.4%	5.35

# Results for Research

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Table III. General Statistics for Survey Items 6 through 10

Survey item	Percentage of participants giving the highest ranking (5, 6, or 7)	Avg. ranking
6	80.0%	5.42
7	80.0%	5.42
8	78.5%	5.42
9	80.0%	5.45
10	80.0%	5.54

# Limitations

## System

- (a) Breathing **disorders** and visual **handicaps**
- (b) Audiences wearing **heavy attire**, making it difficult to detect breathing status
- (c) This application is designed for **single users**, not for multiusers
- (d) The genuine deterioration process of **ancient artefacts through time cannot be verified**, so it is only a conjectured visual simulation
- (e) The Kinect-based interface is **not suitable for outdoor** because the IR radiation from the sun might compete with the IR lighting from the Kinect

# Limitations

## Evaluation

- (a) Most of the participants were **Taiwanese** and, therefore, remained in the same culture context. Thus, the visitor responses could not be analysed based on distinct **cultural backgrounds**
- (b) Components of the research analysis were based on descriptive statistics analysis, which is unable to express statistically significant results.
- (c) Regarding the time metaphor research item, this study focused on analysing visitor experience associated with the presentation of visual information. However, user perceptions from other consciousness were not analysed

# Conclusion

- No significant differences were found regarding inspiring participant interest or helping participants understand the Mao-Kung Cauldron between the experimental and control group participants
- Compared with women, men more intensely believed that they were virtually traveling through thousands of years by experiencing the deterioration and recovery simulation process of the Mao-Kung Cauldron

Thank you