

Guess Who?

with VEX AIM

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15-494: Cognitive Robotics Final Project, Carnegie Mellon University



"Guess Who? is a two-player board game in which players each guess the identity of the other's chosen character." – Wikipedia



I taught Celeste how to play.

Approach

Physical Game

How can I make the classic board game accessible to Celeste while still being fun and engaging for a human opponent?

Navigation

How will Celeste traverse the cards?

Prompt Generation

How will Celeste ask questions to her opponent to narrow down her guessing pool?

Prompt Response

How will Celeste accurately, fairly, and consistently respond to questions from her opponent?

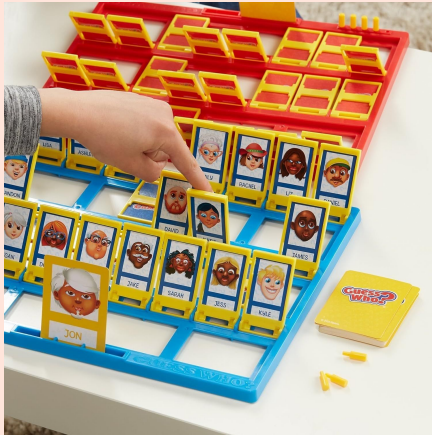
When to Guess

How will Celeste know when to make a guess?

First, I considered **accessibility**

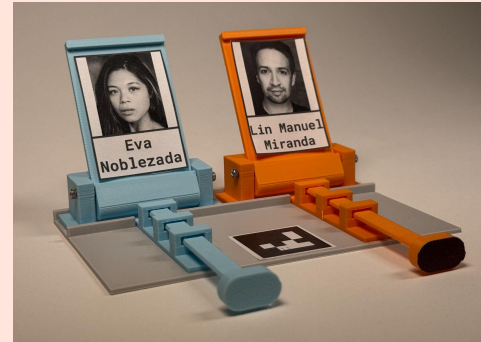
Problem:

Pulling the cards **down** from the top isn't possible for Celeste due to her lack of limbs.



Solution:

I designed and fabricated cards with pushers for her to bump into in order to knock them down in a way that still keeps them hidden from her opponent



First, I considered **accessibility**

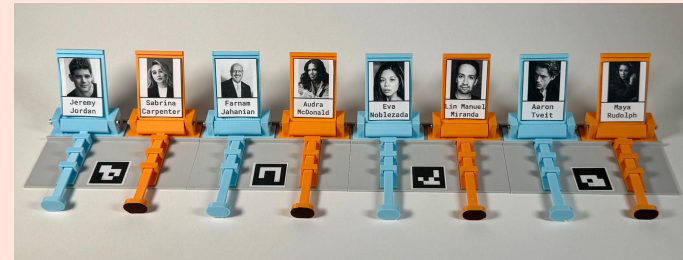
Problem:

Viewing **rows** of cards isn't possible for Celeste due to her height.

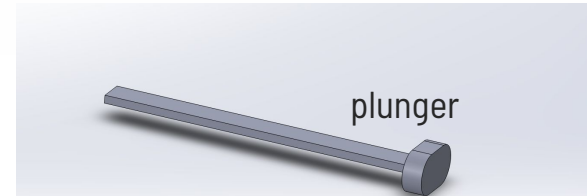
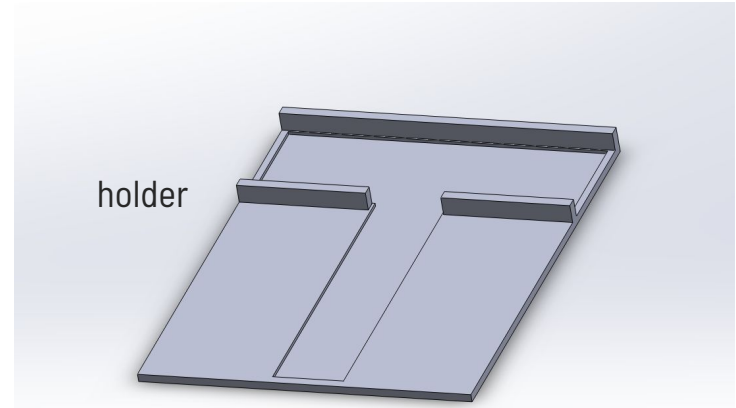
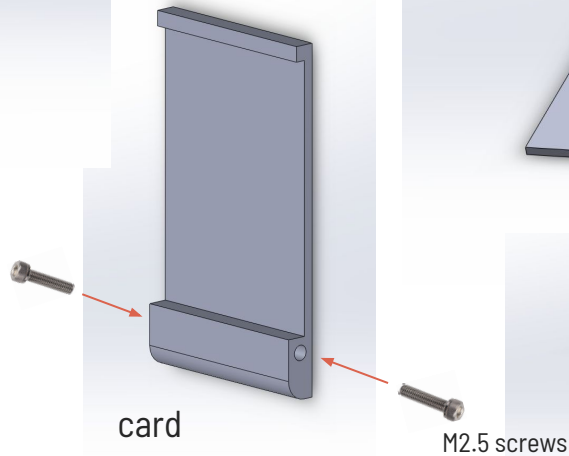
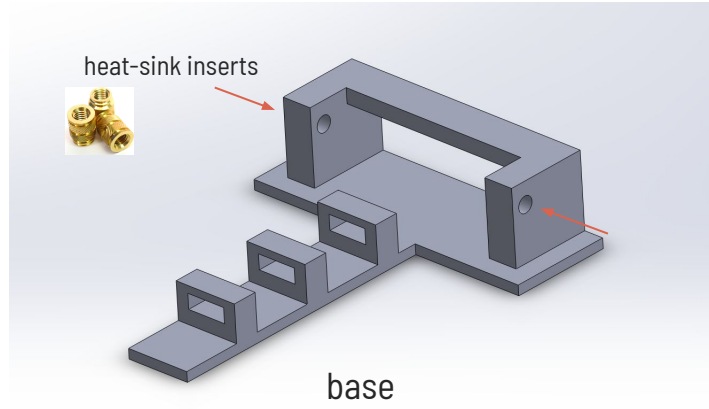


Solution:

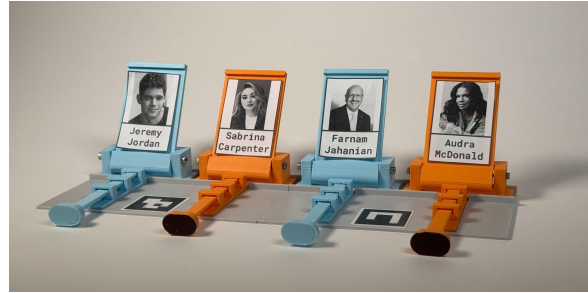
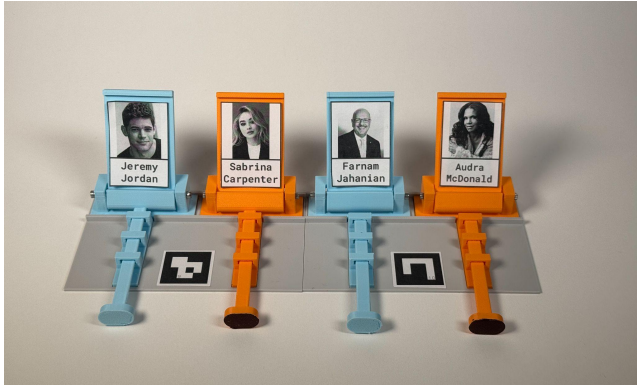
I decreased the number of cards in the game and spread them out in one line that she can easily traverse.



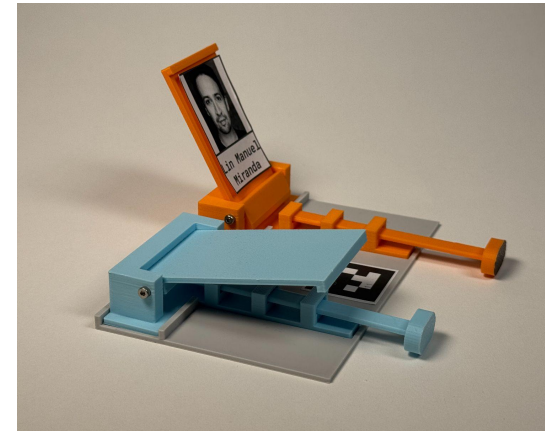
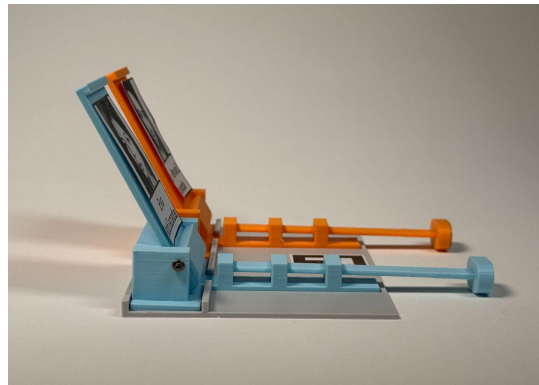
More Images



More Images



fun fact: Celeste thought the ends of the orange pushers were orange barrels, so I sharpened them



Next up: Navigation

One ArucoMarker per set

I utilized the PilotToPose class to get Celeste to the marker, then applied a shift based on which character she wanted to eliminate.

Centering

I wrote a CenterAboutMarker class* that used vectors (tvec, rvec) from the camera to do small left/right adjustments until Celeste was centered about the card she wanted to eliminate.

*arguably the most interesting aspect of my solution

```
name_to_marker = {  
    "JeremyJordan": "ArucoMarker-9.a",  
    "SabrinaCarpenter": "ArucoMarker-9.a",  
    "FarnamJahanian": "ArucoMarker-10.a",  
    "AudraMcDonald": "ArucoMarker-10.a",  
    "EvaNoblezada": "ArucoMarker-11.a",  
    "LinManuelMiranda": "ArucoMarker-11.a",  
    "AaronTveit": "ArucoMarker-12.a",  
    "MayaRudolph": "ArucoMarker-12.a"  
}
```

```
name_to_shift = {  
    "JeremyJordan": 20,  
    "SabrinaCarpenter": -20,  
    "FarnamJahanian": 20,  
    "AudraMcDonald": -20,  
    "EvaNoblezada": 20,  
    "LinManuelMiranda": -20,  
    "AaronTveit": 20,  
    "MayaRudolph": -20  
}
```


Prompts: Generation and Response

A cheat sheet... for both players.

I gave Celeste bios for all of the people in the game, and I also formatted the bios to be given to her opponent as well.

This way, you don't need to be familiar with the people on the cards to play.

When there is one person left in her guessing pool, Celeste will guess!

Roll Call: Who's Who

Jeremy Jordan ★ Broadway and TV actor ★ Known for <i>Newsies</i>, <i>Supergirl</i>, <i>Smash</i>	Sabrina Carpenter ★ Pop singer and actress ★ Former Disney Channel star (<i>Girl Meets World</i>)	Fernando J. J. J. ★ President of Carnegie Mellon University ★ Computer scientist, entrepreneur, and academic	Audra McDonald ★ Broadway legend and opera-trained singer ★ 6-time Tony Award winner (<i>Porgy and Bess</i>, <i>Ragtime</i>)
Eva Noblezada ★ Broadway actress and singer ★ Starred in <i>Miss Saigon</i>, <i>Hedwig and the Angry Inch</i>	Lin-Manuel Miranda ★ Actor, composer, lyricist, producer, director, playwright ★ Wrote and starred in <i>Hamilton</i>, <i>In the Heights</i>	Aaron Tveit ★ Broadway and TV actor ★ Starred in <i>Catch Me If You Can</i>, <i>Moulin Rouge!</i>, <i>Grease Live!</i>	Maya Rudolph ★ Comedian and actress ★ Known for <i>Saturday Night Live</i>, <i>Bridesmaids</i>

Cheat Sheet: Guessing Guide

Some groupings to get you started...

Men - Jeremy Jordan - Fernando J. J. J. - Lin-Manuel Miranda - Aaron Tveit	Women - Sabrina Carpenter - Audra McDonald - Eva Noblezada - Maya Rudolph	Tony, Grammy, or Emmy - Audra McDonald - Lin-Manuel Miranda - Maya Rudolph	Broadway - Jeremy Jordan - Audra McDonald - Eva Noblezada - Lin-Manuel Miranda - Aaron Tveit
VEX Robotics Carnegie Mellon University	TV - Sabrina Carpenter - Maya Rudolph - Jeremy Jordan	Good Luck!	

Results

What worked?

- Physical game
- PilotToPose was indispensable!
- CenterAboutMarker works well
- Mostly, she functions as intended

What didn't work?

- Sometimes, Celeste will tell you that it's your turn when it's actually her turn
- Sometimes, Celeste will not move forward enough to knock over a card. Theory: her distance sensing is thrown off by the flat ArucoMarkers.

Next Steps

- Play lots of *Guess Who?* to find the bugs that sometimes happen and fix them

Extensions

- Facial recognition
- Guess sooner if she is somewhat confident
- Re-localize and/or notify the user after getting lost

Video



~2.5 min video of ~6 min game



Thank you!

Does anyone have any questions?

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