

입력 디스플레이 — 이미지 처리 — 출력 디스플레이  
카메라  
키보드, 마우스  
터치스크린.

# Part 1: Introduction

## 3. AR and Interaction

1. 영상 획득 → camera, graphics, AR
2. 영상 출력.

# Outline

- I. Interaction
  - A. Body Interaction
  - B. 모션 센서
- II. Applications

# 1 Interaction

사람  $\xleftrightarrow{\text{상호작용}}$  컴퓨터

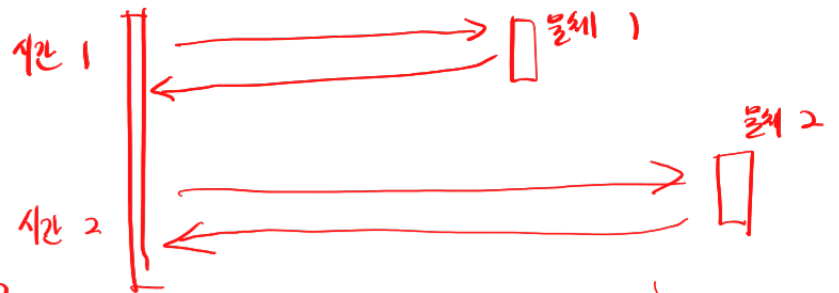
VR 기기 (이오프트 하드웨어)



# 1.1 Body Input

- Depth

시간 1 < 시간 2  
(거리 1 < 거리 2)



키넥트. 게임회사인 마이크로소프트의 센서.

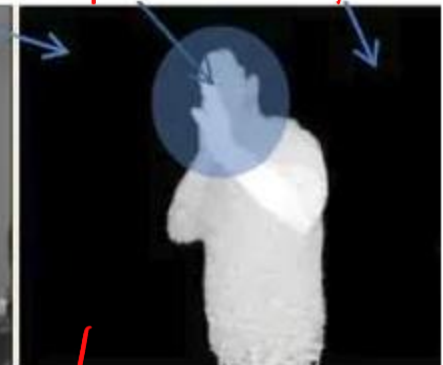


Kinect for [Xbox 360](#). The Xbox 360 E revision has an Xbox logo to the left of the Xbox 360 branding.

카메라



depth 카메라.

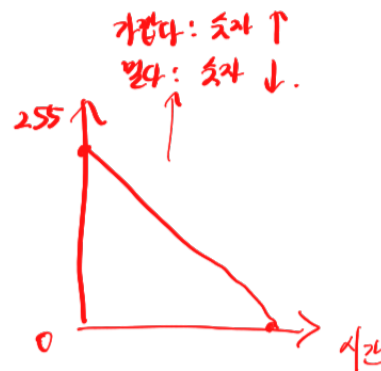


원근을 표현. (거리 표현)

사람 - 배경 분리.

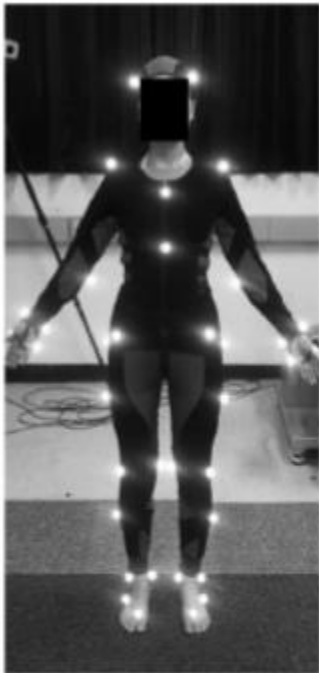
물 - 앞으로 나타나는 손 분리.

거리값을 0 ~ 255로 표현..  
(시간)

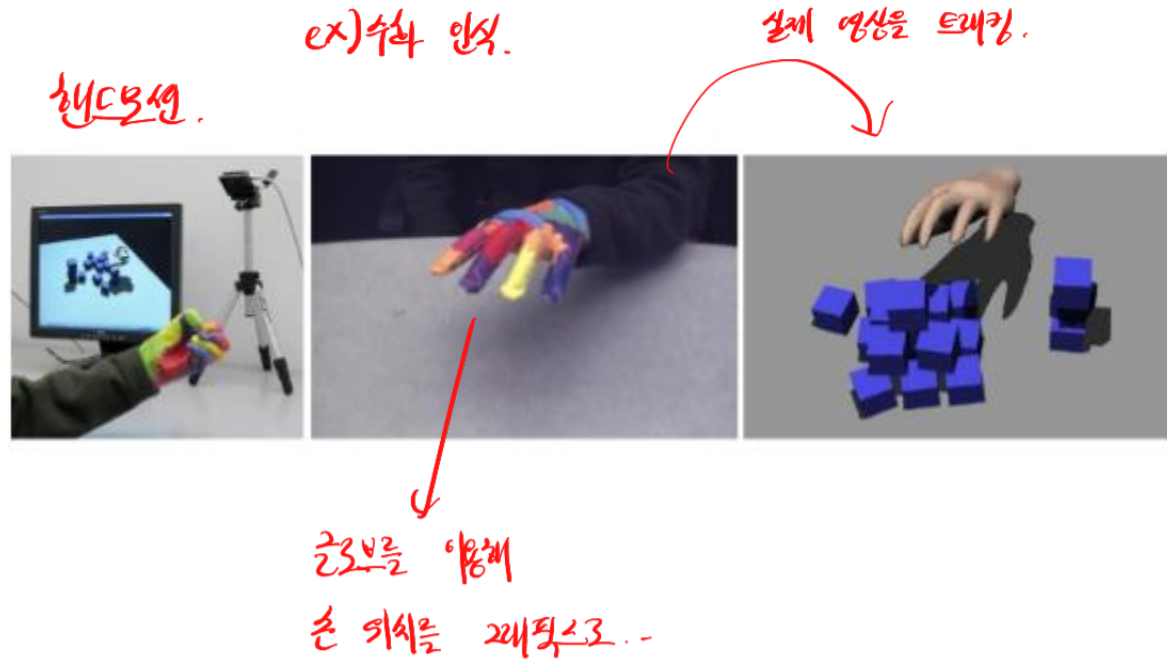


# 1.1 Body Input

- Body and Hand Motion



nicen 비콘. 센서  
비콘 하나 하나 위치



카메라로 인식: Passive.  $\longleftrightarrow$  다른 방법으로 인식: Active 센싱

## 1.2 Motion 인식

- Inertial Sensing Active . 관성 이용.

Inertial sensors use a variety of <sup>관성.</sup>inertial measurement devices, such as  
(1) (angular rate gyroscopes), (2) (linear accelerometers), and (3) (magnetometers).

*Gyroscope* is a device used for measuring or maintaining orientation and angular velocity<sup>각속도</sup>. It is a spinning wheel or disc in which the axis of rotation is free to assume any orientation by itself. When rotating, the orientation of this axis is unaffected by tilting or rotation of the mounting, according to the conservation of angular momentum.



자이로스코프 .

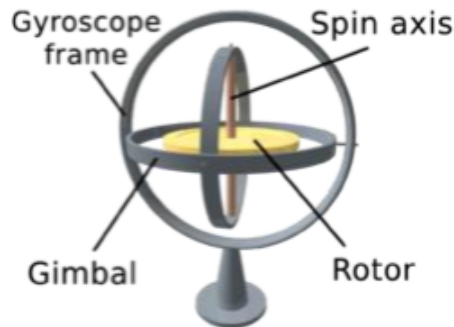
# 1.2 Motion 인식

"MEMS" → 반도체 속에  
멀티 앰프 기기를 넣을 수 있음.  
ex) 스마트폰, 웨어러블.

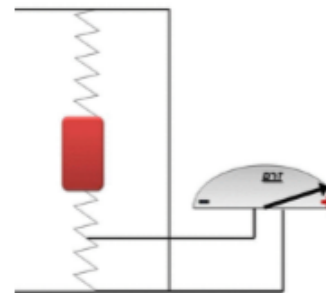
- Inertial Sensing

Inertial sensors use a variety of inertial measurement devices, such as angular rate gyroscopes, linear accelerometers, and magnetometers.

*Gyroscope* is a device used for measuring or maintaining orientation and angular velocity. It is a spinning wheel or disc in which the axis of rotation is free to assume any orientation by itself. When rotating, the orientation of this axis is unaffected by tilting or rotation of the mounting, according to the conservation of angular momentum.



gyroscope  
회전 방향 측정.



accelerometer  
가속도계.  
가속도의 방향 측정.  
(원래 방향)



magnetometer  
나침반, 자기력계.

# 1.2 모션 인식

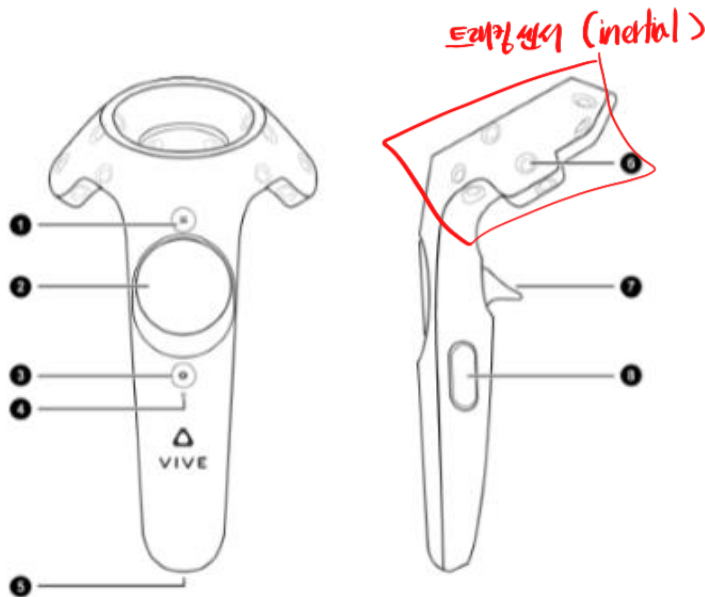
- Output Hardware – HUD
  - Motion Tracking – **Active** (HTC VIVE)

## About the VIVE controllers

Use the controllers to interact with objects in the VR world.

The controllers have sensors that are tracked by the base stations.

**Important:** The sensors on the controllers are sensitive. Do not cover or scratch the sensor lenses.



|   |                                 |
|---|---------------------------------|
| 1 | Menu button                     |
| 2 | Trackpad 2차원 공간 선택. (에뉴판)       |
| 3 | System button                   |
| 4 | Status light                    |
| 5 | Micro-USB port                  |
| 6 | Tracking sensor → 3차원 공간 좌표 획득. |
| 7 | Trigger                         |
| 8 | Grip button                     |



## 2.1 Application %.

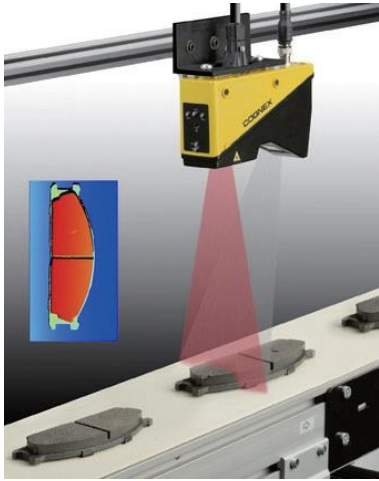
- Mobile 인터랙션 UI. (A값 ↔ UI)



## 2.2 Application

- 공장 자동화 분야

스마트 팩토리.



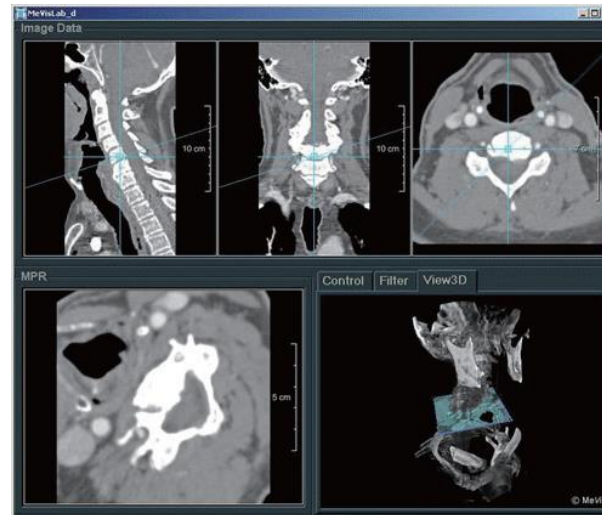
스마트 시티.

사람 ↔ 컴퓨터.

└ 센서망도

컴퓨터가 대신 해줌.

- 의료 분야 **디지털 영상.**  
컴퓨터 단층 촬영(CT)  
자기 공명영상 (MRI)  
양전자 단층촬영 (PET)



## 2.3 Application

- Games





## 2.4 Applications

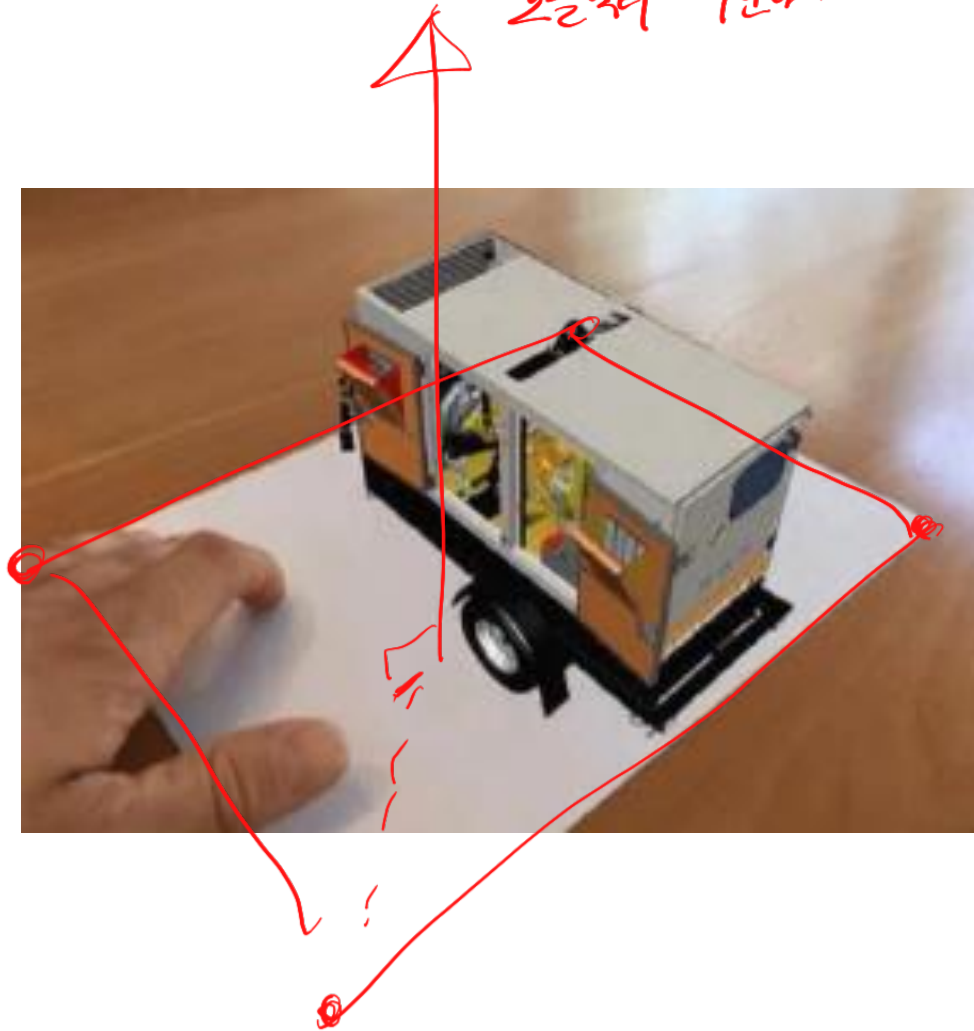
- VR Games



## 2.5 Applications

- Tablet AR

중요 4개 포인트를 보고  
노출벡터 구한다.



## 2.6 Applications

- Heritage and Tourism

- Application Areas

Heritage and Tourism

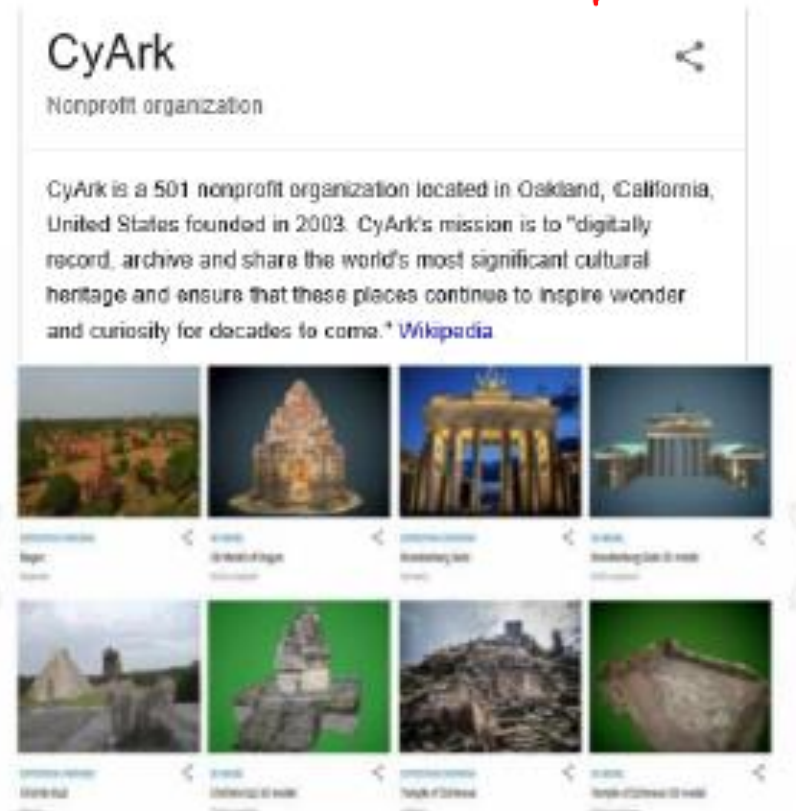
유적지 VR화.



Multiple View 지능트리



여기 각도에서 문화 촬영 후 입체 영상으로 보관.  
각상 카메라로 새로운 각도에서의 촬영 가능.









<https://artsandculture.google.com/project/openheritage>

# 2.7 Applications

- Simulation and Training

## Simulation and Training

|   |   |   |
|---|---|---|
|  <p><b>DESIGN REVIEW</b></p> <p>Visualize your products as if it was already built. Get early design errors and modify your 3D model in real time to test new ideas. Easily collaborate with your colleagues, customers and clients and get feedback at once.</p>                       |  <p><b>MAINTENANCE, ASSEMBLY</b></p> <p>Work together during the production and maintenance phase. Monitor around you to see the assembly and maintenance tasks of a single production. Modify your 3D model in real time and test it as many times as you want.</p>   |  <p><b>PROCESS</b></p> <p>Visualize the processes in your factory with fully built before putting them in place. Check various parts in the drawing phase and much less costly than late stage decision.</p>                                     |
|  <p><b>LAYOUT</b></p> <p>Easily validate and modify the layout of an entire design or a factory. Visualize all full machines and test new ideas. Thanks to the digital factory, have sure that parts fit together correctly, that safety is ensured and that capacity is optimized.</p> |  <p><b>ERGONOMIC ASSESSMENT</b></p> <p>Easily check if your work environment is safe and ergonomic. Thanks to the digital manufacturing, you can simulate operations and health safety and working conditions, weaknesses and optimize both health and operations.</p> |  <p><b>MARKETING, SALES</b></p> <p>Showcase your product to your clients, partners and investors and demonstrate its capabilities and options of customization. Thanks to 3D, you can show your virtual prototype in its future environment.</p> |

Improv3

## 2.8 Applications

- Education





## 2.9 Applications

- Architecture and Construction

건축.



3D 모델  
+ 영상처리. 그래픽스.