THESIS

Exploration of Multidimensional HCI (Human to Computer Interaction) Methods

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SPRING 2016
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ART 470 Thesis
Spring 2016
Prof. Meredith James

THESIS PROJECT GENRE WRITEUP

Looking over my current work and home environment I had to think about the concept of IoT (The Internet of Things) the interconnection of appliances, computers, devices, cars, and everything around us to the global internet system. How can we improve upon it? Thinking in terms of non-traditional methods of interacting with our environment. Through augmented reality and projection mapping we can view the needed information throughout our home and environment.

An interconnected home interface that is present whenever it is needed. This sort of product/interface might find itself in the design genre of more commercial, informative/aid, and experiential. The possible format and mediums used would be a sort of projection mapping technology using projections and 3D cameras such as an Xbox/Windows Kinect Camera System. Such a graphical interface would have to be designed and conceptualized using imagery and motion graphics.

THE FUTURE OF DESIGN / ENGINEERING.

THE ADVENT OF SUSTAINABLE ENERGY,

A.I. (ARTIFICIAL INTELLIGENCE), BETTER BATTERIES,

EFFICIENT / SMART TRANSPORTATION METHODS,

& MANNED SPACE EXPLORATION.

- TRANSPORTATION?
- MEDICAL TECHNOLOGIES.
- MILITARY ASSETS

{ MULTIDIMENSIONAL — NON-TRADITIONAL }

① A.I.

② AUGMENTED REALITY

③ VIRTUAL REALITY.

V.U.I?

COMPLEX HUMAN-TO-COMPUTER INTERACTIONS.

THESIS - RESEARCH IDEAS & BRAINSTORMS 4/2

V.U.I (VOICE USER INTERFACE) SYSTEM? A.I. ASSISTANT?

SMART HOME AUTOMATION SYSTEM? SECURITY SYSTEMS?

ROBOTICS / DRONES / ROVERS / DESK APPLIANCES (LAMP / ARM?)

HOLOGRAPHIC INTERFACE? AUGMENTED REALITY (HIGH FRAME RATE HOLOGRAPHIC GENERATOR) PROJECTION TECHNOLOGY?

MOTION GRAPHICS / GUI / HUD INTERFACE. VEHICLE?
SEE THROUGH MONITOR TECH? MIRROR PROJECTION?

① VR HEADSET + LEAP + GOPRO + iPHONE?

② DUET DISPLAY + iPHONE w/ VR SET

RASPBERRY Pi + ARDUINO UNO? ROBOTICS - PROGRAMMING
(JPL / NASA / BOSTON DYNAMICS)

GESTURAL / PROJECTION / INTERFACE?

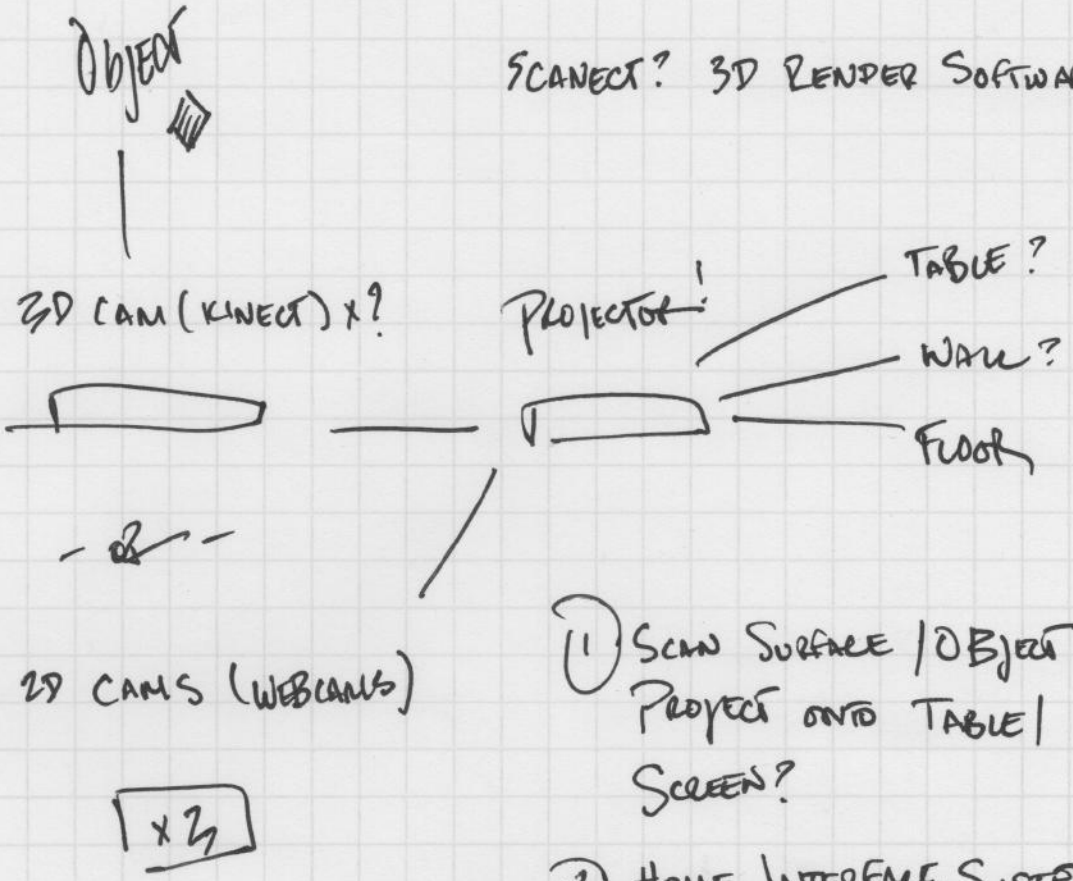
ACCELEROMETER? LIDAR? 3D - TABLE A.I.

ELECTROMAGNETIC / SPECTRUM INFRARED / UV

SENSORY INFORMATION / AUTOMATED

HUMANITARIAN / DISASTER RELIEF

1) HACKING | AUGMENTED REALITY | 3D SCANNING & PROJECTION MAPPING



(1) SCAN SURFACE / OBJECT PROJECT ONTO TABLE / SCREEN?

(2) HOME INTERFACE SYSTEM?

Q: HOW CAN I SCAN A 3D LAYOUT / ENVIRONMENT & HAVE IT PROJECT? IS THE PROJECTION PART-OF OR SEPERATE FROM THE ENVIRONMENT?

Q: WHAT IS THE APPLICATION?

AERIAL VIEW. WINDOWS / XBOX KINECT.

- 3D RECREATION OF A GEOGRAPHICAL / TOPICAL / PHYSICAL SPACE —— VIA REALITY AUGMENTION. PHYSICAL MANIPULATION OF SAID INFORMATION.
- ENHANCEMENT OF GENERAL COMPUTING W/ PROJECTION TOOLS
- SMART HOME INTERFACES.
- ASSISTIVE TECHNOLOGY FOR THE DISABLED.

THESIS - RESEARCH IDEAS & BRAINSTORMS!

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SMART HOME AUTOMATION SYSTEM? SECURITY SYSTEM?

ROBOTICS? DRONES / ROVERS / DESK APPLIANCES. LAMP / ARM?

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MOTION GRAPHICS / G.U.I. / HUD INTERFACE. VEHICLE?
SEE THROUGH MONITOR TECH? MIRROR PROJECTION.

① VR HEADSET + LEAP MOTION + GOPRO + IPHONE?
② + PUET DISPLAY & PHONE W/ VR SET.

RASPBERRY PI + ARDUINO UNO? ROBOTICS — PROGRAMMING.
(JPL, NASA, INSPIRED)

Accelerometer!

GESTURAL / PROJECTION / INTERFACE.?

LIDAR!? 3D —— TABLE

your reality affects technology. REVERSE OF

AI

ELECTROMAGNETIC / SPECTRUM. I.R. U.V.

SENSORY INFORMATION. HUMANITARIAN / DISASTER RELIEF

AUTONATED.

NOTES & IDEAS! 4/3/16

CENTRAL "INTERNET" HUB?
TESLA SIPHONING ELECTRICITY / ENERGY.

3D SCANNING & PROJECTION TECH?

STRUCTURED-LIGHT 3D SCANNING

WEARABLE PROJECTION TECHNOLOGY?
INFORMATION PROJECTED ON WRIST / ARM / HAND / ETC.
TOUCHABLE / LASER 3D DETECTION?

FLUID INTERFACES? MIT MEDIA LAB PROJECT.

RESEARCH STEPS?

① CONCEPT / SOB yes?

② HARDWARE / EXPERIMENTION?

STEP BACK. SHIFT AWAY FROM HISTORICAL RESEARCH &

GO INTO EXPLORING THE TECHNOLOGY LANDSCAPE.

JPL V MIT. TOTALLY DIFFERENT THINGS.

TO THE POINT CLEAR GOAL. VS. EXPERIMENTAL. WHOAEEE!

MIT MEDIA LAB FOR GRAD SCHOOL?

HIGH FIVE! (TWO MODES OF THINKING) — CONCEPTUAL — EXPERIMENTAL / TINKER!

① EXPLORE / RESEARCH WHERE THIS TECHNOLOGY WILL BE PROMINENT IN? WHERE IS IT IN TERMS OF A RELATIONSHIP? MOTHER TO CHILD, FAMILY. INDIVIDUAL, ETC. ——
MARS EXPLORATION, ELON MUSK. ——→ TECHNOLOGY.
WHAT IS FEASABLE? WHAT IS REALISTIC? WHAT CAN BE ACCOMPLISHED?

PROJECTION MAPPING / AUGMENTED REALITY?

RESEARCH: TECHNOLOGY LANDSCAPE. SPACE TRAVEL / MARS.
WHERE THIS TECHNOLOGY WILL BE

REMOTE OPERATION OF DRONES / ROVERS / ROBOTS.

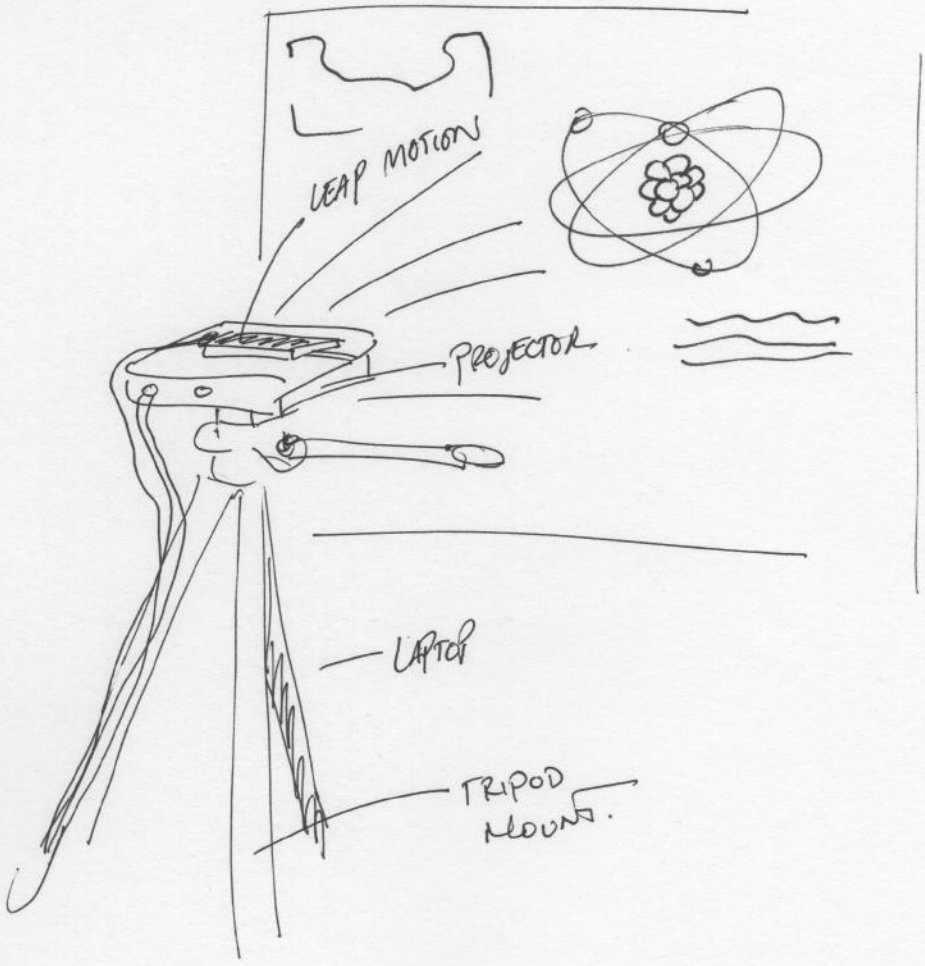
- AUGMENTED REALITY
  - PROJECTOR

- GESTURE CONTROLLED
  - LEAP MOTION
  - XBOX KINECT

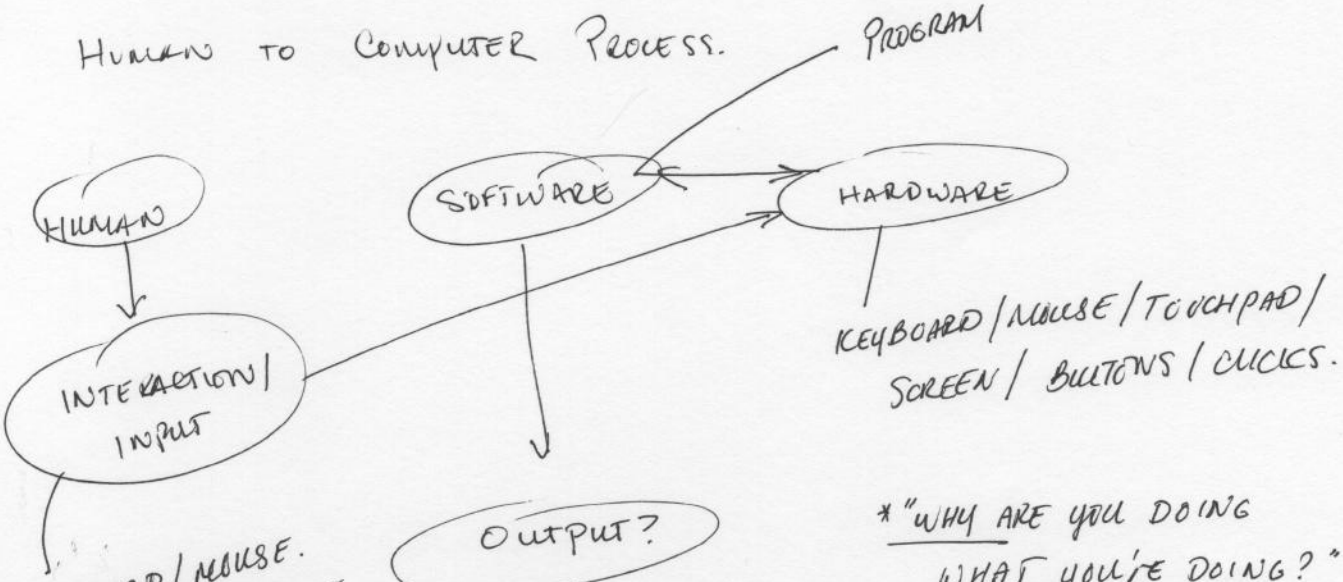
- ROBOTICS
  - RASPBERRY PI
  - ARDUINO

- SOFTWARES
  - AUTODESK MAYA
  - BLENDER
  - UNITY 3D
  - SIEMENS NX
  - SKETCHUP

- PROJECTOR
- XBOX KINECT
-



HUMAN TO COMPUTER PROCESS.



KEYBOARD / MOUSE.
TOUCHPAD / GESTURE
TOUCH SCREEN /
EYE TRACKING /
VOICE.

(MULTIDIMENSIONAL.)
GESTURE / BODY MOVEMENT
TRACKING.

OUTPUT?

ACTION / EVENT.

*"WHY ARE YOU DOING WHAT YOU'RE DOING?" LET THAT DRIVE YOUR WORK." ———.

COMPUTERS TURN HUMAN INSTRUCTIONAL INPUT INTO BINARY. 1's & 0's.

QUANTUM COMPUTING SQUEEZES BOTH 1's & 0's TOGETHER.

1
2048 × 1024
~~4088~~
2048 × 1024
———————
4096 × 2048

4/17/16

PARTICLE PHYSICS! / MOLECULAR / VIRAL

DATA VISUALIZATION IN 3D SPACE.

SUBATOMIC PARTICLES!

GESTURAL INTERFACE!?

- OPEN DATA. CERN. CH
- MAGIC LEAP INTERFACE?

PARTICLE PHYSICS!

+

AUGMENTED R!

JS / 3D Render?

+

GESTURAL TECH!

PARTICLE PHYSICS IS OFTEN EXPLORED IN A VERY TWO DIMENSIONAL WAY. EITHER THROUGH PAPER/TEXTBOOK FORMAT OR THROUGH PHYSICAL 3D MODELING, BUT WHAT IF SUBATOMIC PARTICLES COULD BE EXPLORED & UNDERSTOOD THROUGH A MULTIDIMENSIONAL PLATFORM SUCH AS 3 DIMENSIONAL EXPLORATION USING GESTURAL TECHNOLOGY & PROJECTION MAPPING?

SECONDARY RESEARCH!

- AUGMENTED REALITY. HEAD MOUNTED DISPLAYS.
- THE GENERAL CONCEPT BEHIND VIRTUAL & AUGMENTATION INTERFACES.
- AN EXPLORATION INTO A.I. (ARTIFICIAL INTELLIGENCE)
- "A MORE NATURAL & FLUID INTERFACE SYSTEM."
- STUDYING THE J.P.L. & M.I.T. MEDIA LAB.
- SPACE EXPLORATION TECH?
- DATA OVERLAY / DATA VISUALIZATION & MANIPULATION IN THREE DIMENSIONAL SPACE!
- THE INTEGRATION OF STEM & DESIGN ENGINEERING.
- HARDWARE MODE. FIGURING OUT WHAT CAN I WORK WITH?

PROTOTYPE / PROOF-OF-CONCEPT

HARDWARE MODE.

J.S. SCRIPT &/OR BLENDER MODELING

* LEAP.JS
* THREE.JS

INTERFACE WITH A WEB BROWSER? OR EXECUTABLE FILE?

LAPTOP!

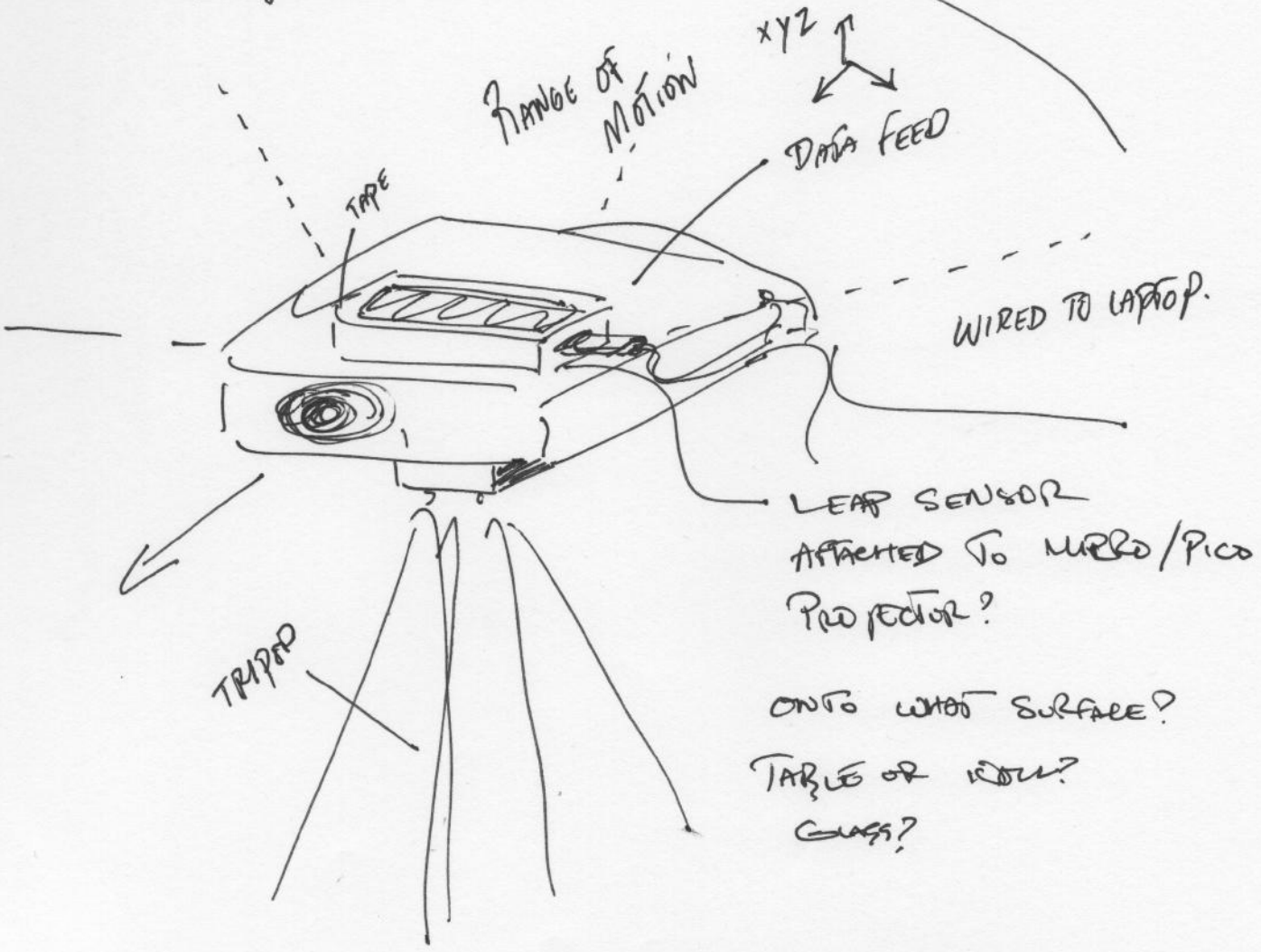
LEAP MOTION

LEAP + BLENDER INTEGRATION?

WOULD HAVE TO BE CREATED IN UNITY.

BLENDER → T.J.S.

PROJECTED INFORMATION



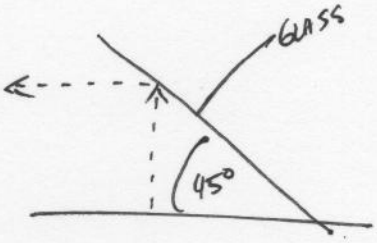
ONTO WHAT SURFACE?

TABLE OR WALL?

GLASS?

1. Polystyrene Sheet
2. Polycarbonate
3. Acrylic Sheet
4. Glass Sheet?

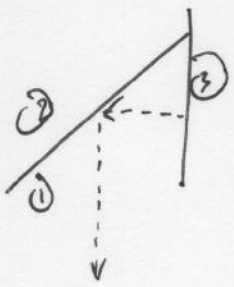
Projection v. Reflection
@ varying Degrees.
45° 90° 360°?



Physics of Light Refraction?

Materials? Glossy / Matte / Frosted.

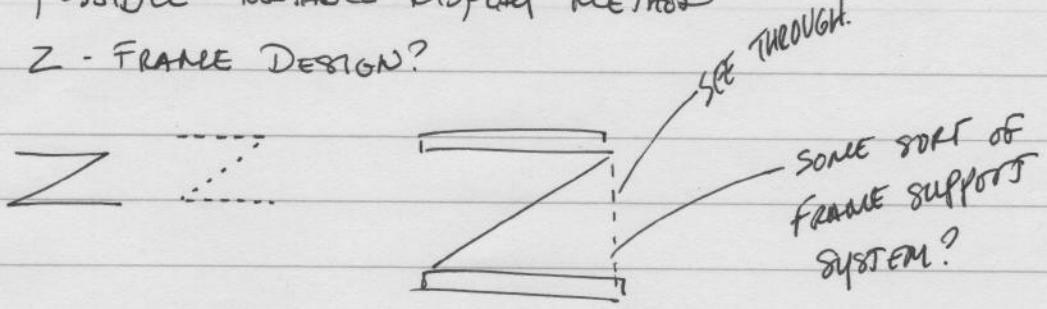
- Reflection off a screen provides clarity, but limits portability of projected screen.
- Projection is limited by lumens. Clarity is <u>not</u> working.
- Project onto glass? Creating effect.

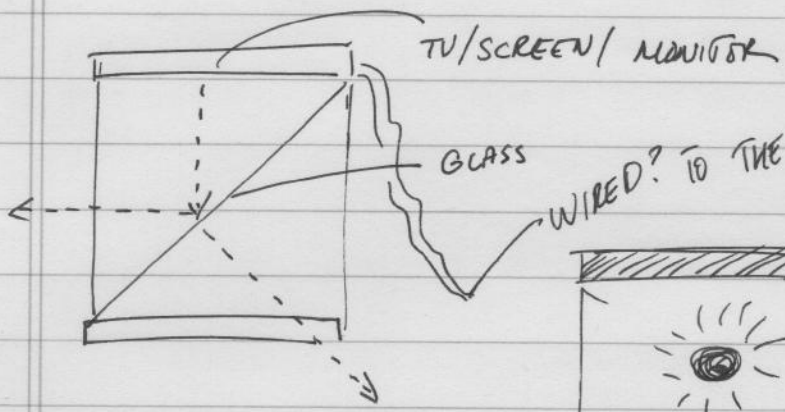


* Will I be able to see it on side (2)?
* Can I use a projector instead of a screen?
* Projection on larger formats? How to accomplish?

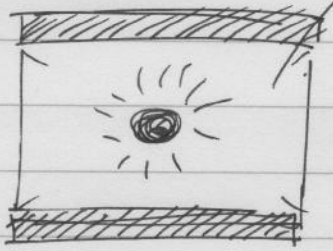
POSSIBLE PORTABLE DISPLAY METHOD

Z - FRAME DESIGN?

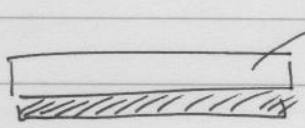




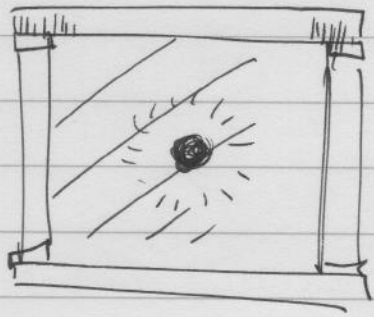
MONITOR FACING DOWN.
INVERTED DISPLAY.



BLACK/DARK SURFACE. + PROPER LIGHT SOURCE? FLASHLIGHT OR LAMP?



- HOW BIG? DIMENSION IDEAS. (DEPENDS ON THE DISPLAY.)



- VIEWED FROM ONE PERSPECTIVE.

ONE DIMENSIONAL SINGLE PERSPECTIVE DISPLAY.

* USING iPAD AS DISPAY? DUE TO RETINA CAPABILITIES

THE THEORY IS THAT YOU MUST HONE ON OBJECT OBSTRUCTING THE PATH OF LIGHT (PROJECTION) IN ORDER FOR IT TO BE SEEN. ESPECIALLY IN A HORIZONTAL FRAME. / YOU RISK HAVING THE

(1)

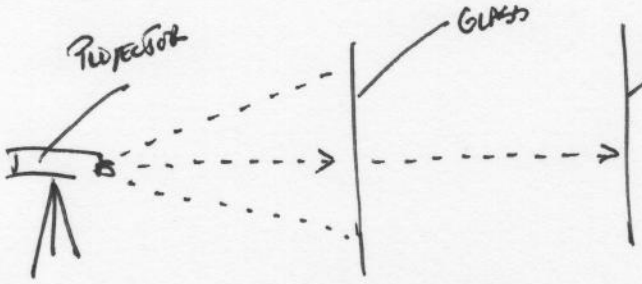
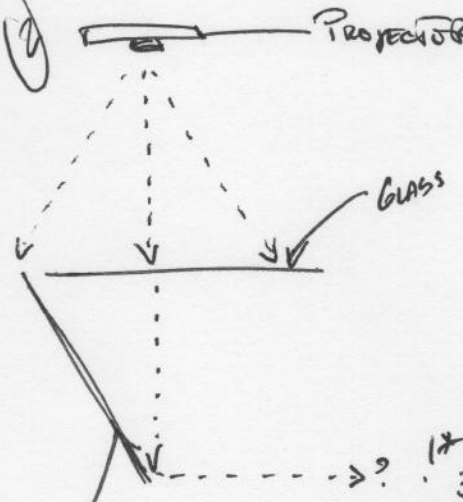


IMAGE BE PROJECTED THROUGH THE OBSTRUCTING ELEMENT IF TRANSPARENT.

(1) A POSSIBLE SOLUTION WOULD BE TO LIGHTLY FROST THE TRANSPARENT FRAME? SO THAT IT IS MATTE AND ABSORBS THE INCOMING LIGHT SOURCE? (2) I CAN HONE IT BE SO THAT IT PROJECTS VERTICALLY. EITHER UPWARDS OR DOWN WORDS? —— IN ORDER FOR IT TO BE VIEWED?

(2)



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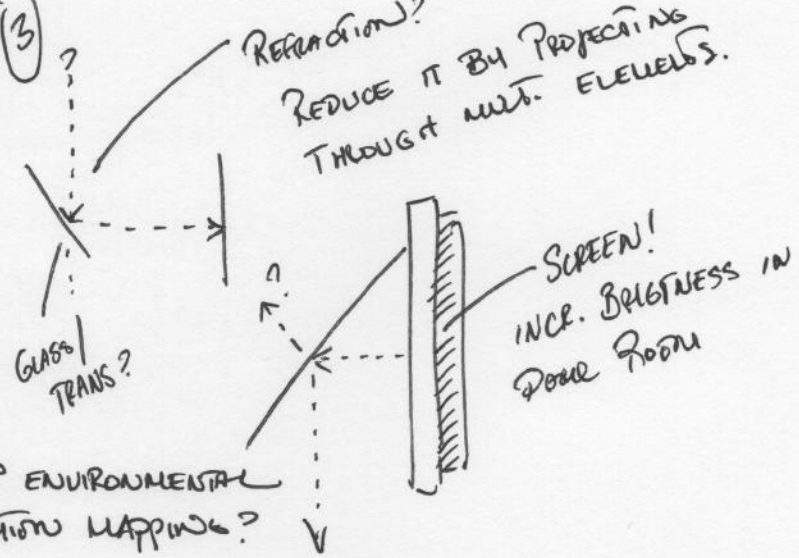

1* 360° ENVIRONMENTAL PROJECTION MAPPING?

* DO I NEED TO USE A PROJECTOR?

* SCREEN FALL UP?