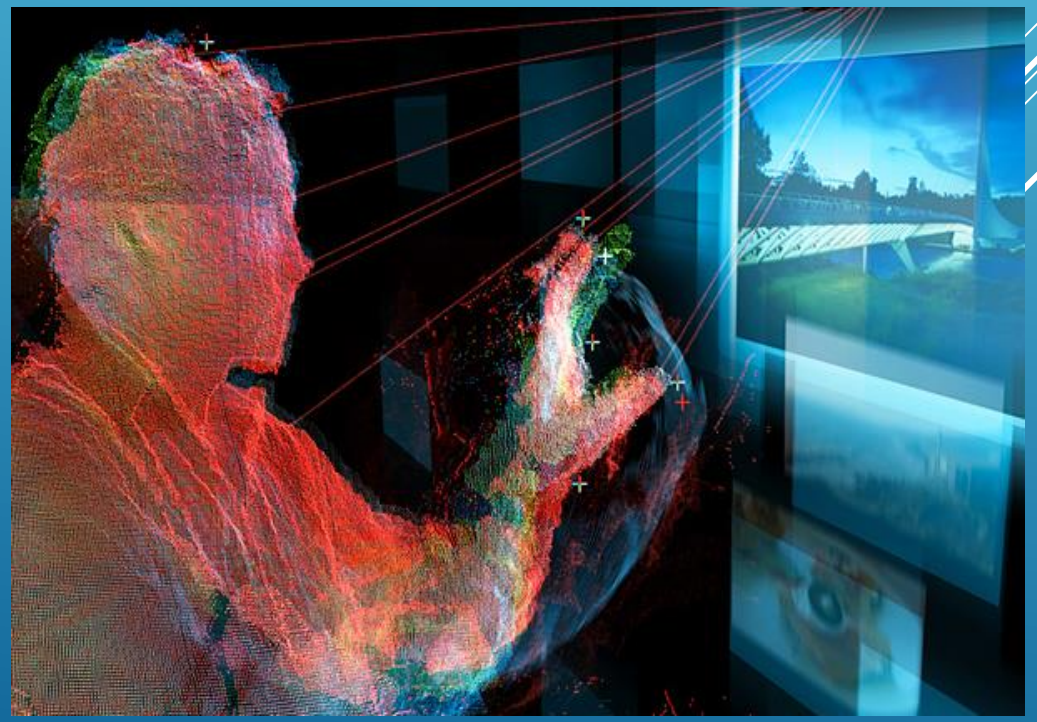
MOTION SENSE GAMING

-by Vineet Ahirkar

MOTION SENSE TECHNOLOGY

1. Infrared
2. Optics
3. Sound
4. Radio Frequency Energy



Top gaming consoles in market today

WII
(Nov 2006)

Xbox Kinect
(Nov 2010)

Playstation Move
(Sept 2010)

Wii console + **Remote controller** + **Sensor Panel**

Wii
(Nov 2006)

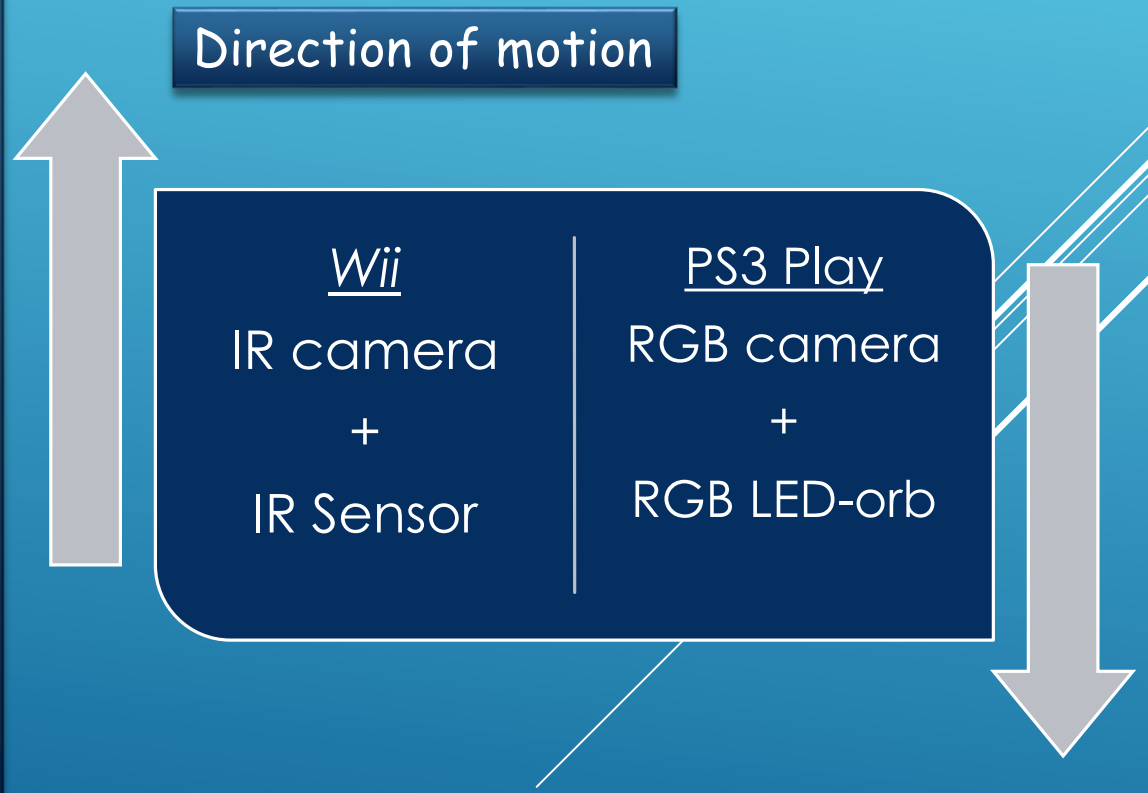
Xbox Kinect
(Nov 2010)

Playstation Move
(Sept 2010)

PS3 console + **Play Stick** + **PS eye**

TECHNOLOGY USED

- Accelerometer
  - -Linear acceleration
- Gyroscope
  - -Angular movement
- Magnetometer
  - -Controller's Orientation against the Earth's magnetic field



WII
(Nov 2006)

Xbox Kinect
(Nov 2010)

Playstation Move
(Sept 2010)

XBOX console + **Controller** + **Kinect**

WHY KINECT…?

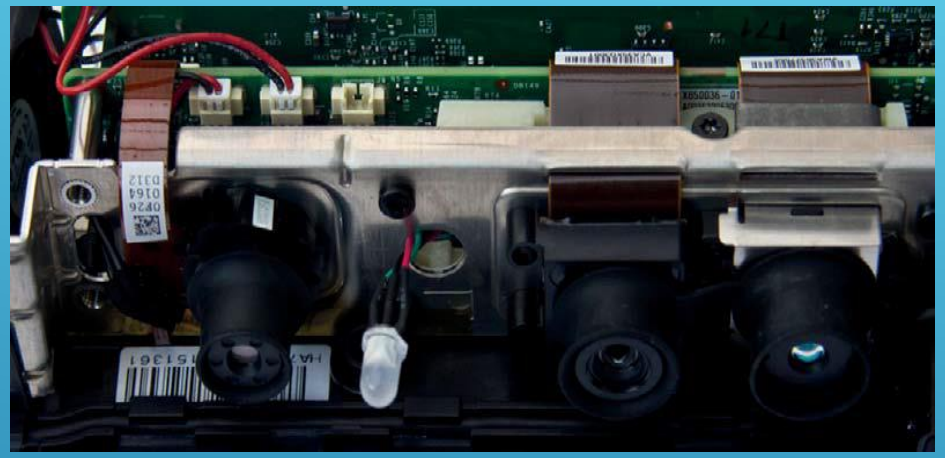
Full Body Gaming

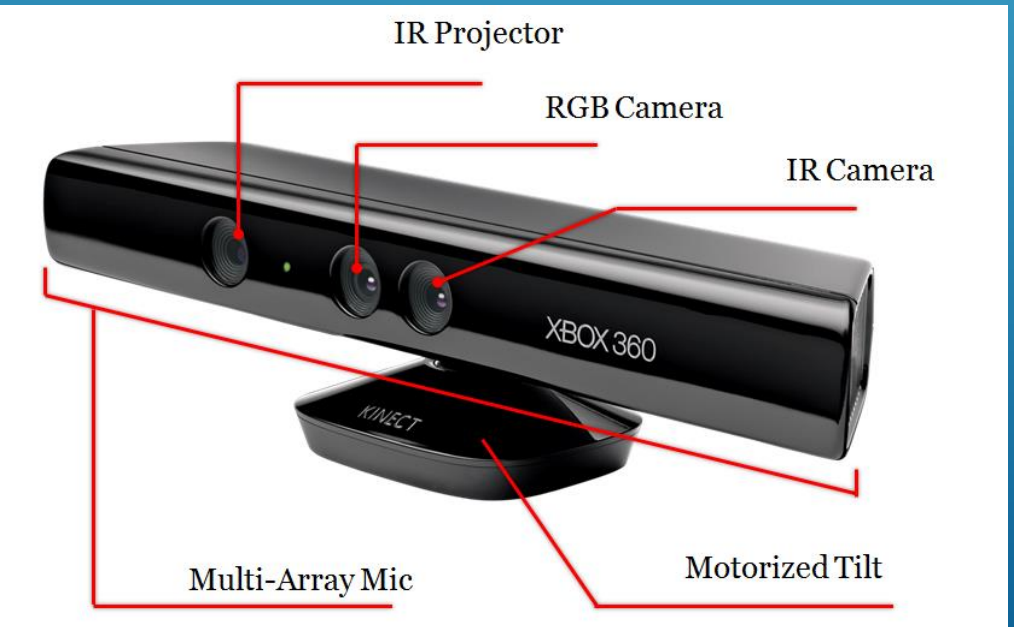
Use Your Voice

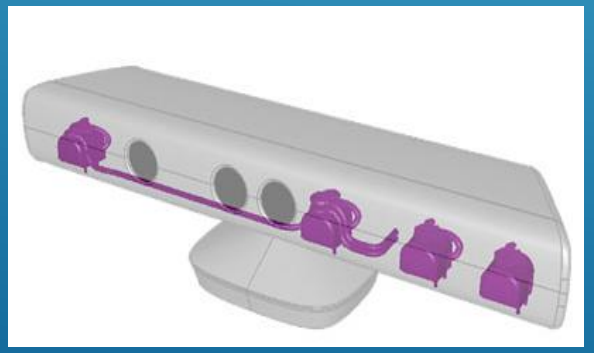
Something For Everyone

It's All About Your Avatar

WHAT'S INSIDE ?





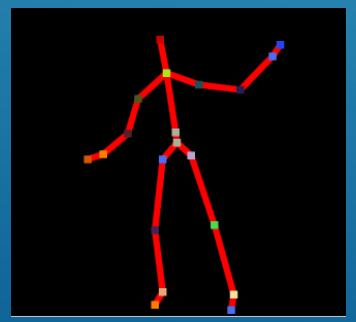


BASIC PROCESS OF MOTION SENSING

1.Structured Light Analysis

2.Machine Learning

3.Body tracking



1. STRUCTURED LIGHT ANALYSIS

A.

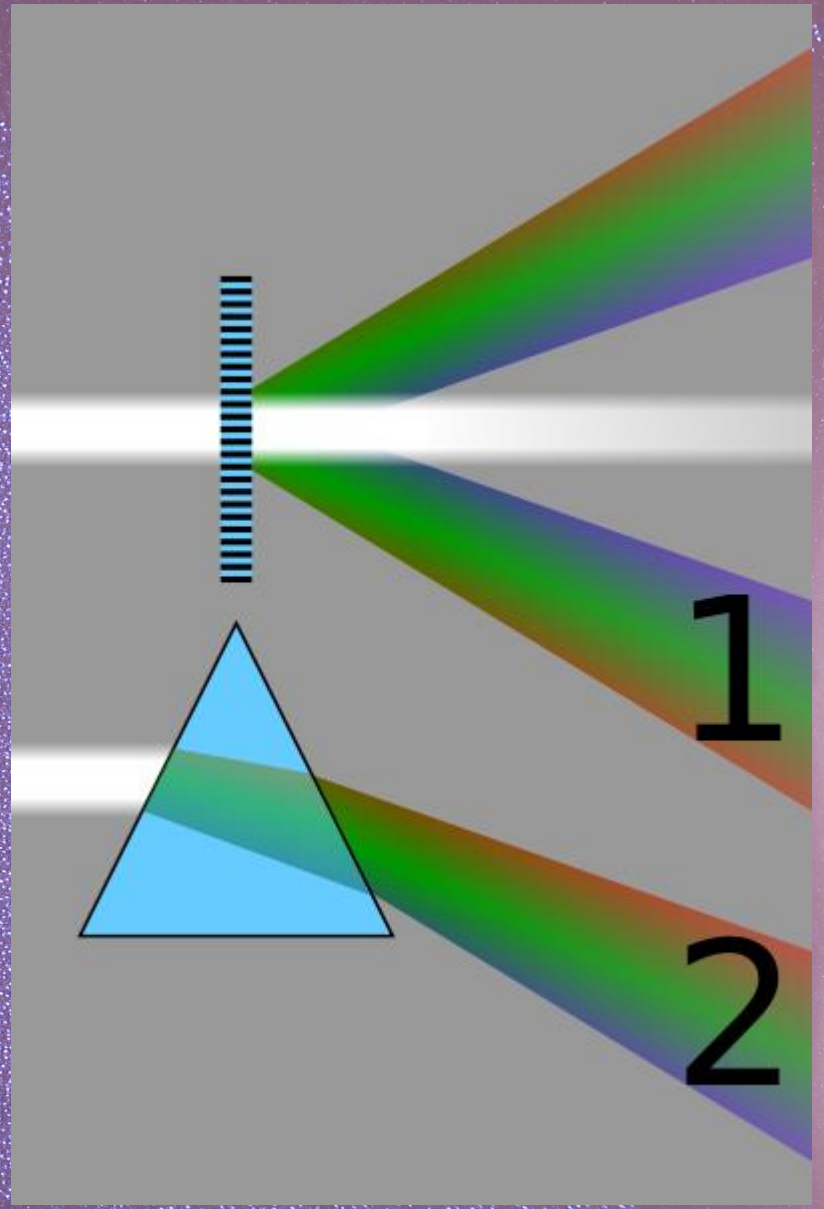
Depth from Stereo

B.

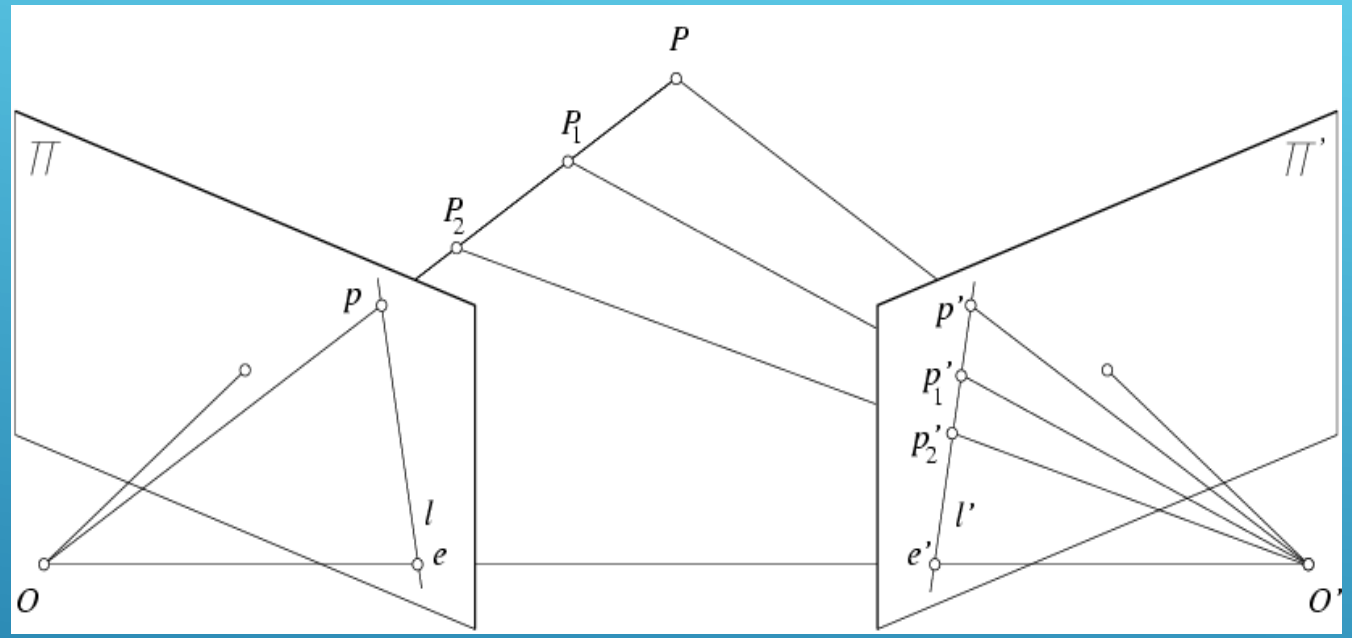
Depth from Focus

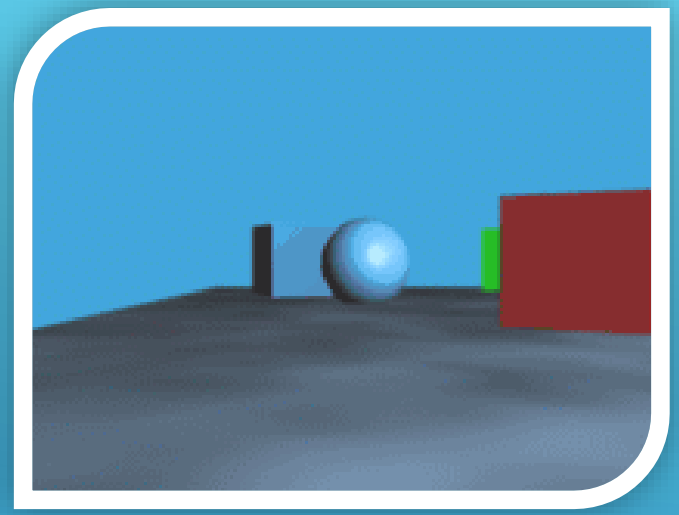
SPECKLE PATTERN

- IR laser passed through Diffraction grating
- Randomly generated speckles formed
- Developed and Patented by Israeli company named PrimeSense
- Known as Structured Light



DEPTH FROM STEREO



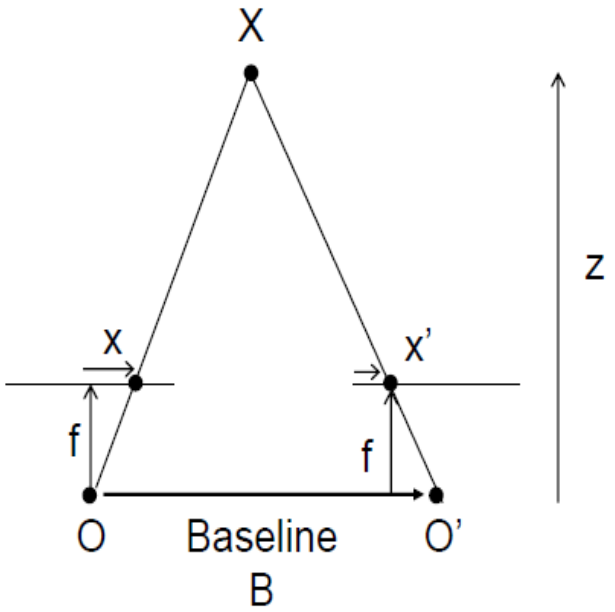


Potential matches for *x* have to lie on the corresponding line *l'*.

Potential matches for *x'* have to lie on the corresponding line *l*.

STRUCTURED LIGHT GENERAL PRINCIPLE

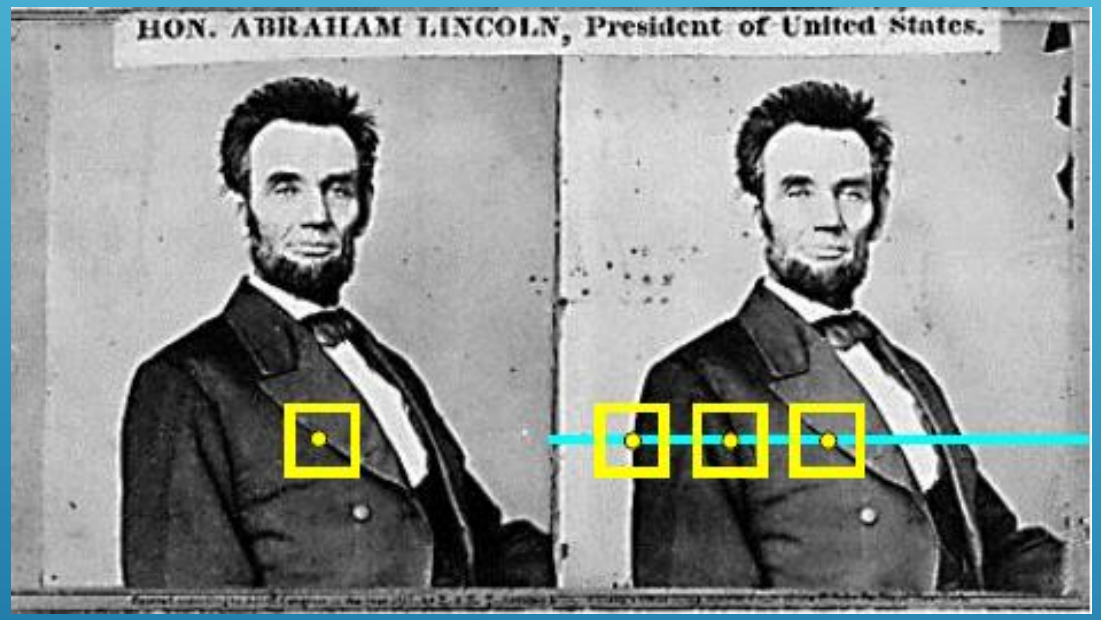
$$\frac{x - x'}{O - O'} = \frac{f}{z}$$

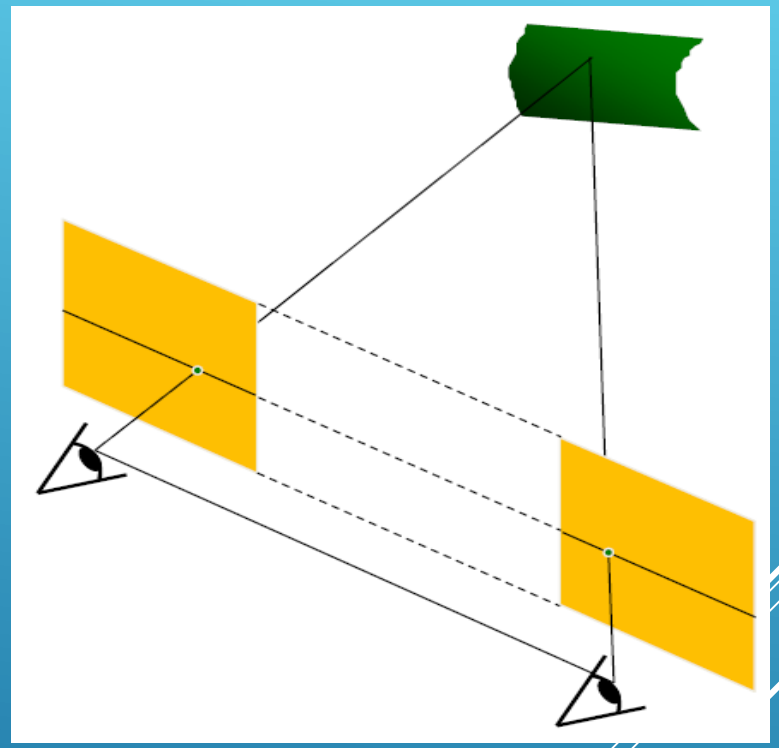


$$disparity = x - x' = \frac{B \cdot f}{z}$$

Goal: recover depth by finding image coordinate x' that corresponds to x

BASIC STEREO MATCHING ALGORITHM

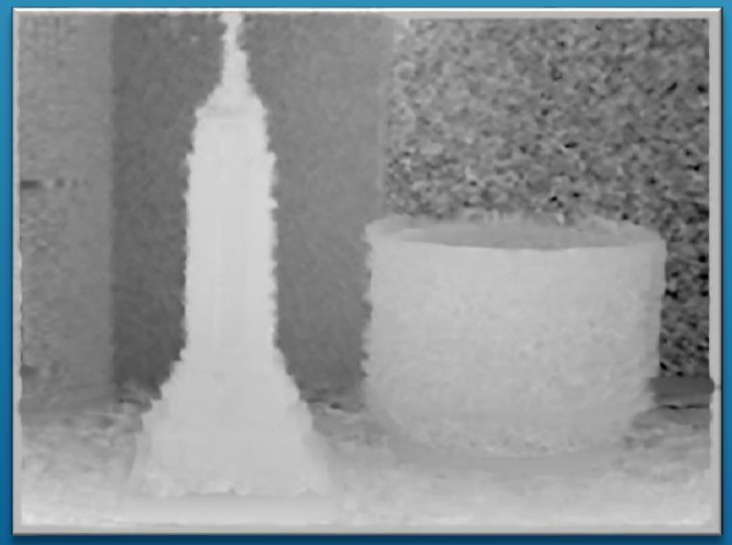




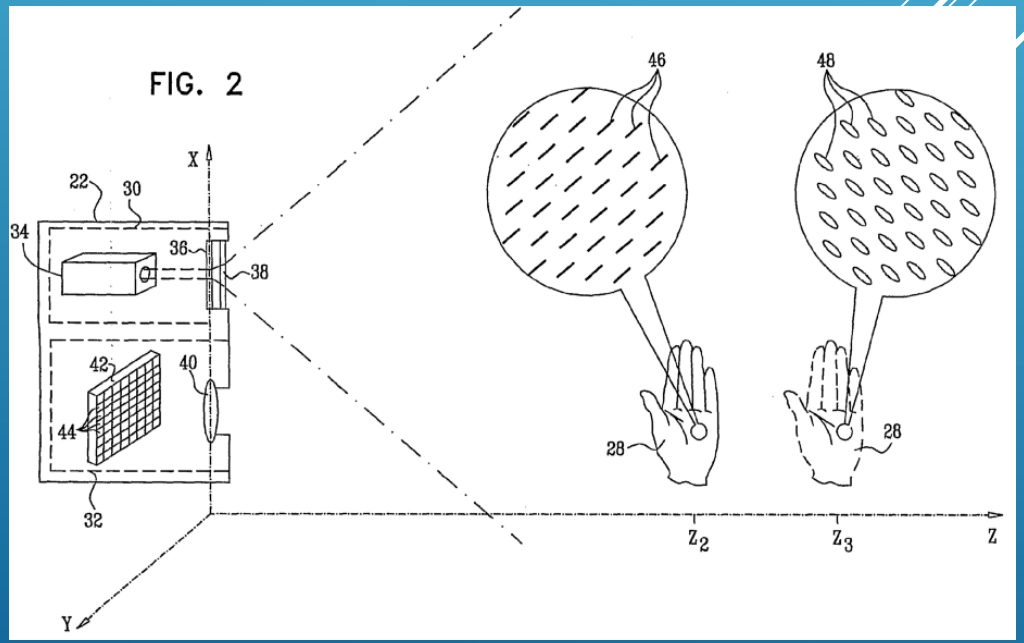
A speckle in the 1st image is searched for in the 2nd image using Normalised Cross Correlation.

Epipolar lines fall along horizontal Scanlines

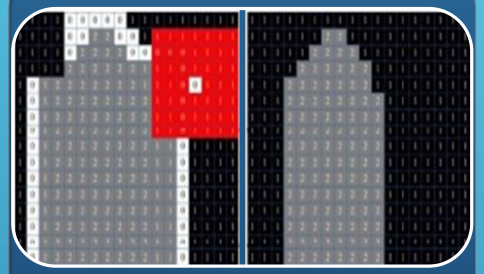
DEPTH FROM FOCUS



Astigmatic lens



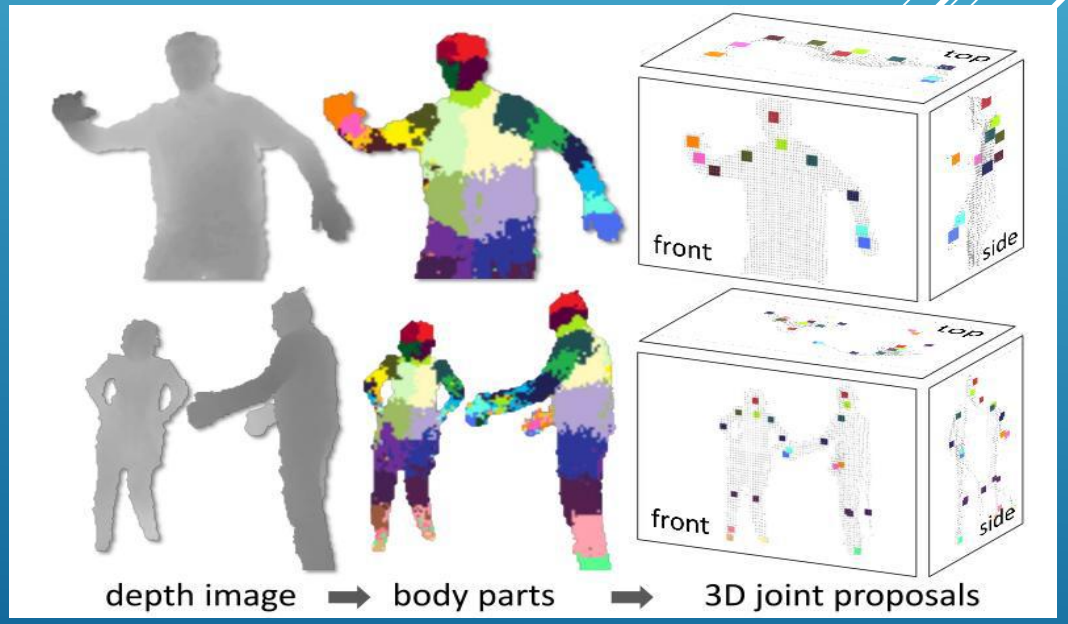
2. MACHINE LEARNING



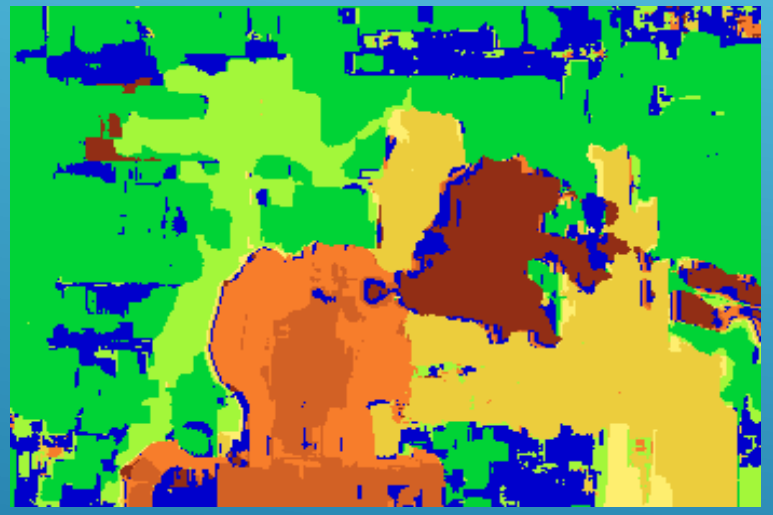
Hole Filling

Body Parts Recognition

Skeletal Structure Creation



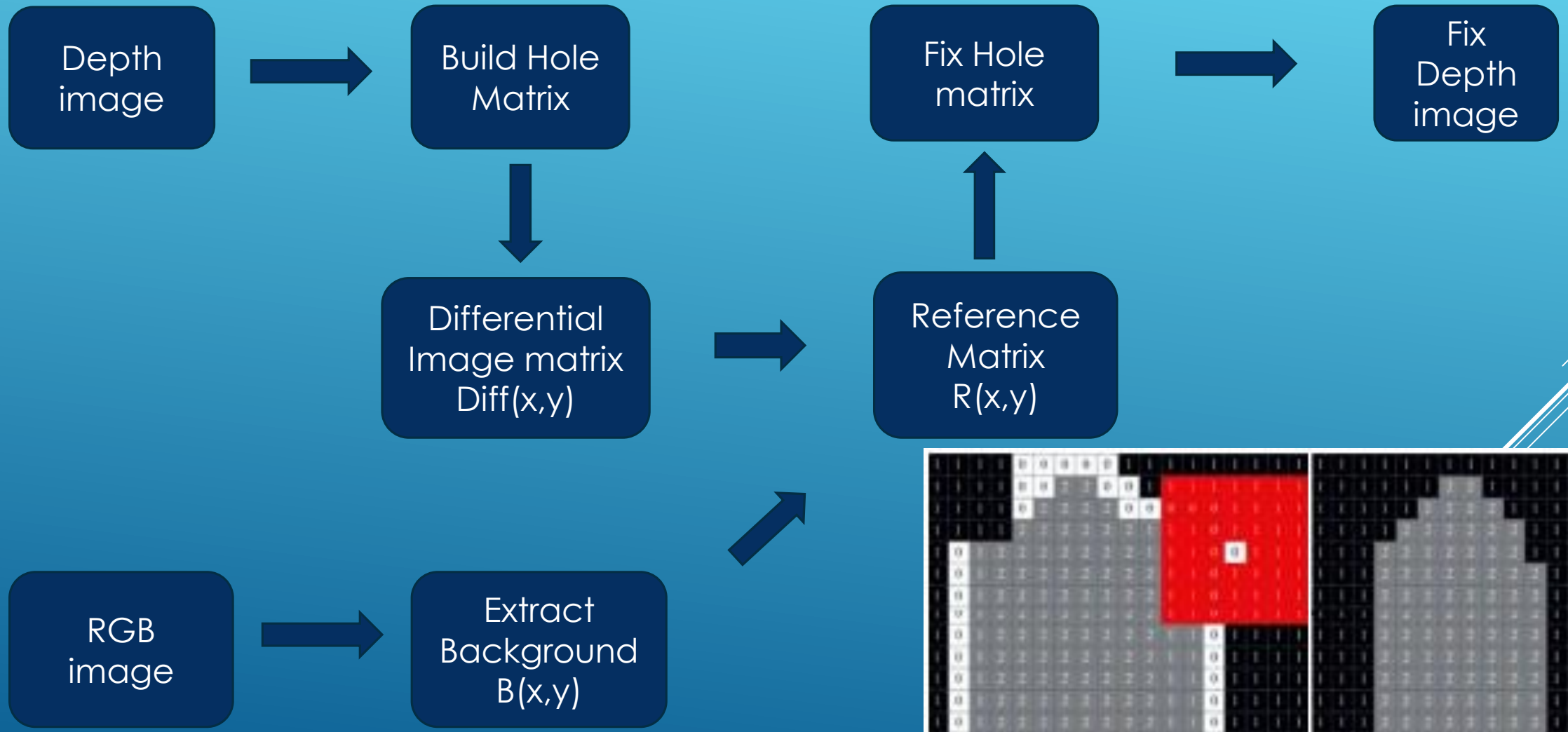
(2.A) WHY HOLE FILLING..?



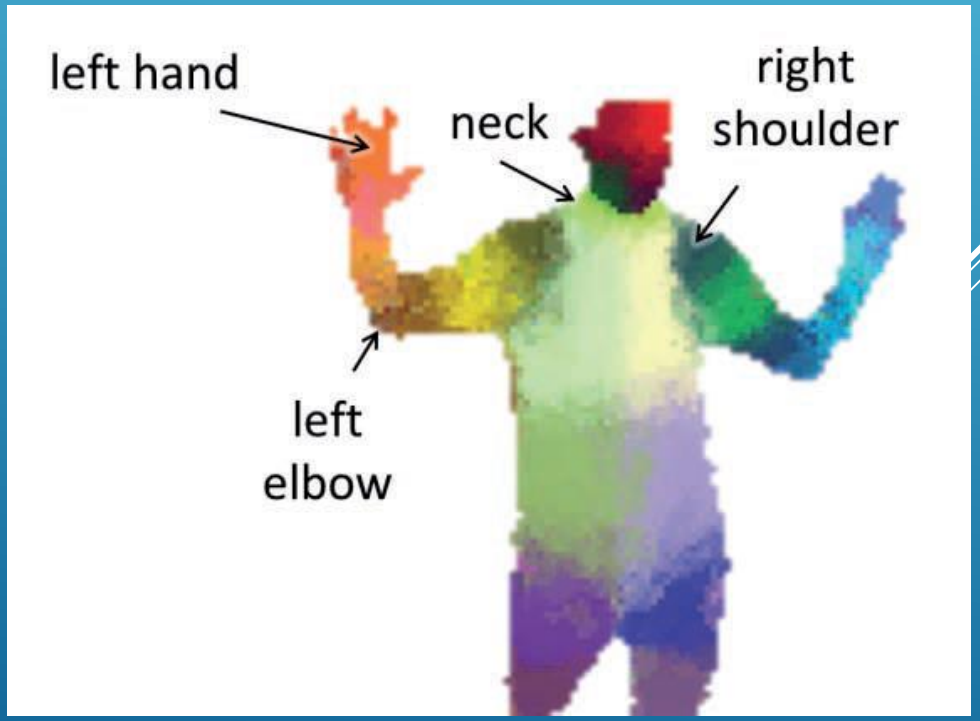
- Edges of objects
- infrared-absorbed surfaces
- Highlight Surfaces
- Flickering artefacts

Depth Image Based Rendering (DIBR)

NEIGHBOURING PIXELS INTERPOLATING ALGORITHM



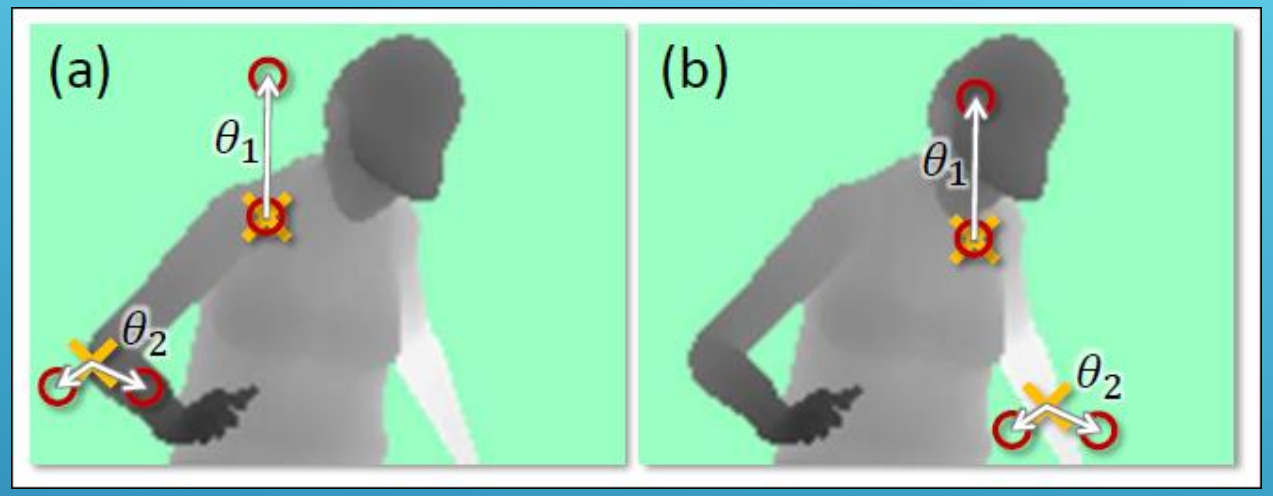
(2.B) BODY PARTS RECOGNITION

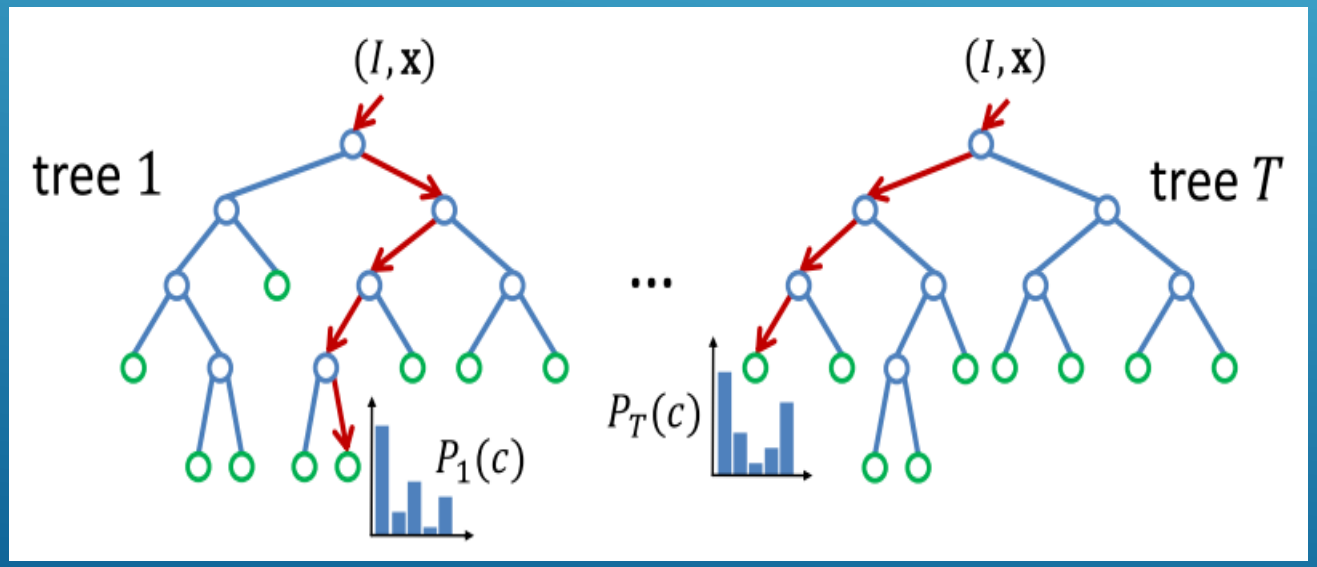


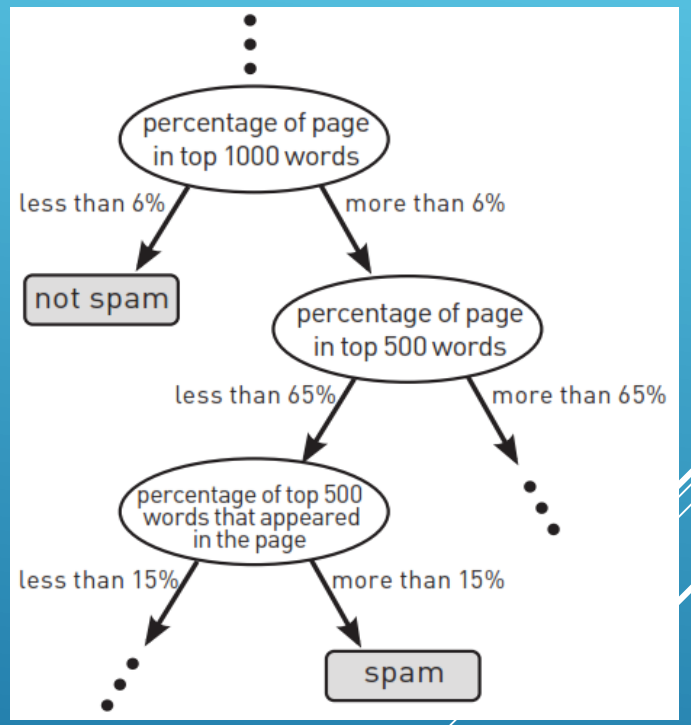
MOCAP DATA

100,000 skeletons of 15 body types.

FOREST FIRE ALGORITHM

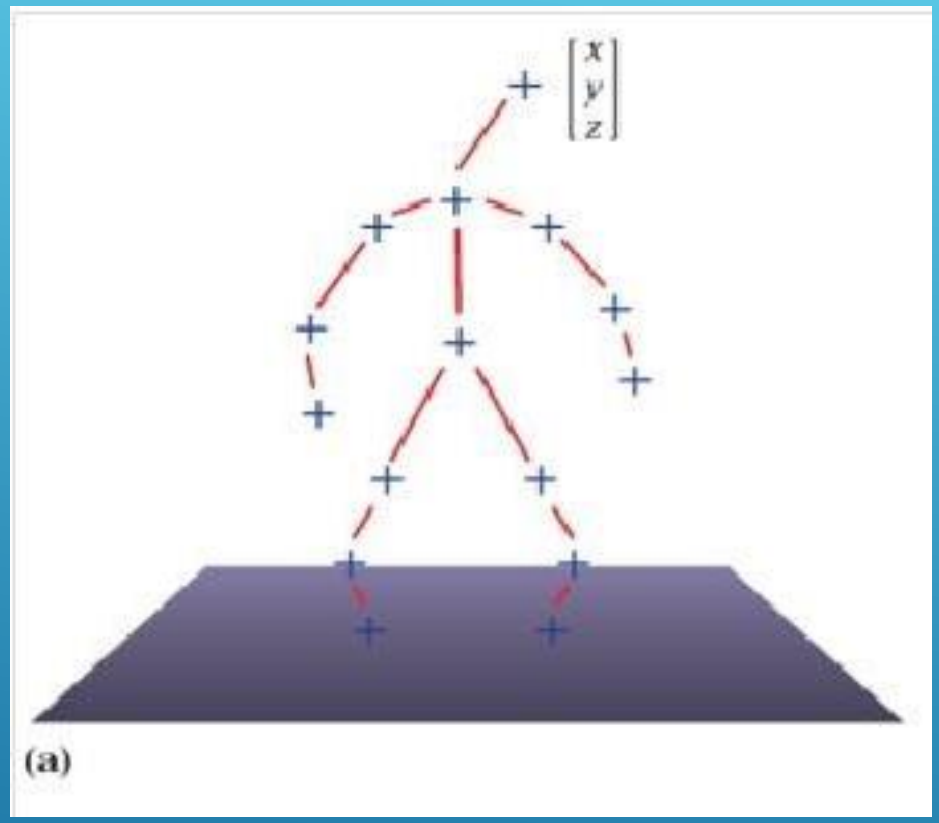






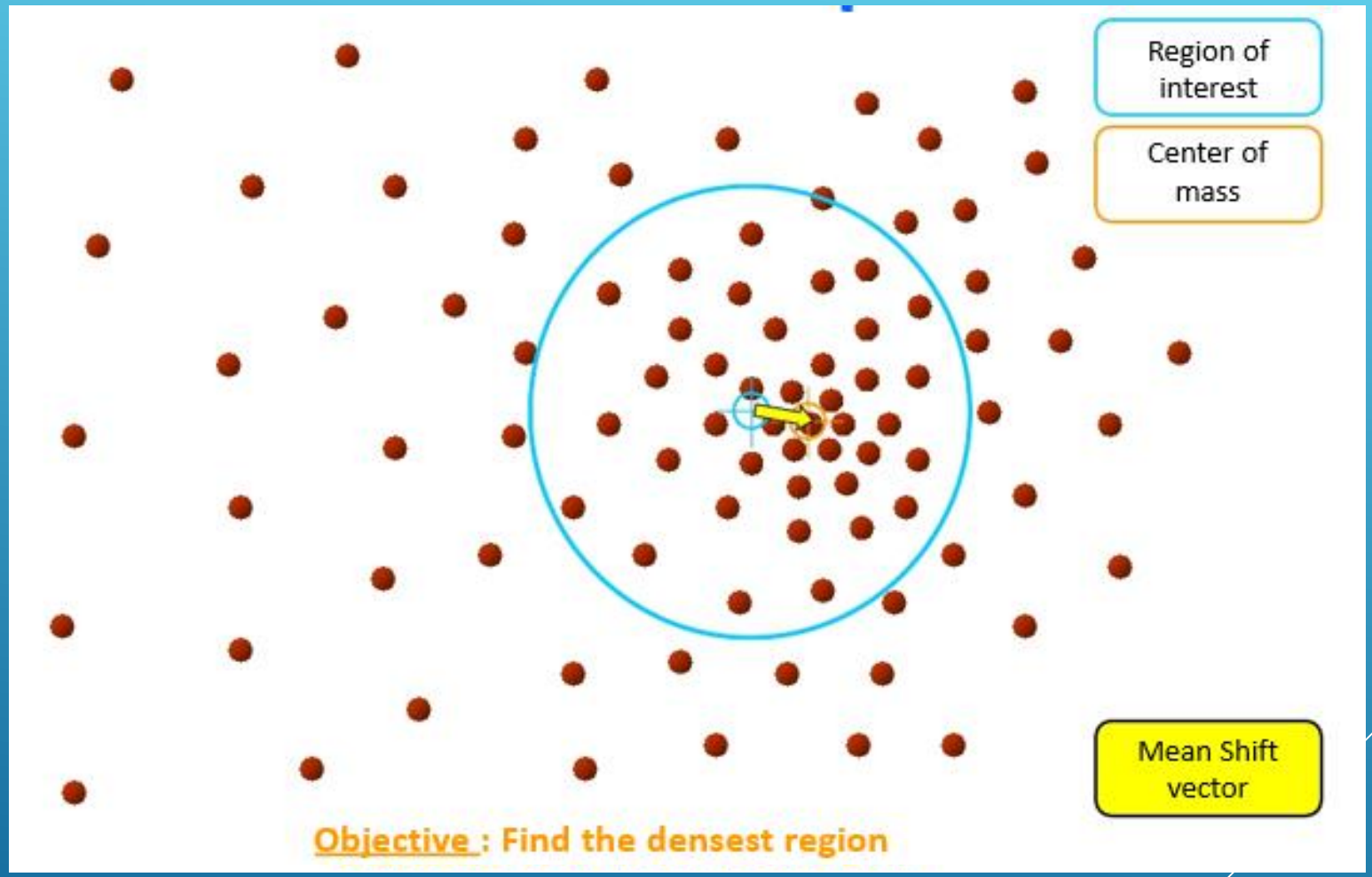
randomised decision forest of 3 trees of depth 20

(2.C) SKELETAL STRUCTURE CREATION

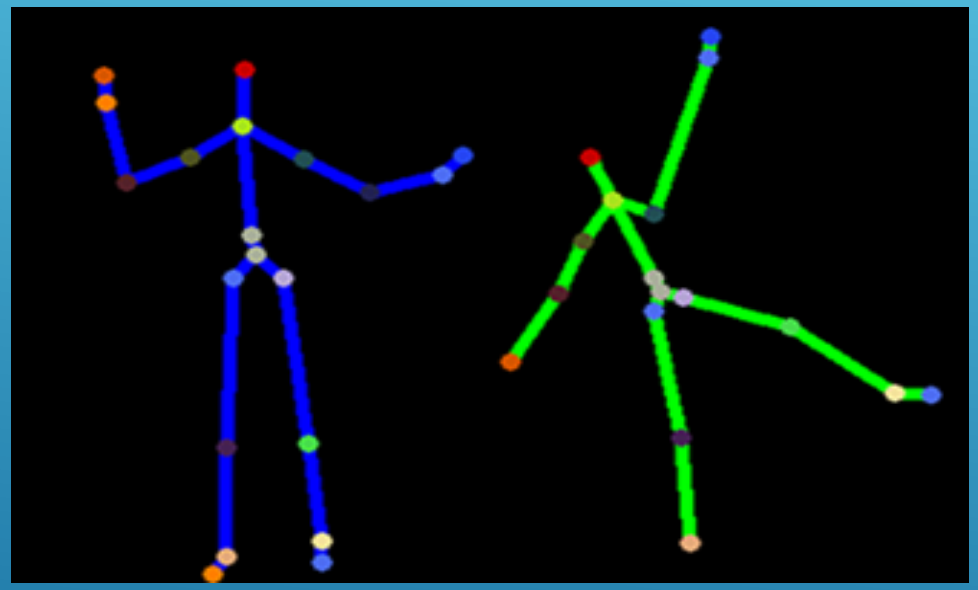


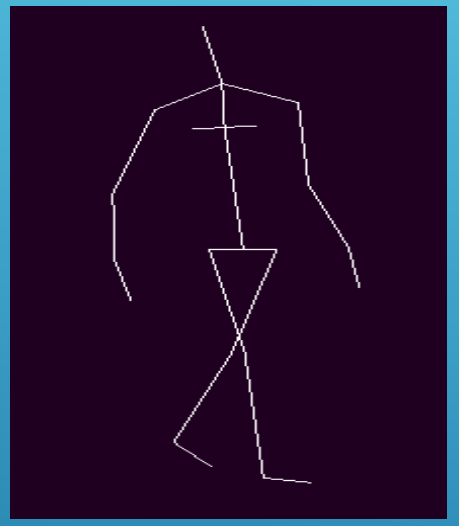
15 Main joints in the body are inferred

MEAN SHIFT ALGORITHM

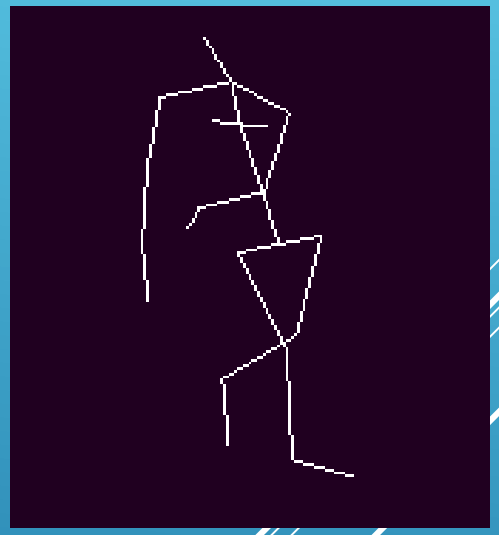


3. BODY MOVEMENT TRACKING





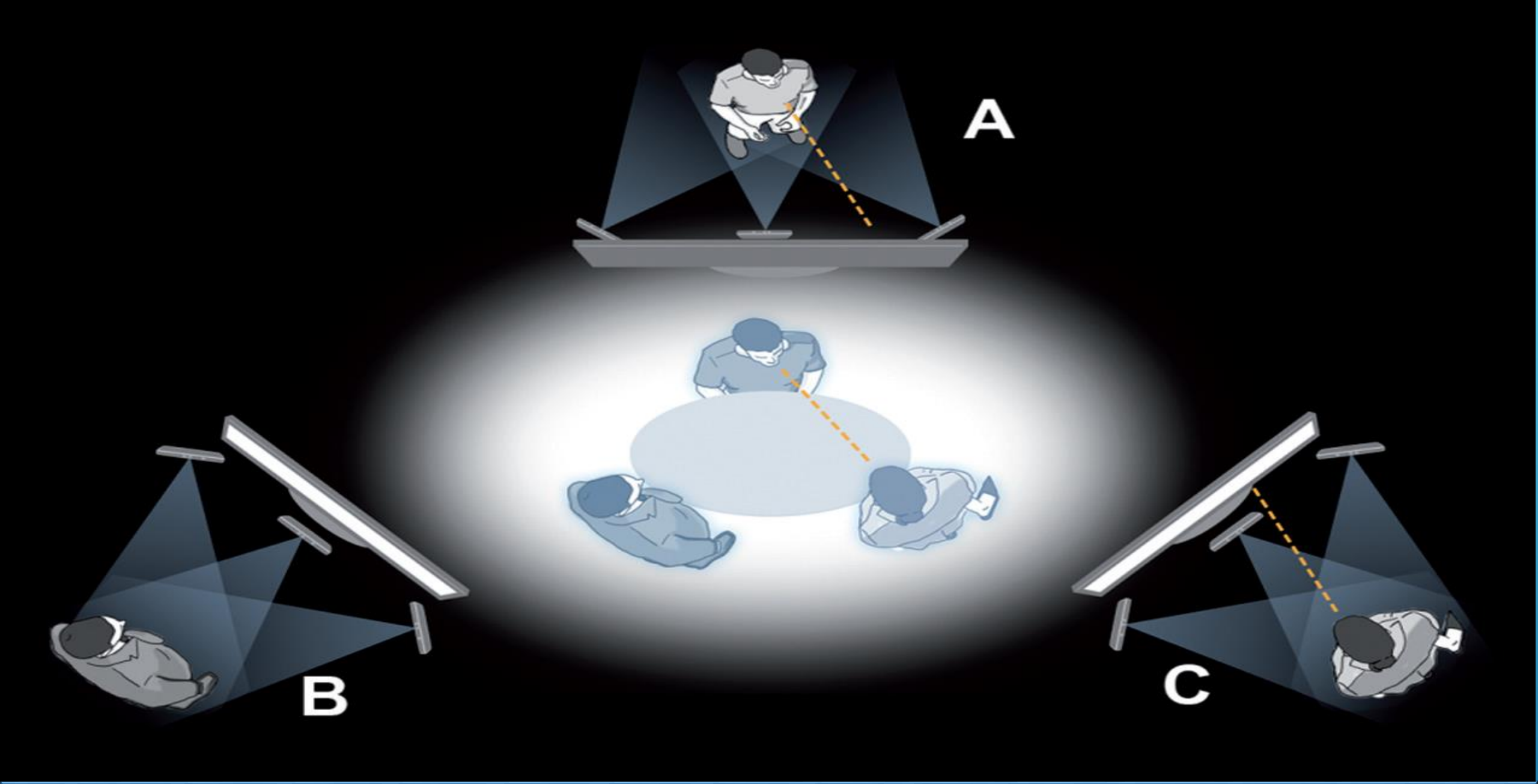
Likely



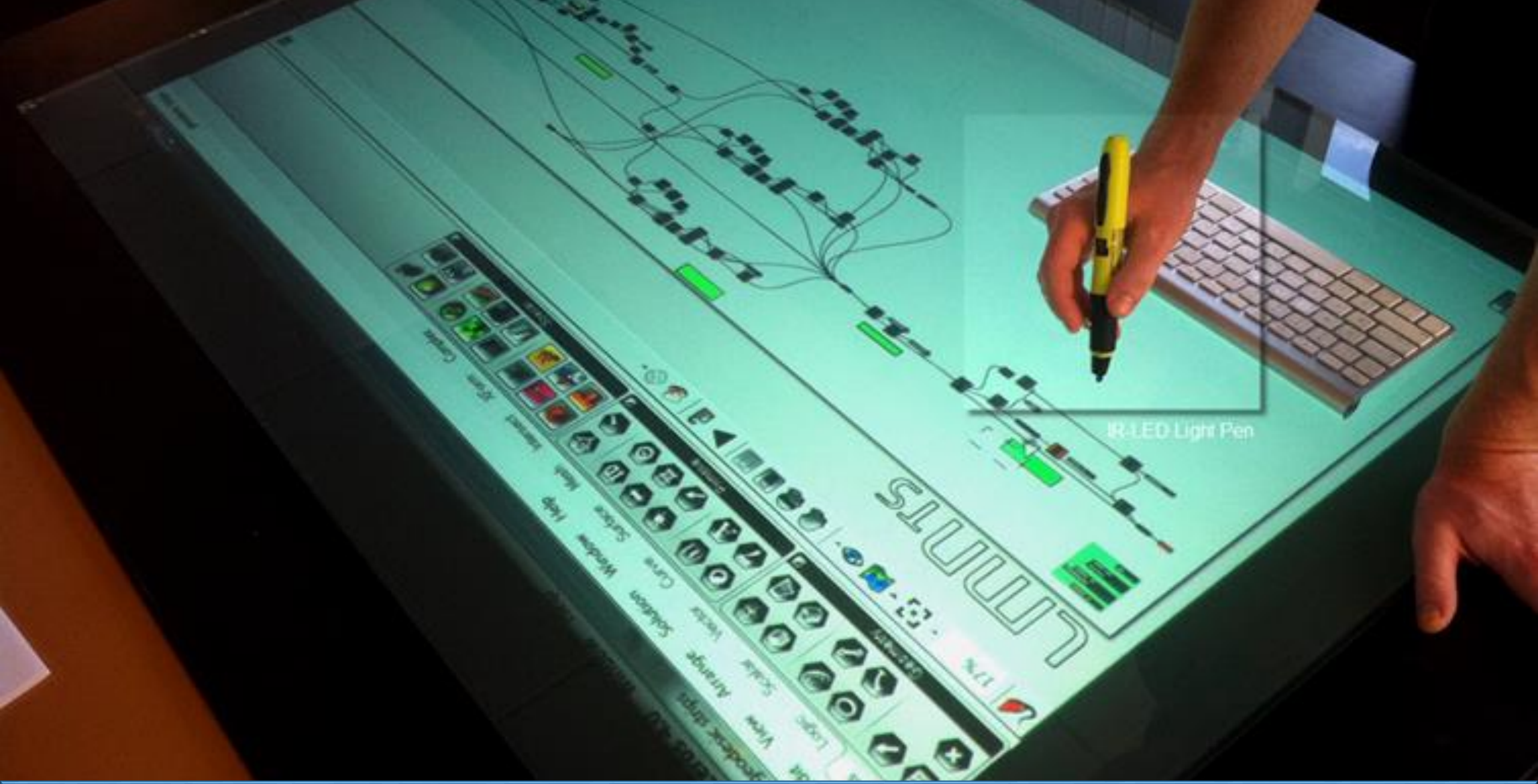
Unlikely

APPLICATIONS = FUTURE SCOPE

- Example models, Principles, Micro showcases available till now
- Perfect devices featuring this technology not introduced in the market.
- In Future, devices using this concept will be flooded in all parts of the market in various fields.



TELE IMMERSIVE CONFERENCING

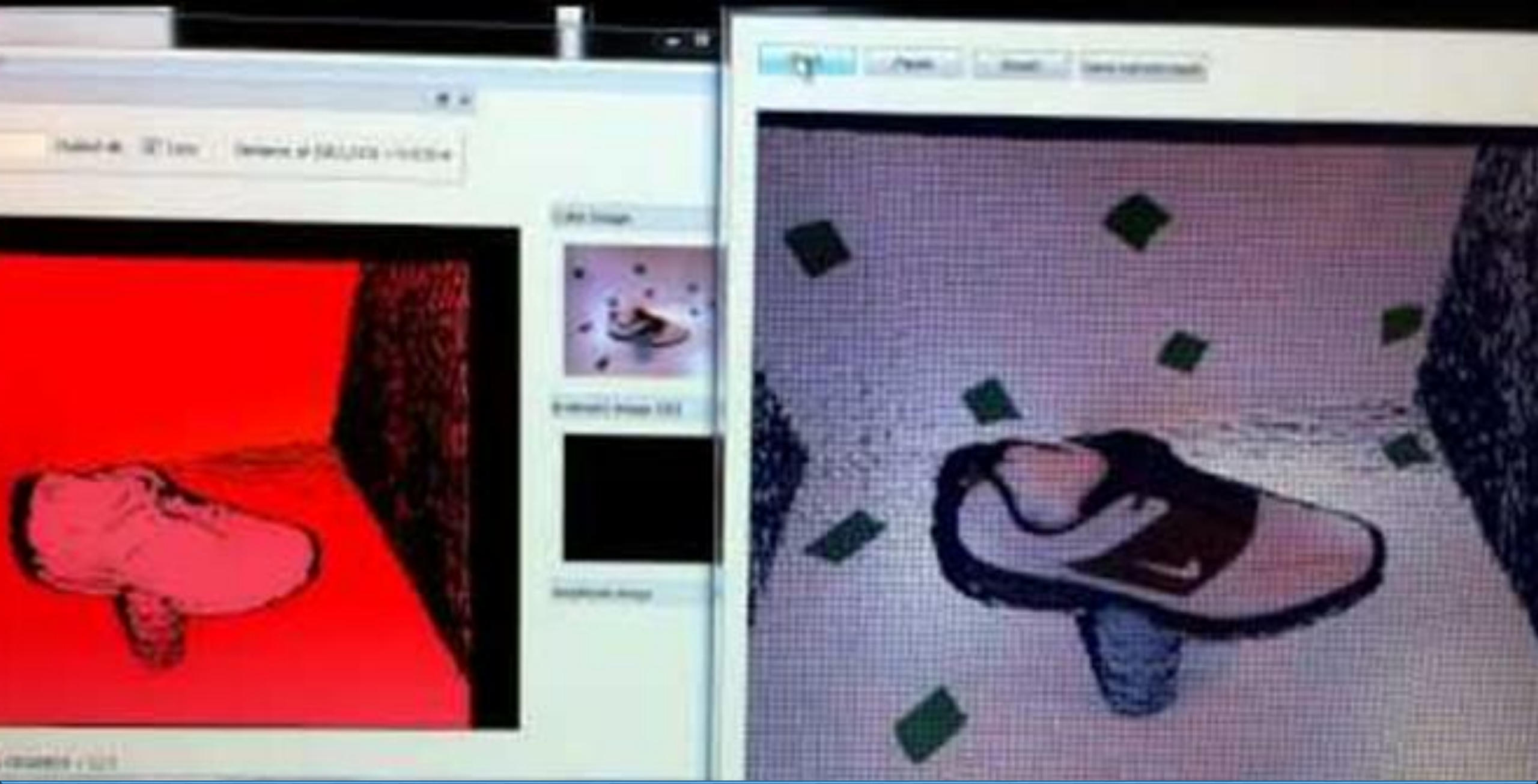


KINECT MULTI TOUCH SURFACE

KINECT EDUCATION

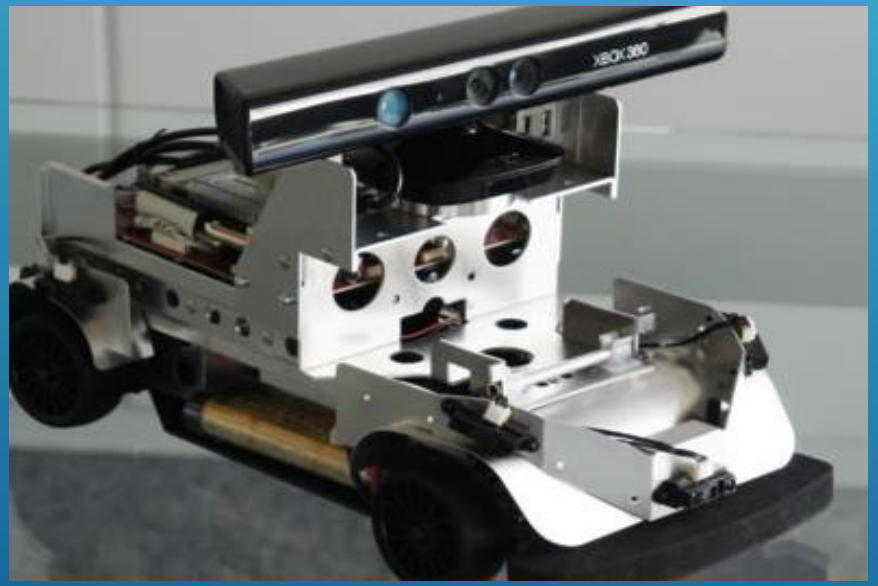
KINECT INTERACTIVE WALL

KINECT IN HOSPITALS

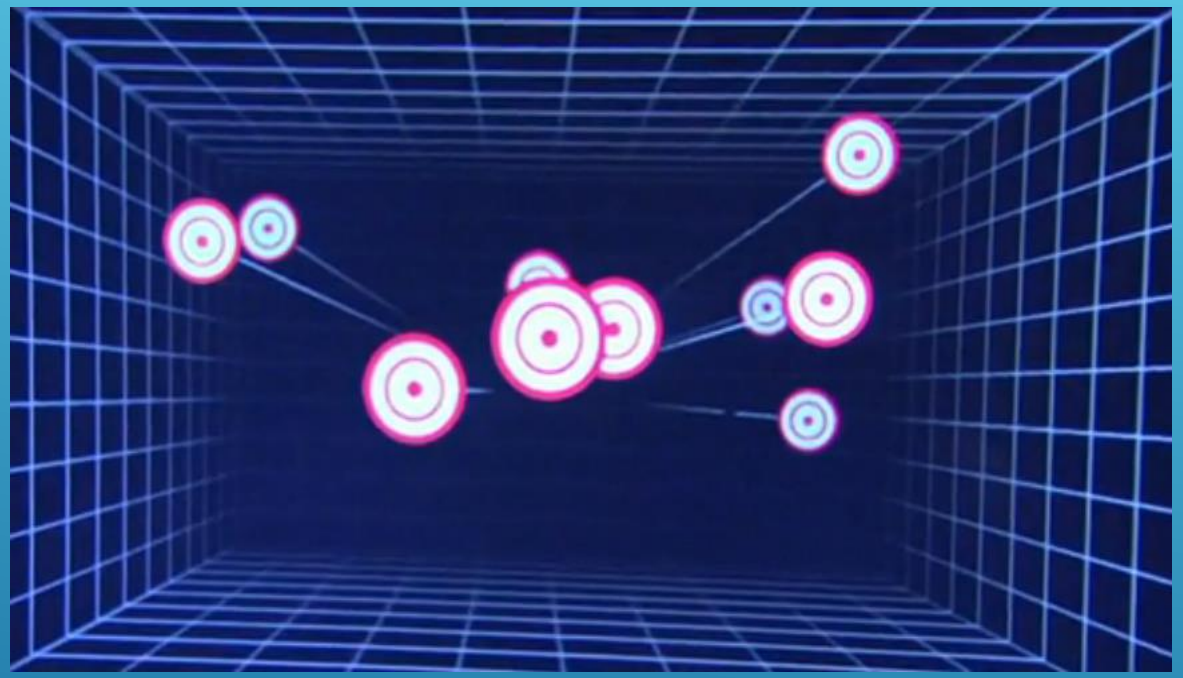


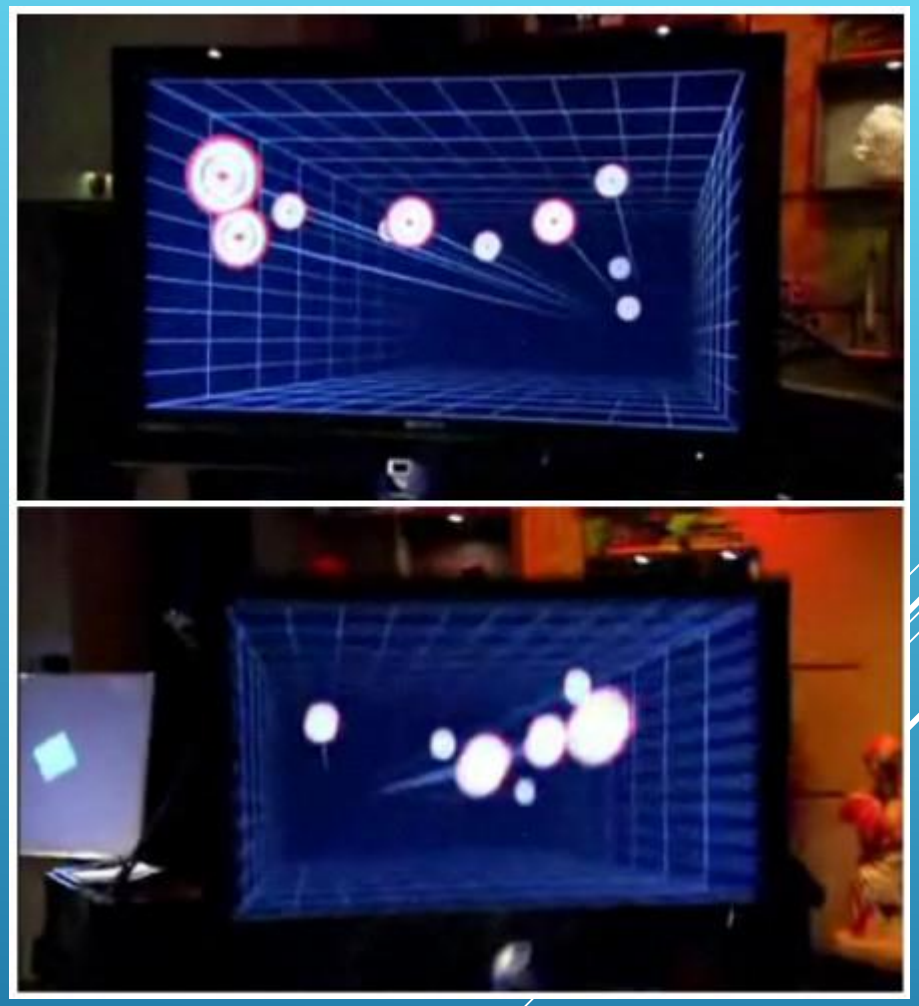
KINECT 3D TURNTABLE SCANNER

CAPTURE FOR HOLOGRAPHY



ROBOT CONTROL





3D GAMING USING KINECT

TO CONCLUDE WITH...

Thank You !!!