



XR Welding Edu Game

Spark-Smith Studio

Faculty Advisors:

Derek Ham, Scott Stevens



Professor Dina El-Zanfaly

School of Design, Carnegie Mellon University



Carnegie Mellon University

Entertainment Technology Center



**industrial arts
workshop**





Project Background



375,000

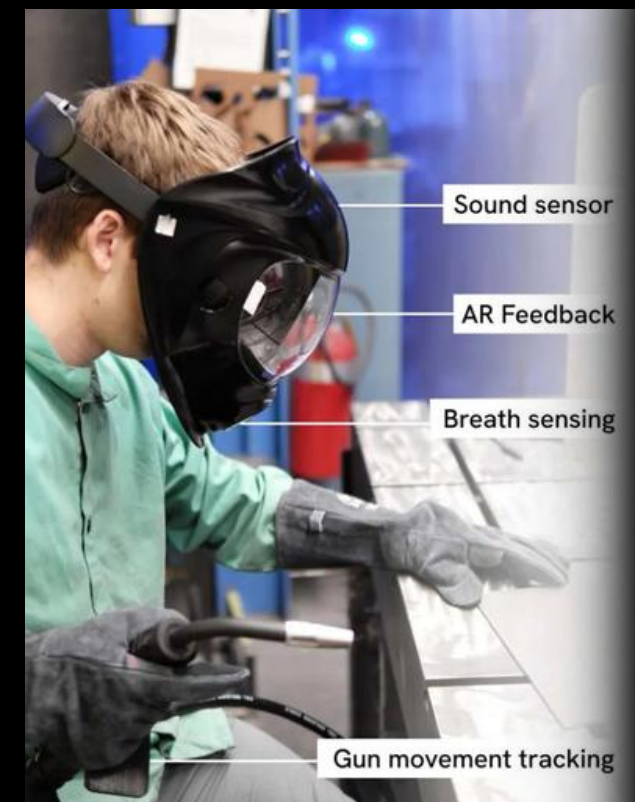
Needed in 2024



**Manufacturing
Futures
Institute**

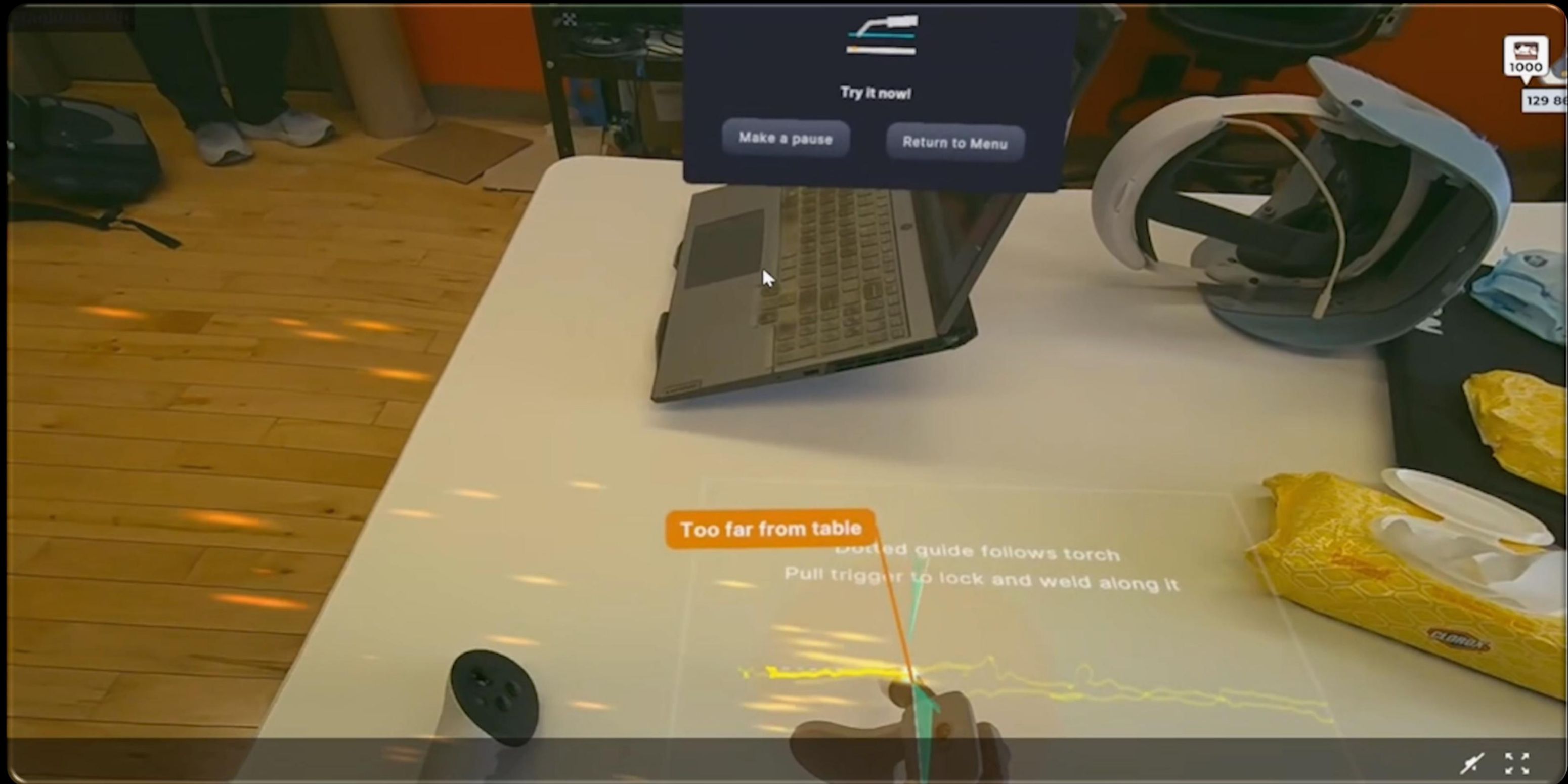
Professor Dina El-Zanfaly

School of Design, Carnegie Mellon University





WeldAR Demo





industrial arts
workshop



**Manufacturing
Futures
Institute**

Professor Dina El-Zanfaly

School of Design, Carnegie Mellon University



John Fulmer

*College of Engineering, Carnegie Mellon
University*

TechSpark 
A PLACE WHERE IDEAS ARE TRANSFORMED



The Question to Answer:

Will adding a **narrative-driven gamified experience** layer help?

- | | | |
|-------------------|-------------------|-----------------------|
| 1. | 2. | 3. |
| Motivation | Engagement | User Retention |



Our Project Goal

VR

Educational

Welding Simulation

Light Narrative

A gamified VR welding experience that transforms players from having little interest or confidence in welding into learners who develop genuine curiosity, confidence, and motivation to pursue welding more seriously.



Target Audience

Teens and young adults (ages 15–21) who are preparing to learn welding but currently lack interest, confidence, or prior experience.





Final Deliverable

A 15-minute single-player VR experience
featuring a complete, self-contained
narrative welding scenario.

Preliminary Research

1. How do we grasp the **feeling of welding** in a VR World?

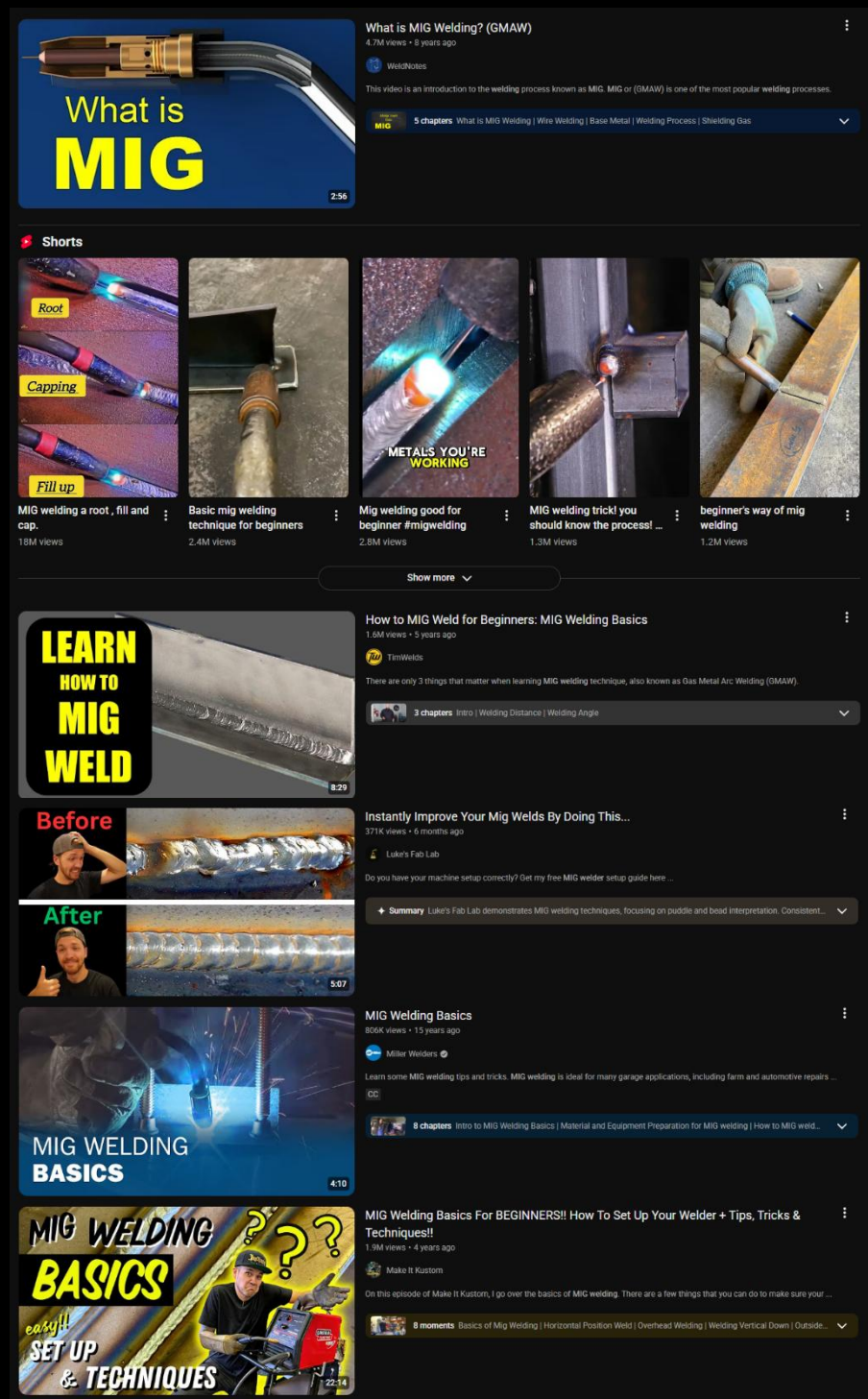




#1 VR Simulation



#2 Video



#3 IAW Workshop





Take-Aways

1. Clear instructions
2. Realistic visual and sound effects
3. The magic of sticking things together

WELDING METHOD: MIG



1. How do we grasp the feeling of **welding** in a VR World?
2. What activity makes welding **more engaging?**



**Make Your Own Art
Through Welding**



2. What activity makes welding more engaging?
3. What setting **fosters meaning and excitement** with welding?



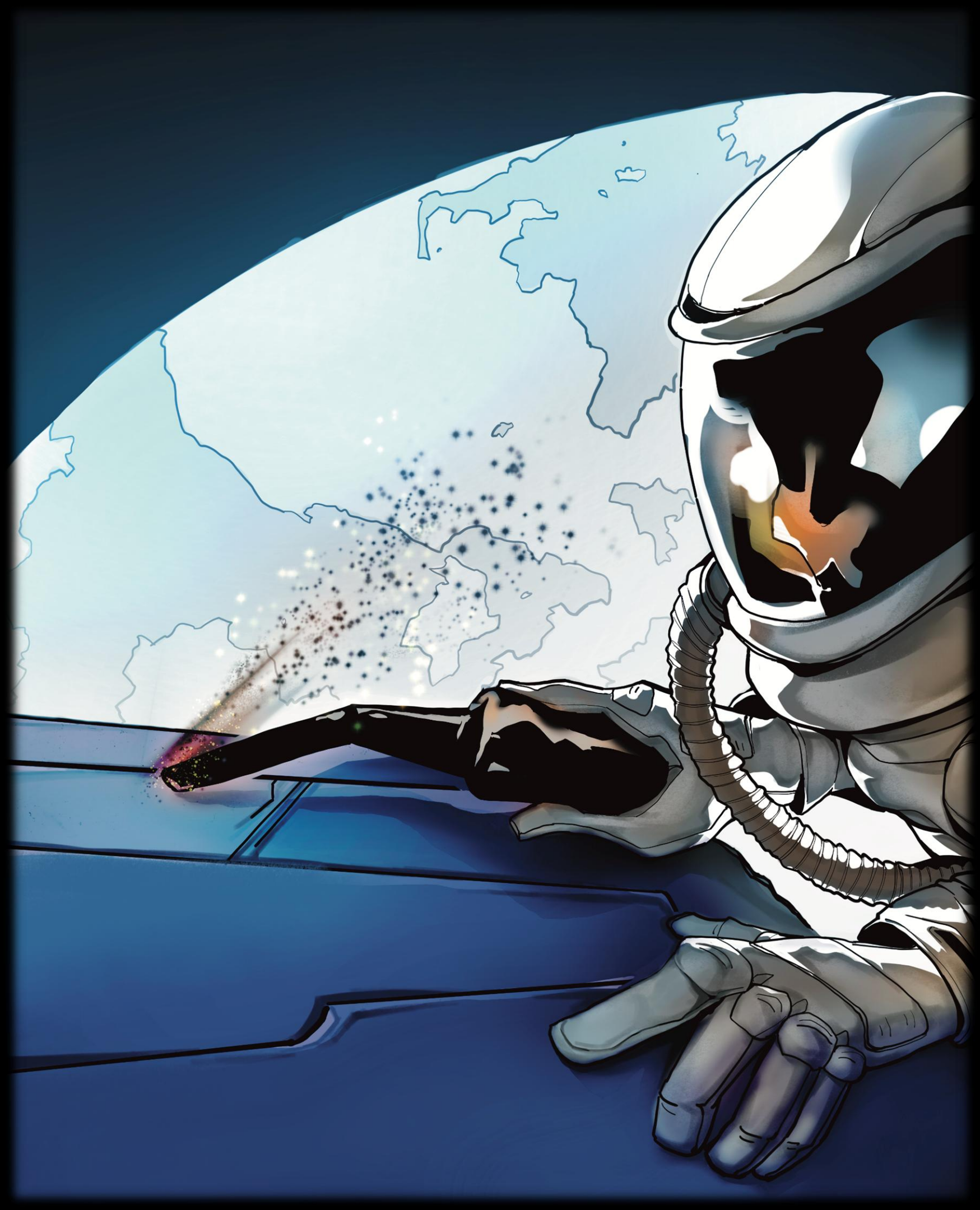
Realistic vs. Sci-Fi





Welding In Space

With a goal of fixing the spaceship to safely **return to the planet Earth.**





#1

Welding

Metal Scraps

Fuel Cell

#2

Safety

Helmet

Power Machine

#3

Evaluation

Stick Metal Pieces

Fill Cracks

#4

Create

Sculpture Room

Random Materials



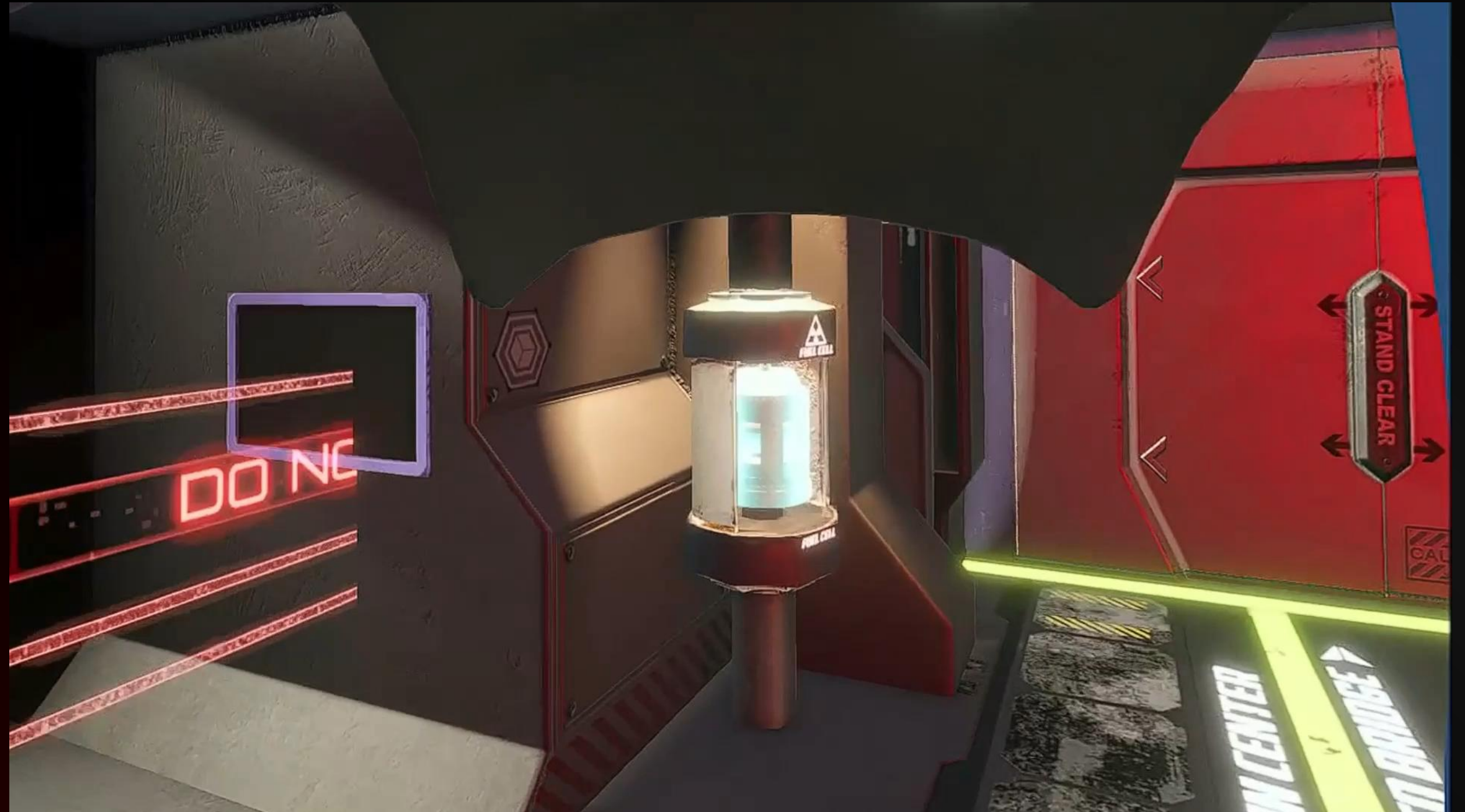
#1 Welding

"metal scraps"



#1 Welding

"fuel cell"





#2 Safety

"helmet"



#2 Safety

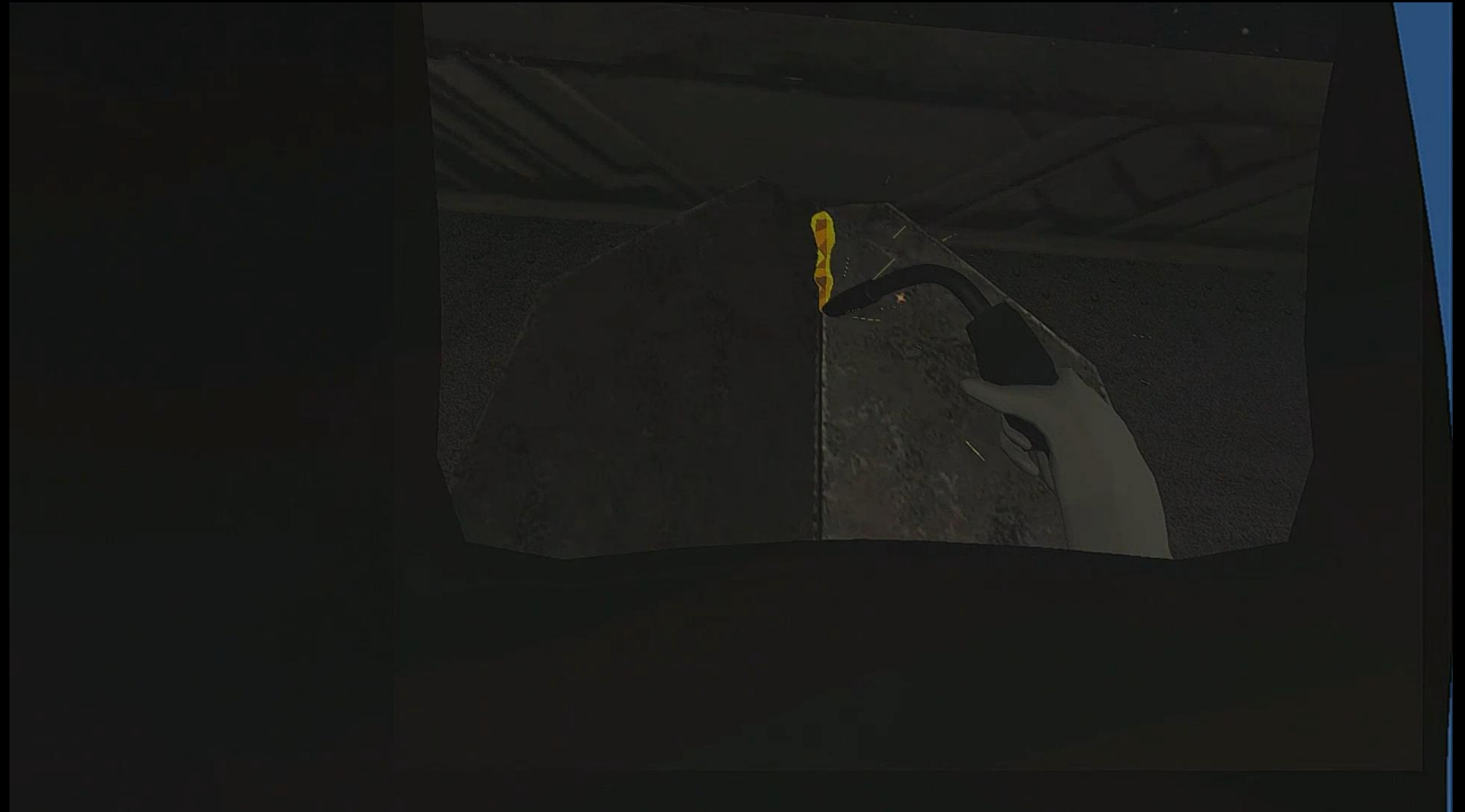
”power-on/off
welding machine”





#3 Evaluation

"metal scrap
submission"





#3 Evaluation

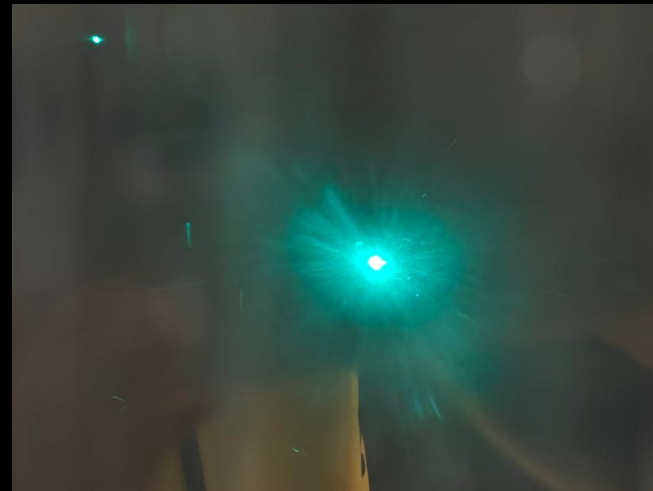
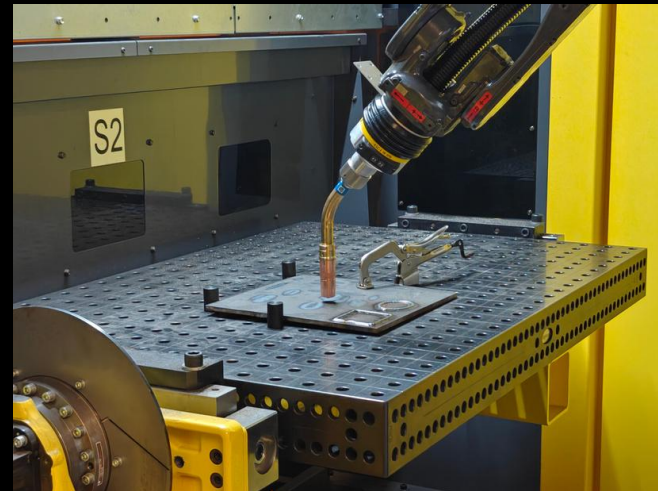
"fuel cell
glow, reinstall"



#4 Create

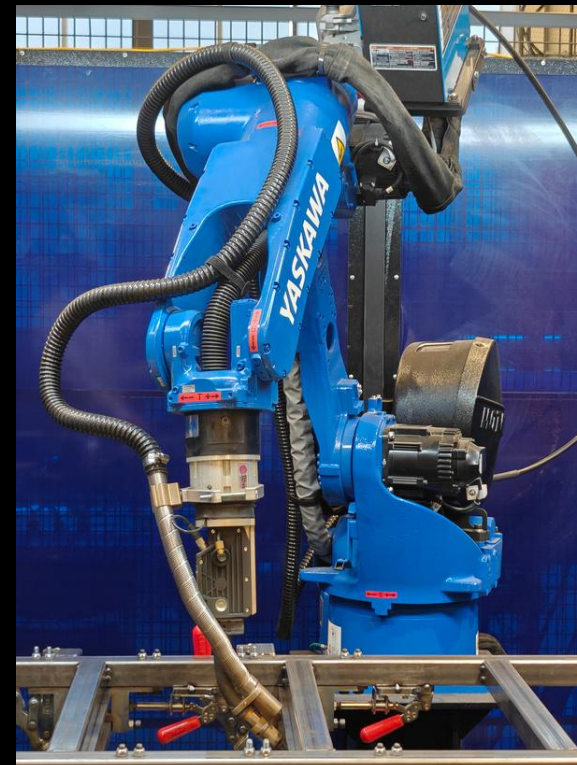
"sculpture"



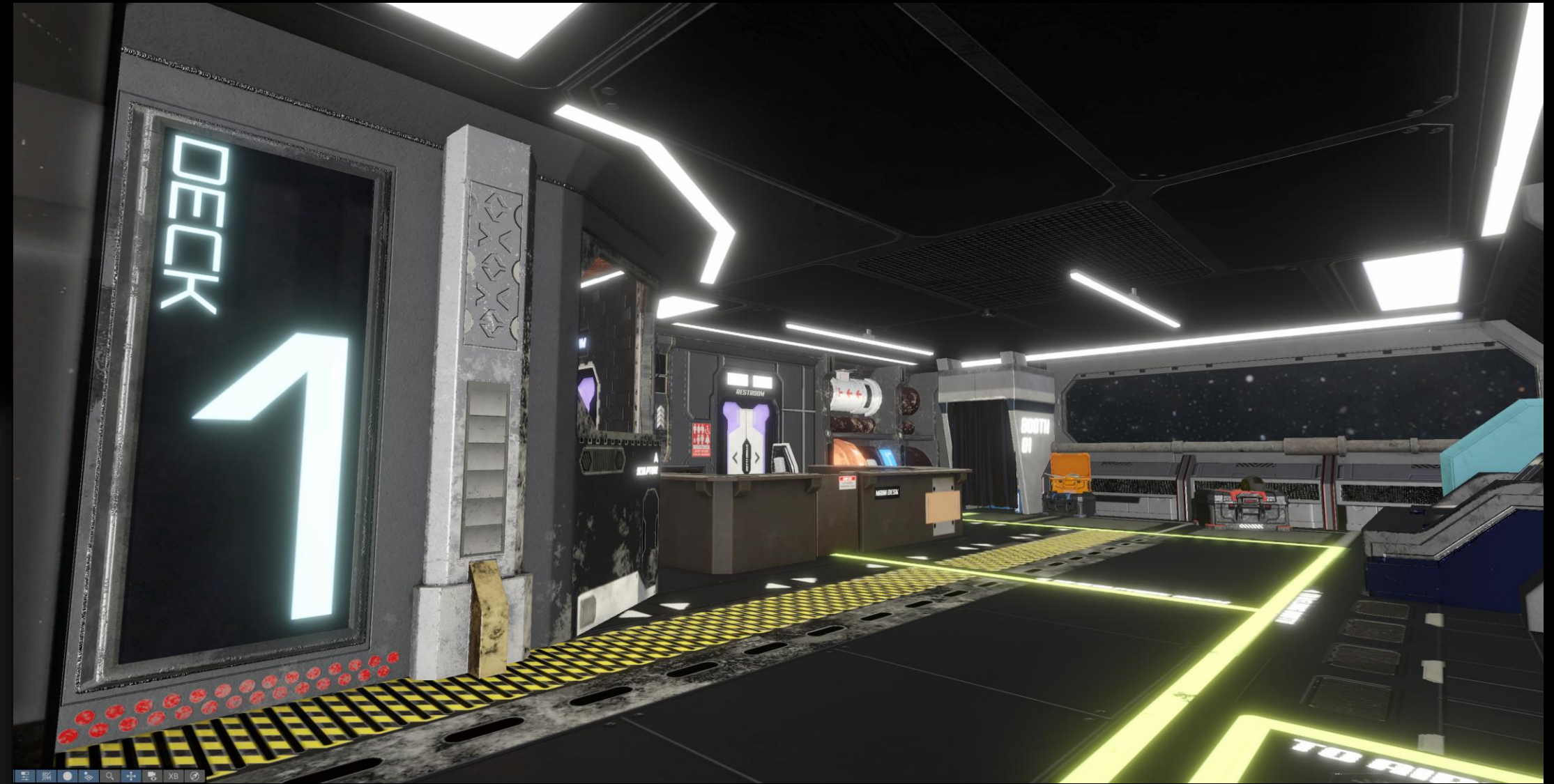
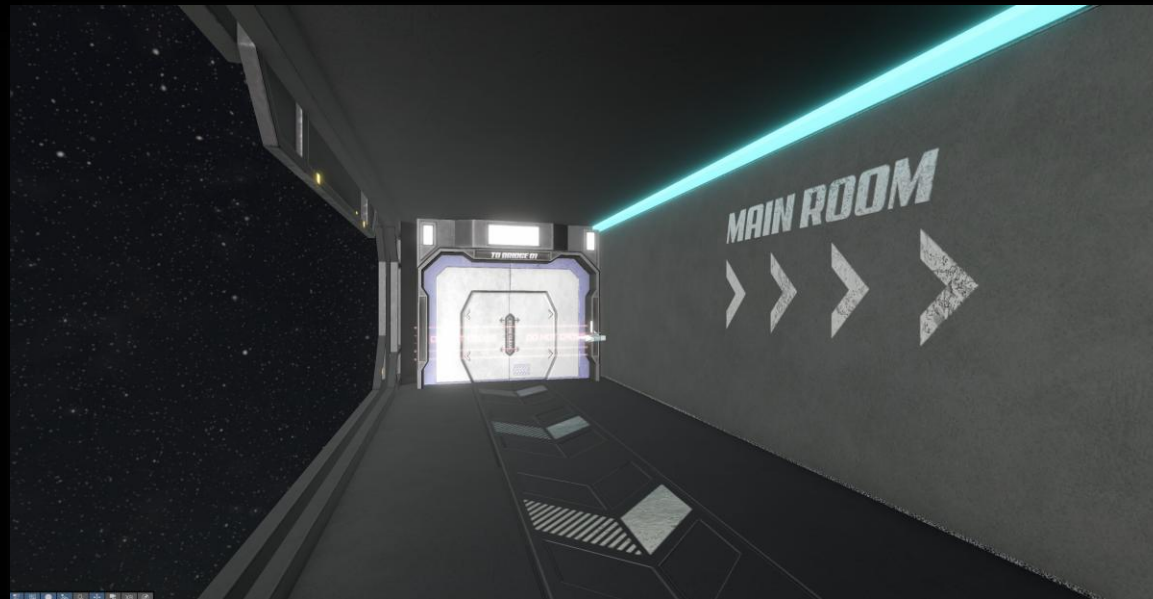


Art Assets

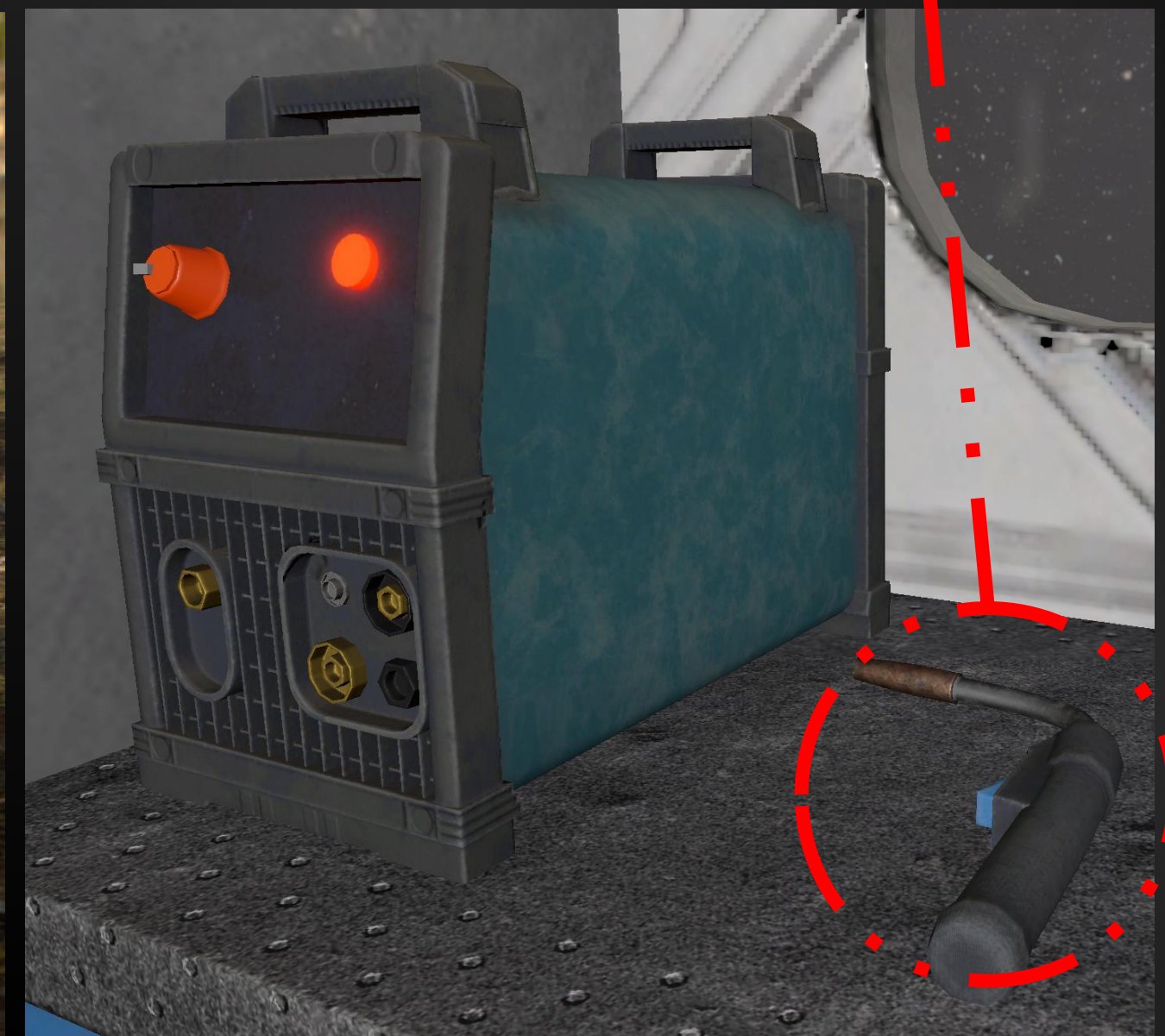
Site Visit @Mill 19 for Inspirations



#1 Environment



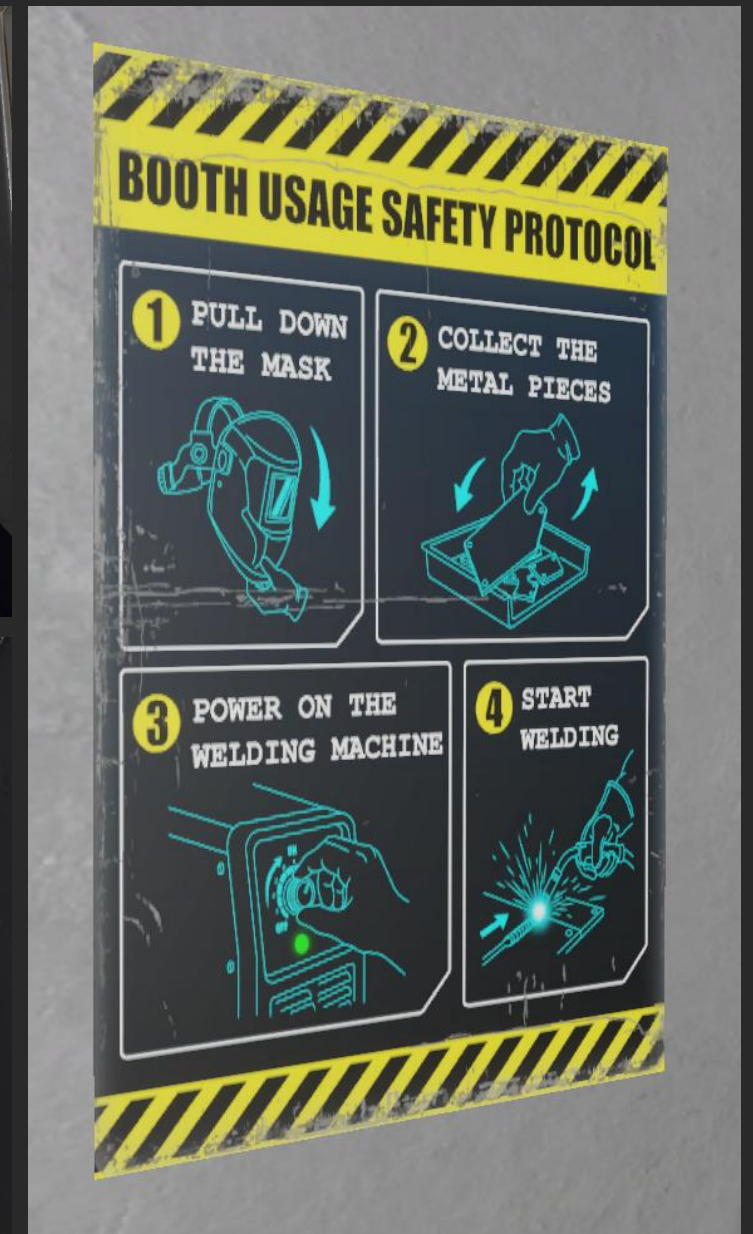
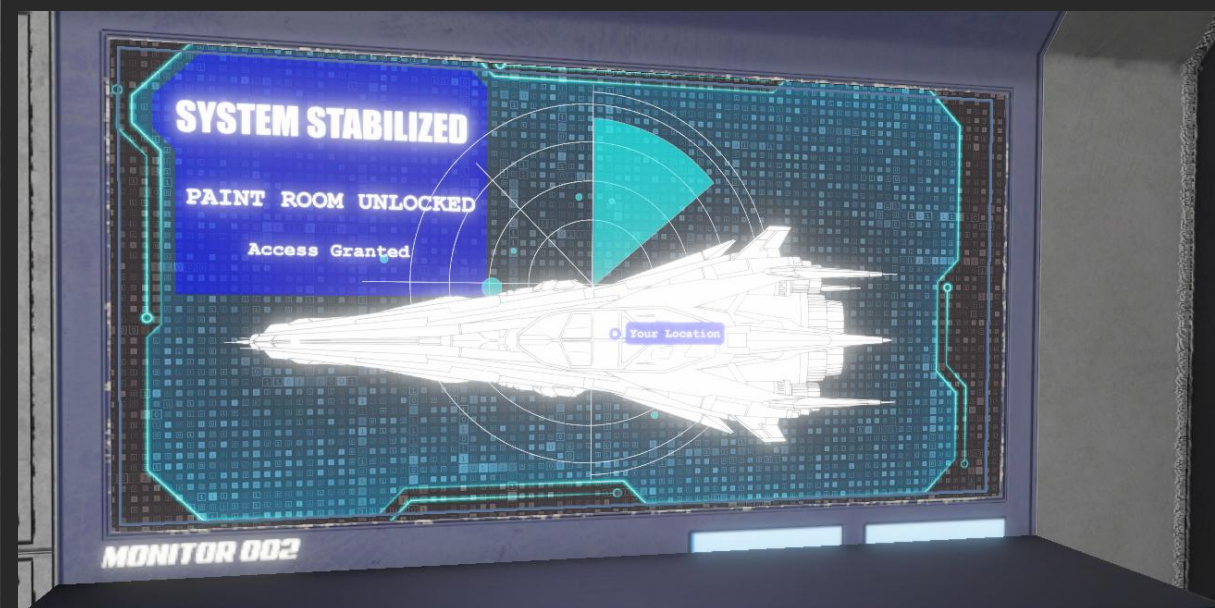
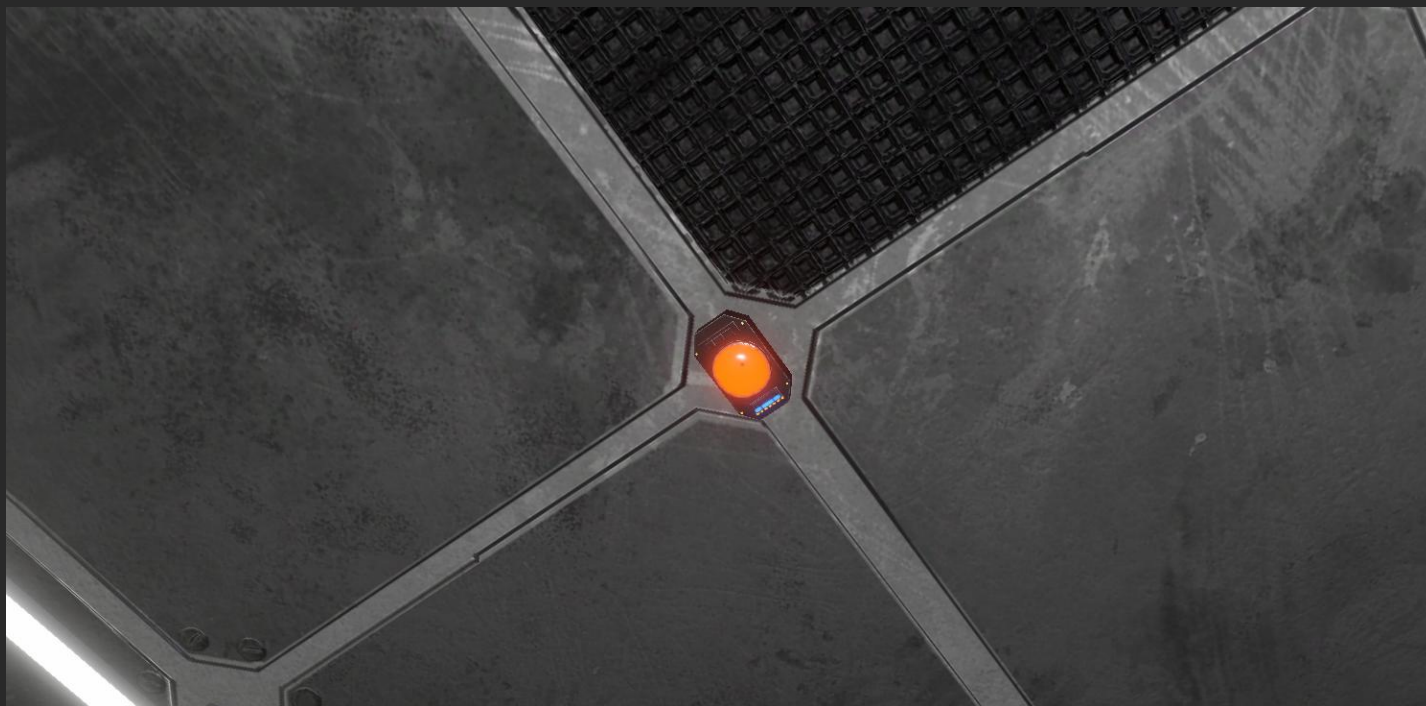
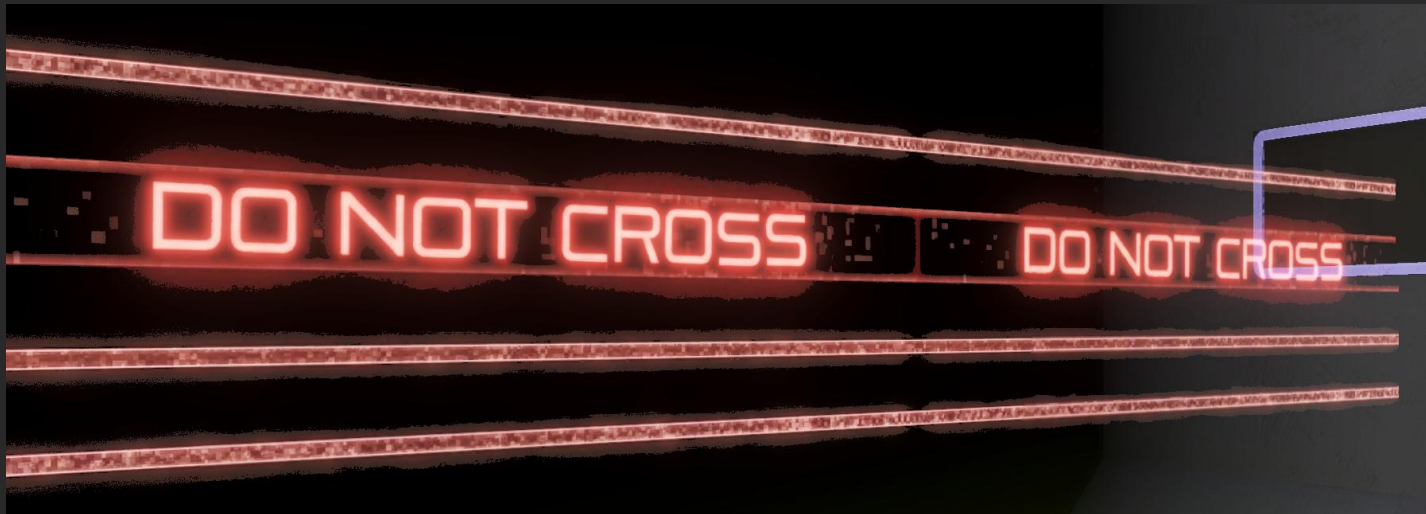
#2 Interactables



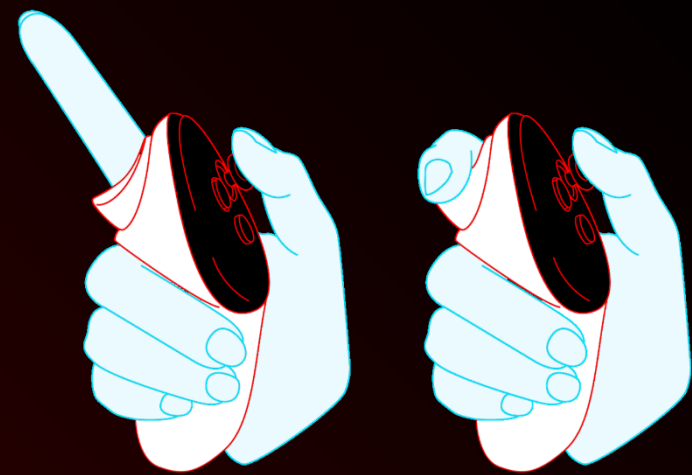
#3 Direction Indication



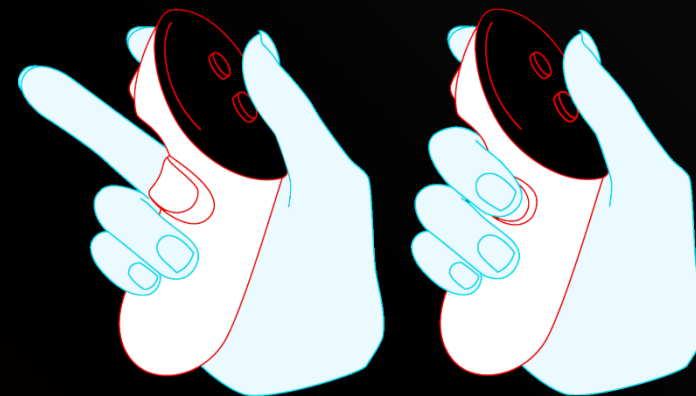
#4 Situational Instruction



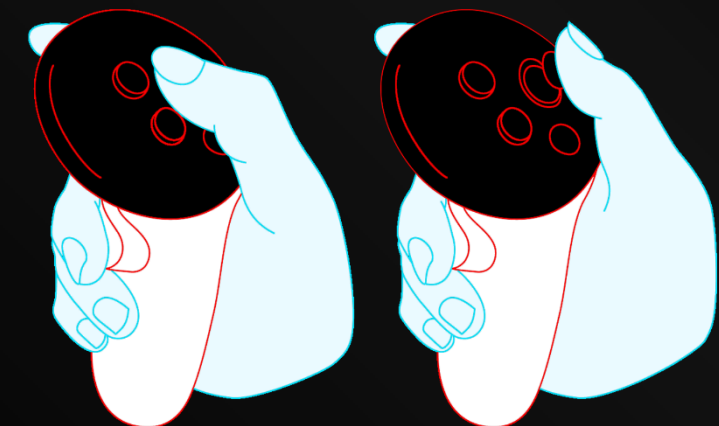
#5 Controller Instruction UI



1. Upper Trigger



2. Side Trigger

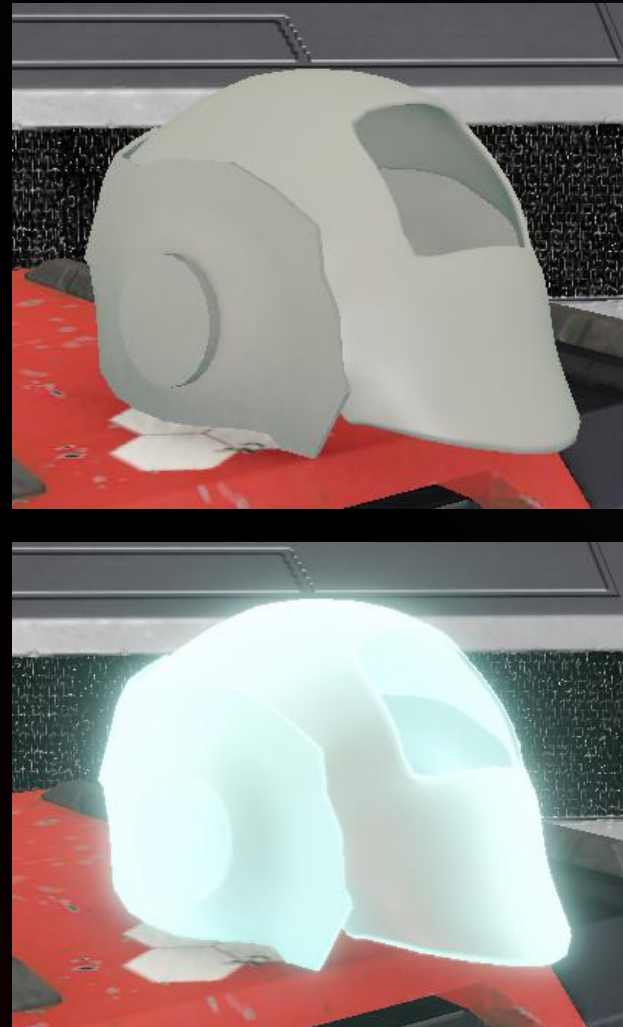
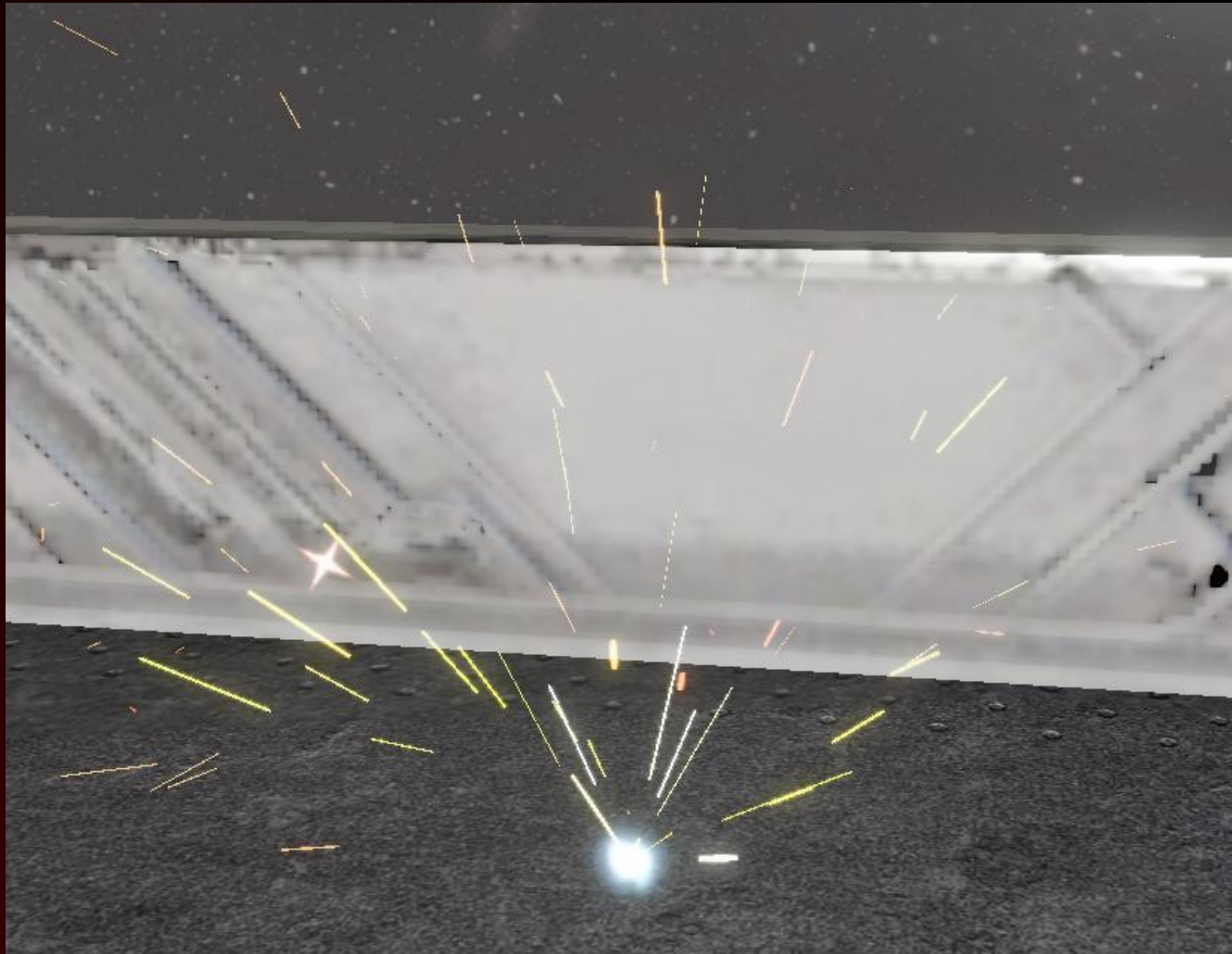


3. Joystick

#6 Asteroid



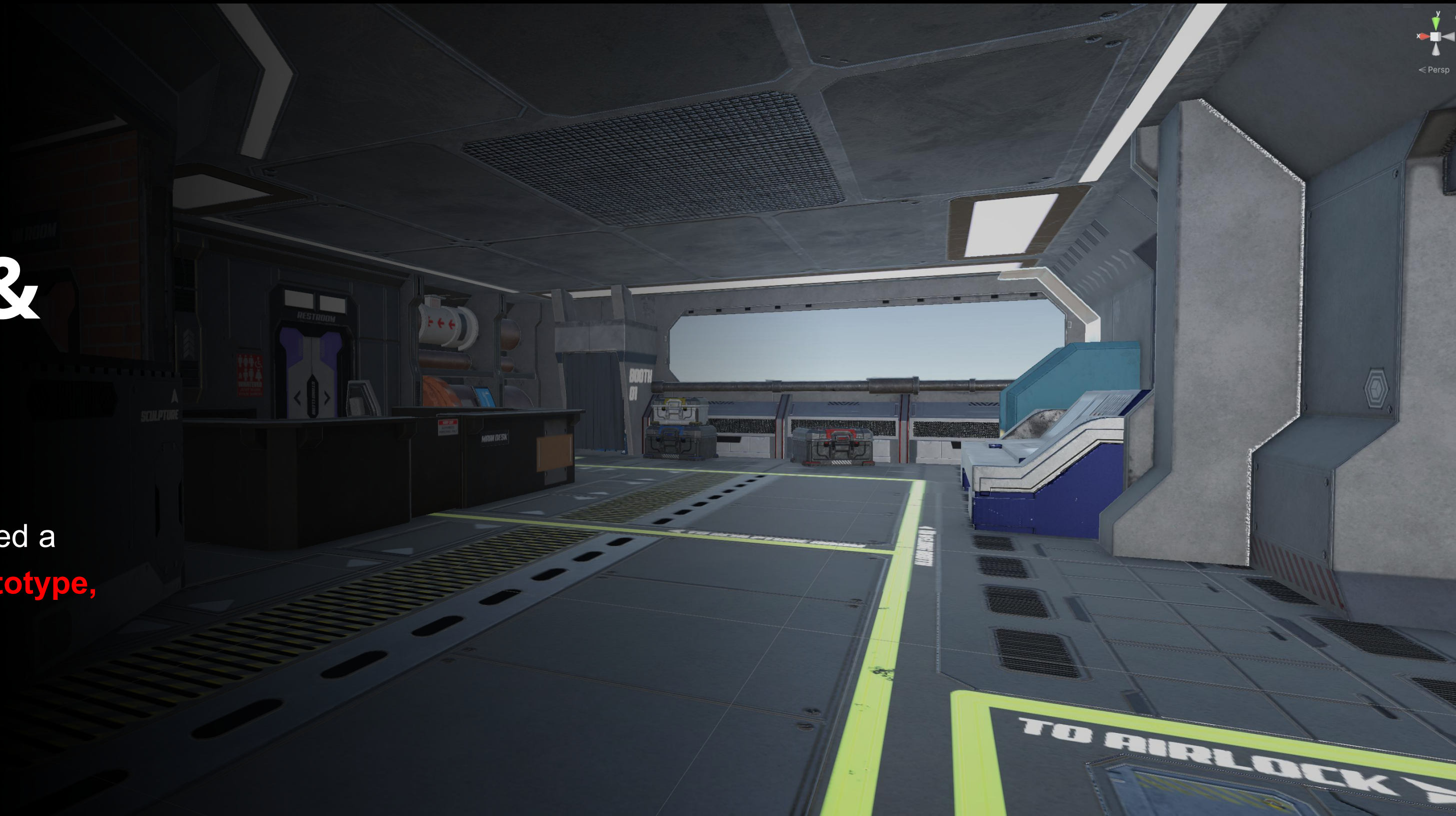
#7 Dynamics





Results & Impact

We successfully developed a **15-minute playable prototype**, achieving our MVP goal.





Evaluating our core question:

Can this experience actually transform
players' **feeling towards welding**?

1.

Confident

2.

Engaged

3.

Motivated



Playtests

- **March 11, Wed.**

GDC Present @ Moscone Center, 1:00 PM – 3:00 PM

- **March 12, Thu.**

Perry High School Playtest @ ETC, 11:00 AM - 12:00 PM

- **March 17, Tue.**

VIP from QF + CFA Advancement @ ETC: 9:00 AM - 12:00 PM

- **March 25, Wed.**

Welders Playtest @ IAW, 4:30 PM - 7:00 PM

- **March 28, Sat.**

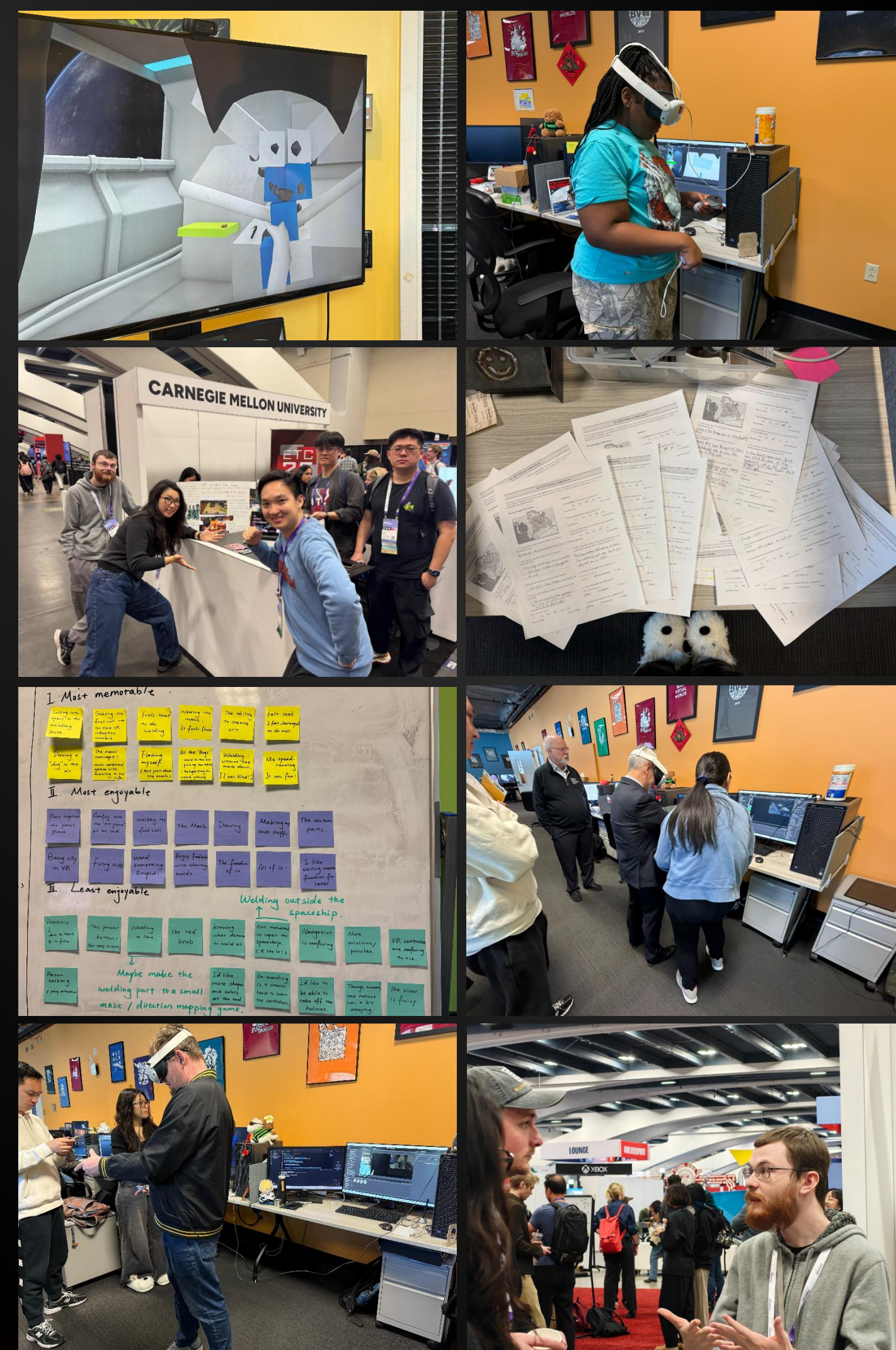
ETC Playtest Day @ ETC, 9:30 AM - 3:00 PM

- **Apr 13, Mon.**

Soft Openings @ETC, 2:00 PM – 6:00 PM

- **Apr 17, Mon.**

ETC Alumni Day, 3:00 PM – 4:30 PM

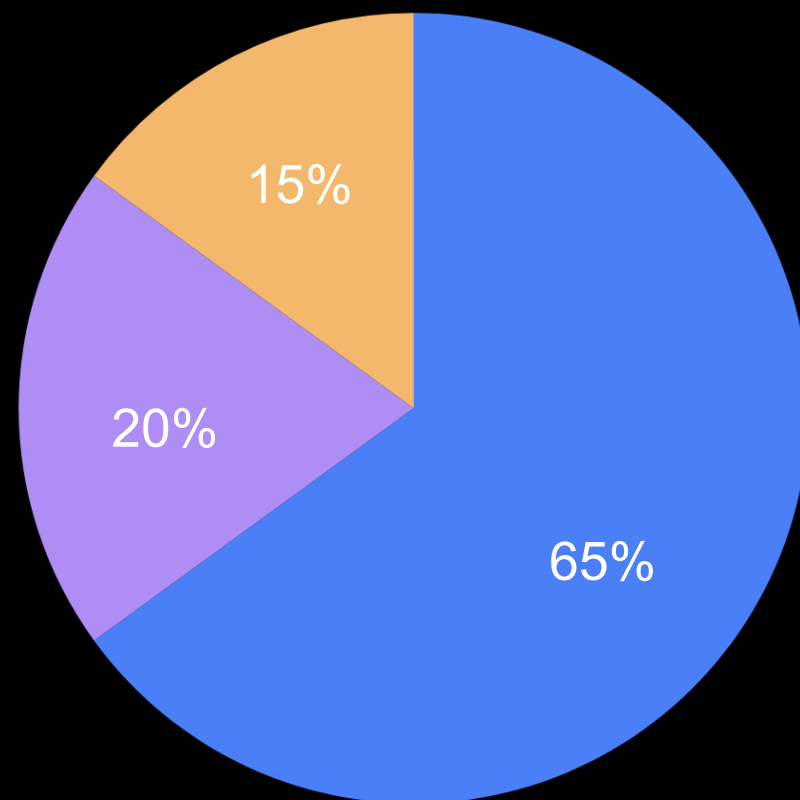




Playtest Data

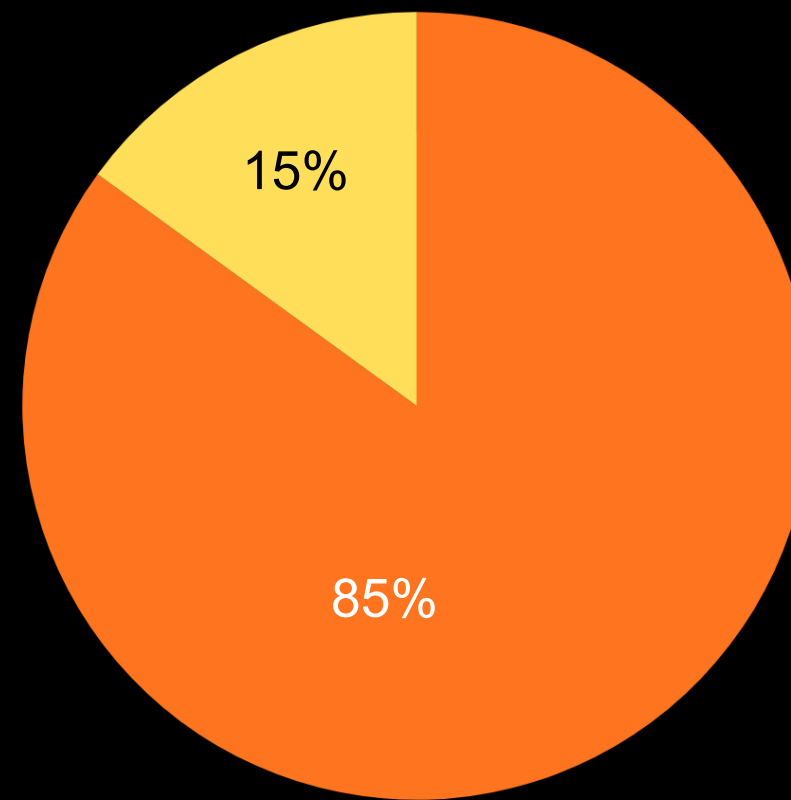
#1 Confident to Weld

- Very Confident
- Somewhat Confident
- Confused about Welding



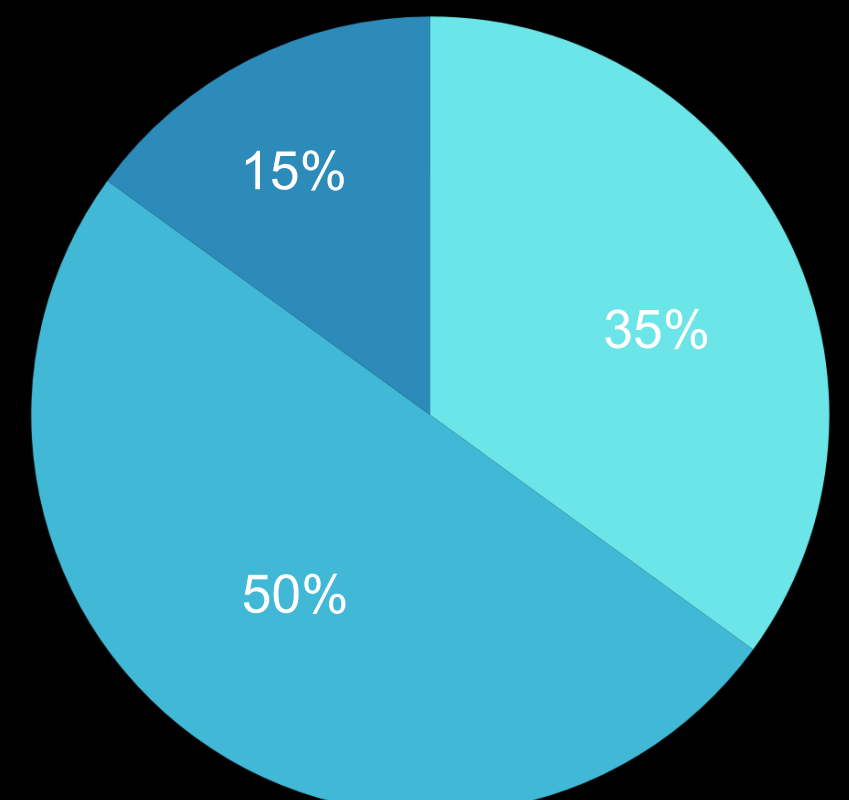
#2 Engage with Welding

- Explicitly named "Welding" as favorite part
- Named other features (Tether, Visual, etc.)



#3 High Motivation

- Highly Motivated
- Motivated
- Neutral to Unmotivated





Hypothesis Validated

Adding narrative and gameplay to welding simulation can largely **improve engagement** and **motivation.**





Next Action

Share our final build with Professor Dina El-Zanfaly and Industrial Arts Workshop (IAW)



Professor Dina El-Zanfaly

School of Design, Carnegie Mellon University



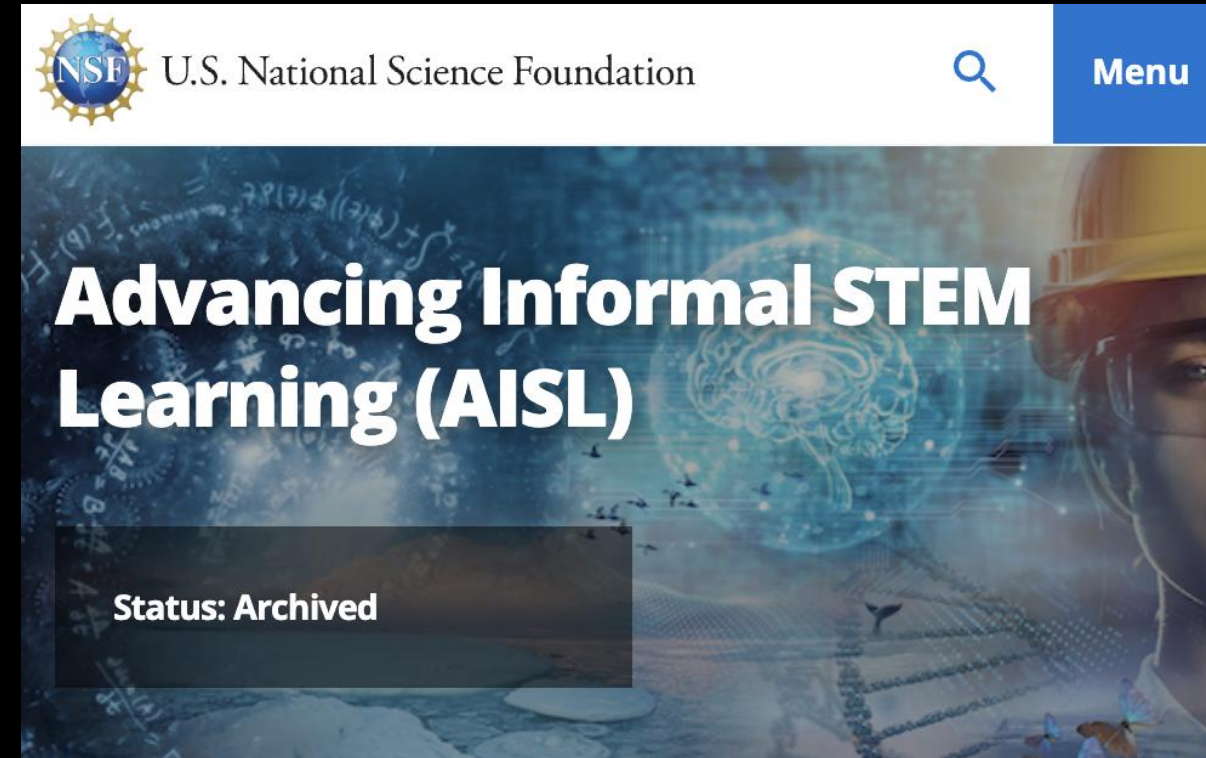
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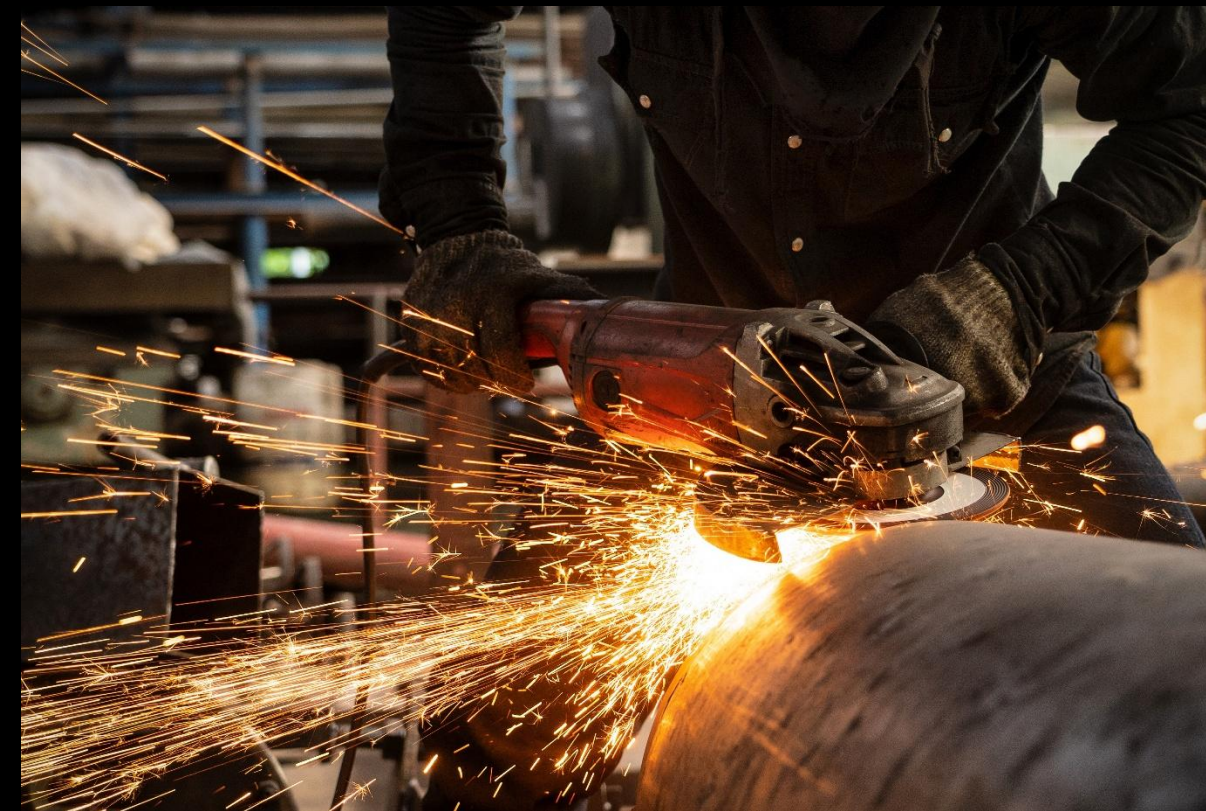
Future Vision



#1
**Expand the
Gameplay**



#3
**Hit A
Larger
Goal**



#2
**Add More
Mechanics**



**Thank you for
watching!**





Our Team



Yuelin Liu

Producer
UX Designer



Barry Yuan

Technical Artist
Assistant Producer



Ethan Wills

Game Designer
Sound Designer



Alvin Li

3D Artist
Technical Artist



Zelin Chen

Technical Designer
Concept Artist



Faculty Advisors



Derek Ham



Scott Stevens

Consultant



Jonathan Walton



Contact

Visit our website:

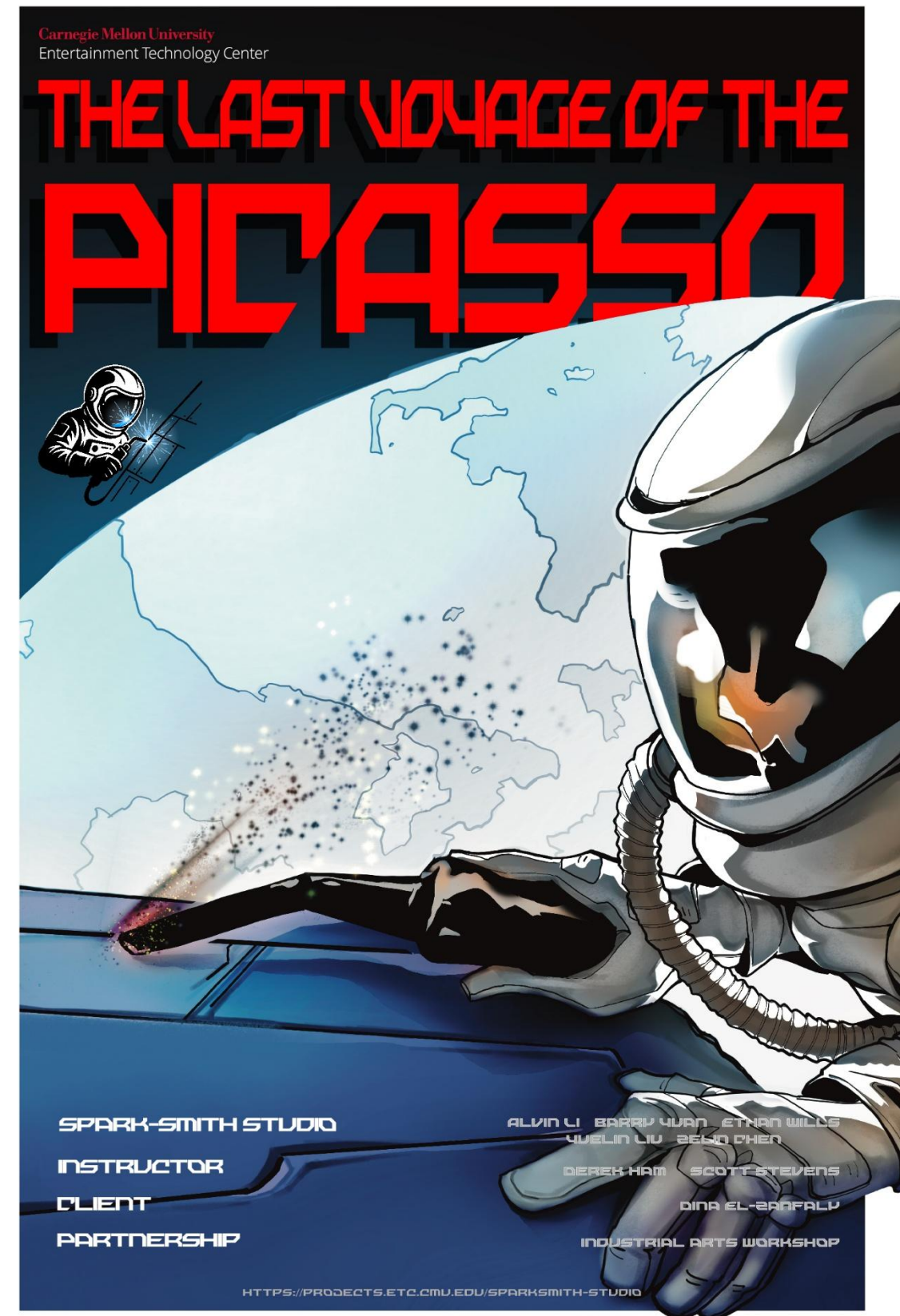
<https://projects.etc.cmu.edu/u/sparksmith-studio/>



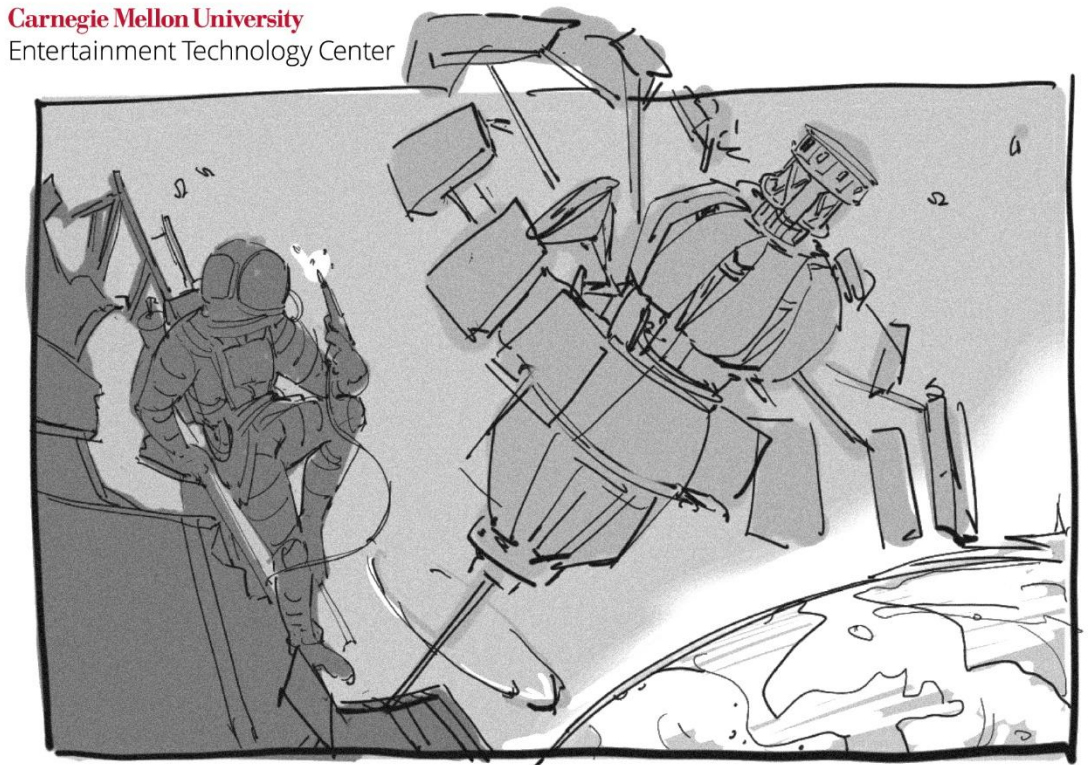
Get in touch:

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Carnegie Mellon University
Entertainment Technology Center



WHAT ARE WE BUILDING?

A narrative-driven VR Welding experience where players embody a maintenance worker repairing a damaged spacecraft. By integrating real welding mechanics with light narrative structure and escalating challenges, the project explores how storytelling and gamification can improve learning engagement, confidence and long-term user retention.

LEARNING & RESEARCH INTENT

1. Investigates how narrative and gamification impact welding skill learning
2. Focus on confidence-building and motivation for beginners



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[HTTPS://PROJECTS.ETC.CMU.EDU/SPARKSMITH-STUDIO](https://projects.etc.cmu.edu/sparksmith-studio)