

# *Team 6: Katamari Seigyo*

**18-549: Embedded Systems Design**

Samantha Skinger

Paul Kennedy

Alex Liu

LisaMarion Garcia



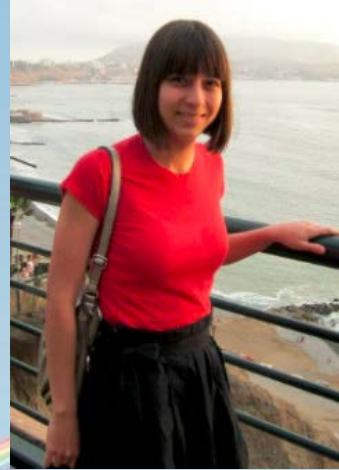
# Team Members



Samantha Skinger  
sskinger@andrew.cmu.edu



Paul Kennedy  
pmkenned@andrew.cmu.edu

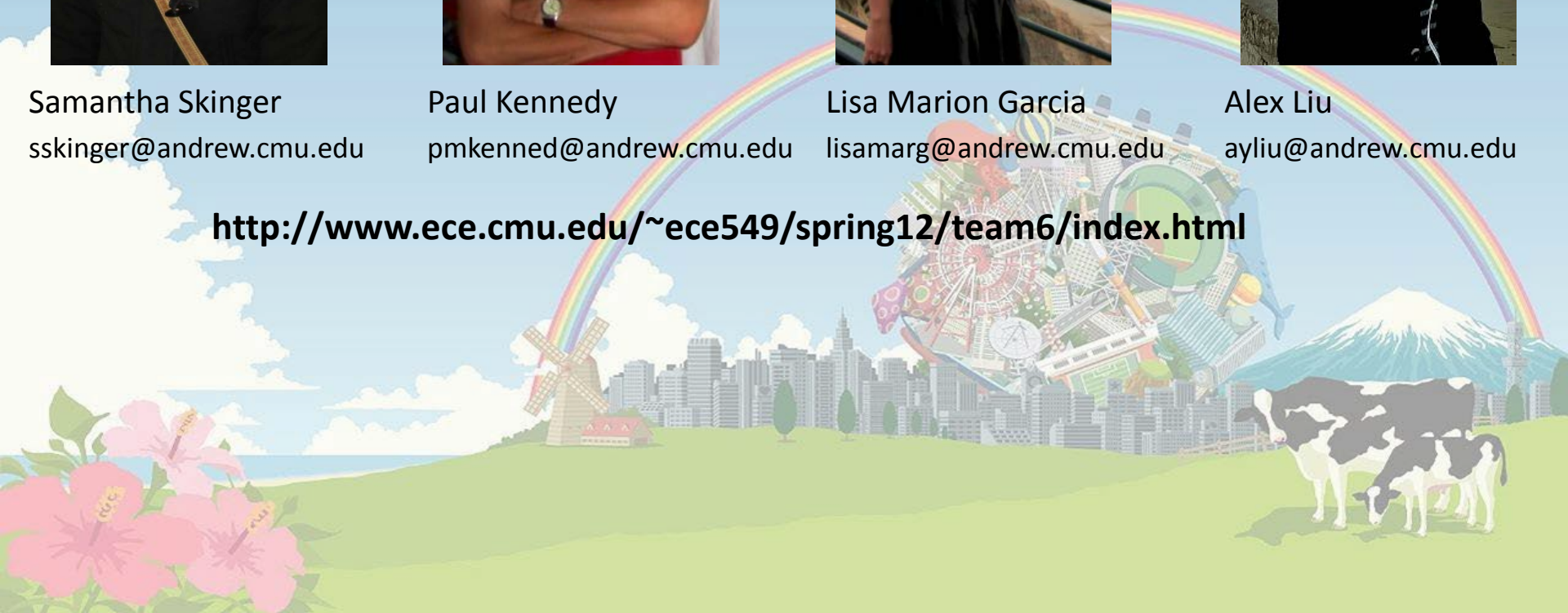


Lisa Marion Garcia  
lisamarg@andrew.cmu.edu



Alex Liu  
ayliu@andrew.cmu.edu

<http://www.ece.cmu.edu/~ece549/spring12/team6/index.html>



# Concept

- **Before:** Limited interaction with gaming console
- **After:** Console controller for a more interactive and immersive gaming experience
- Controller for the game “Katamari Damacy” and sequels\*
- Produced by Namco, praised by critics, sold 500,000 copies and maintained a steady flow of orders over two years \*
- Controller emulates Katamari, which is a ball
- Ball rests on ball bearings, full range of motion, 360 degrees of freedom monitored by two optical mice
- Comprehensive controller, does not need any add-ons
- No commercial equivalent for a gaming console

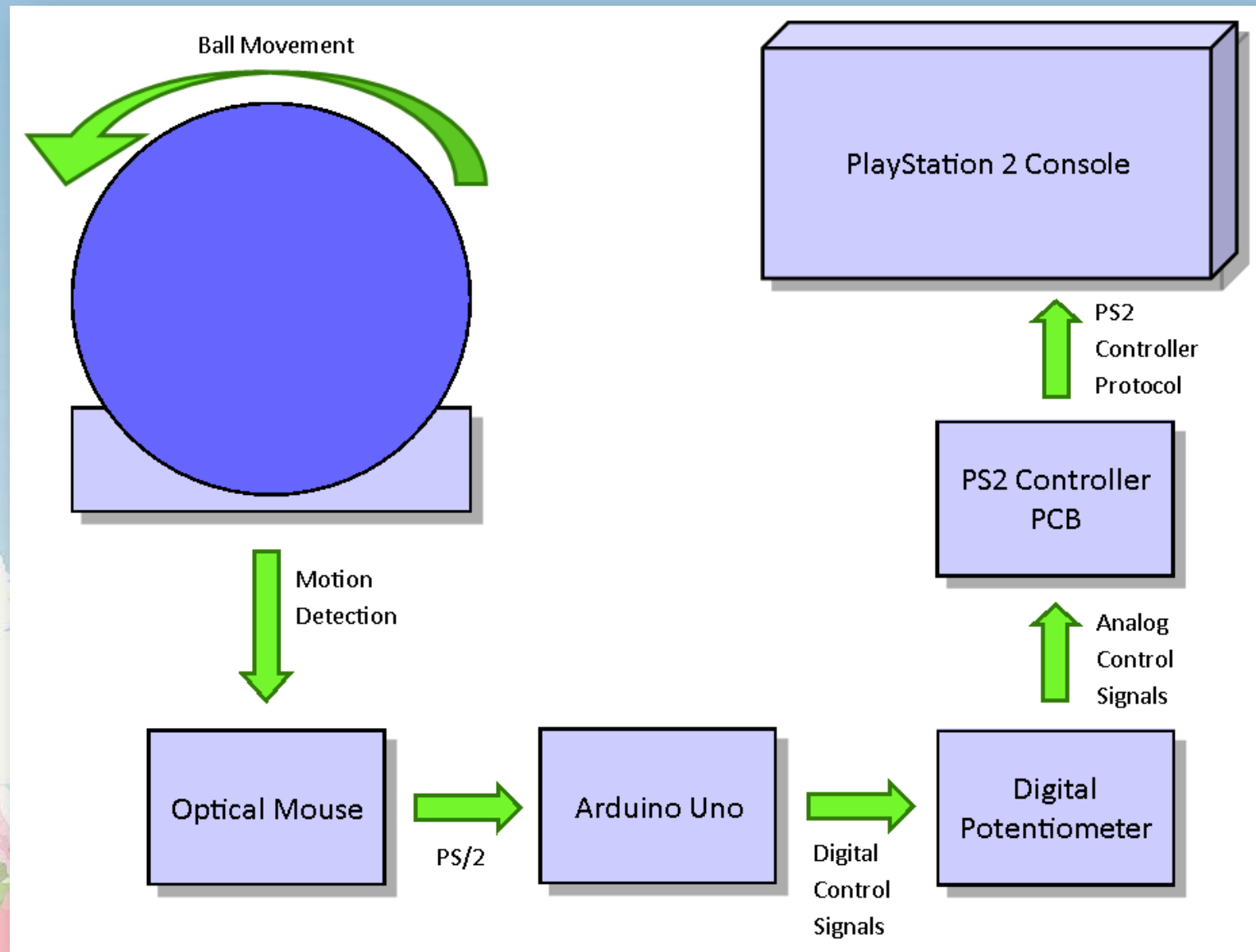
\* See appendix slide if you're unfamiliar

# Goals

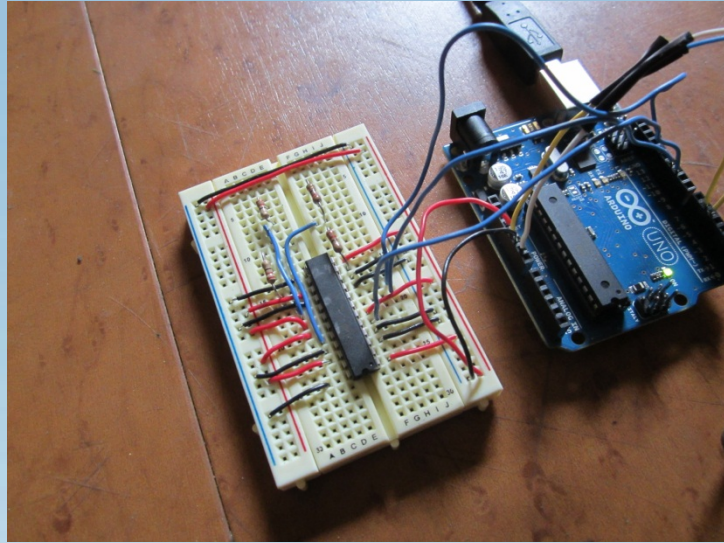
- 360 degrees rotation in any direction
- Fidelity to the game actions
- Wired PS2 connectivity
- Comprehensive game controls, including menu
- Physical stability of controller



# Architecture

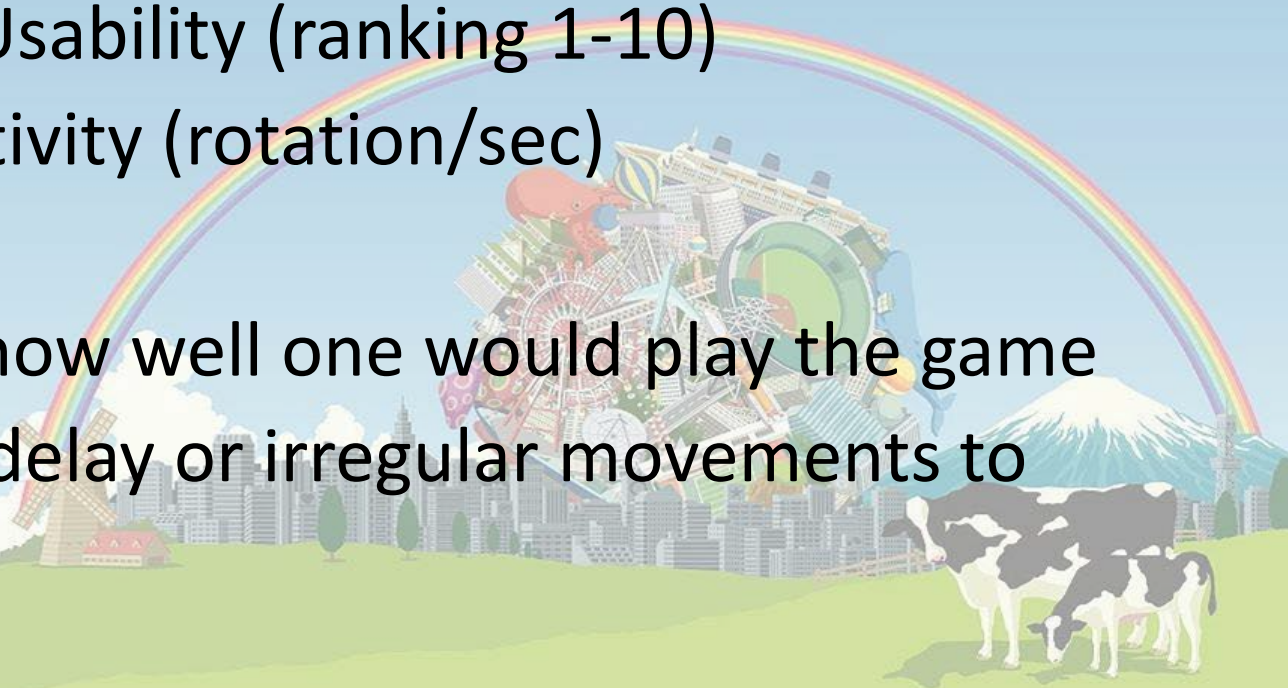


# Components



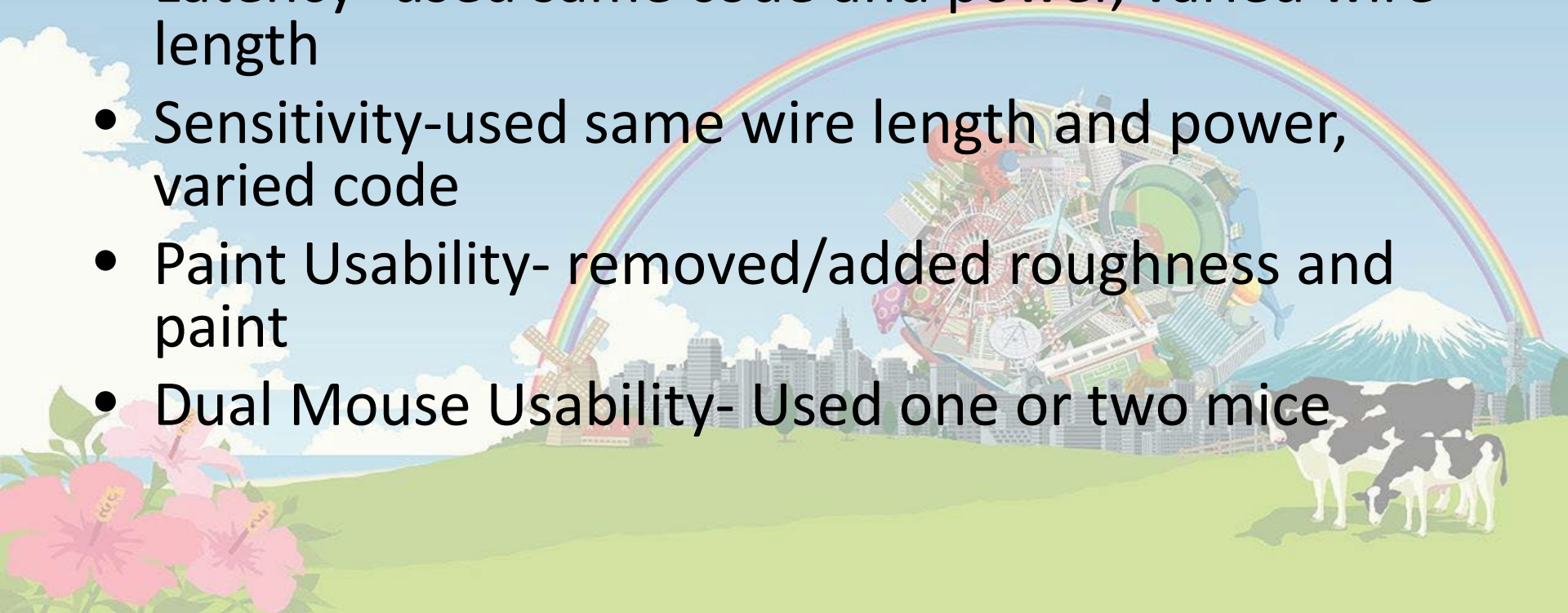
# *Experimentation Campaign*

- **Measured:**
- Latency (sec)
- Paint Usability (ranking 1-10)
- Dual Mouse Usability (ranking 1-10)
- Varying sensitivity (rotation/sec)
- **Relevancy?**
- These effect how well one would play the game
- Used to void delay or irregular movements to user



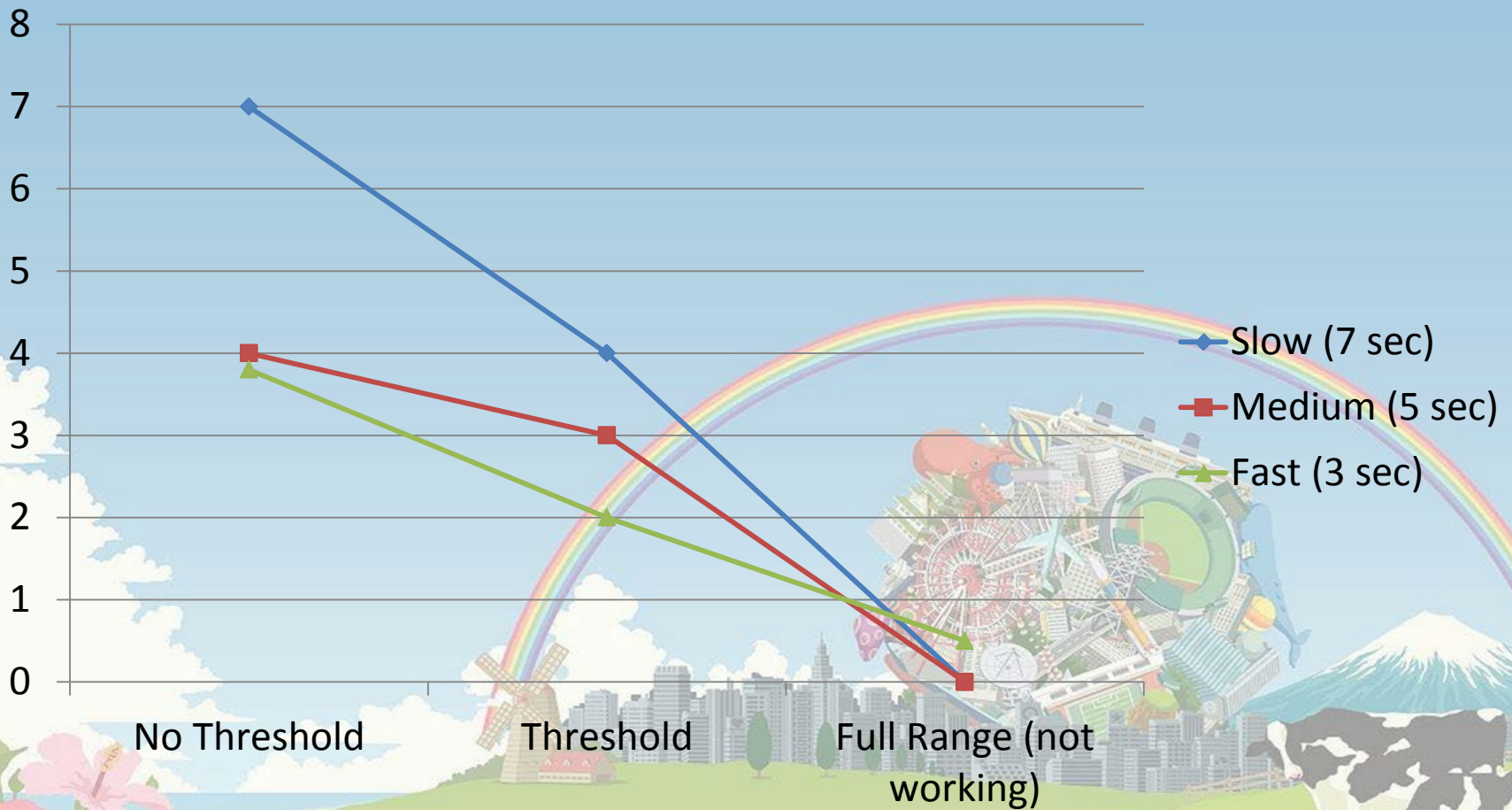
# *Experimentation Campaign Cont.*

- **Ensuring reproducibility**
- Room temperature: 69 °F.
- Maintained power from Lenovo Y570.
- Latency- used same code and power, varied wire length
- Sensitivity-used same wire length and power, varied code
- Paint Usability- removed/added roughness and paint
- Dual Mouse Usability- Used one or two mice





# Experimental Results-Sensitivity

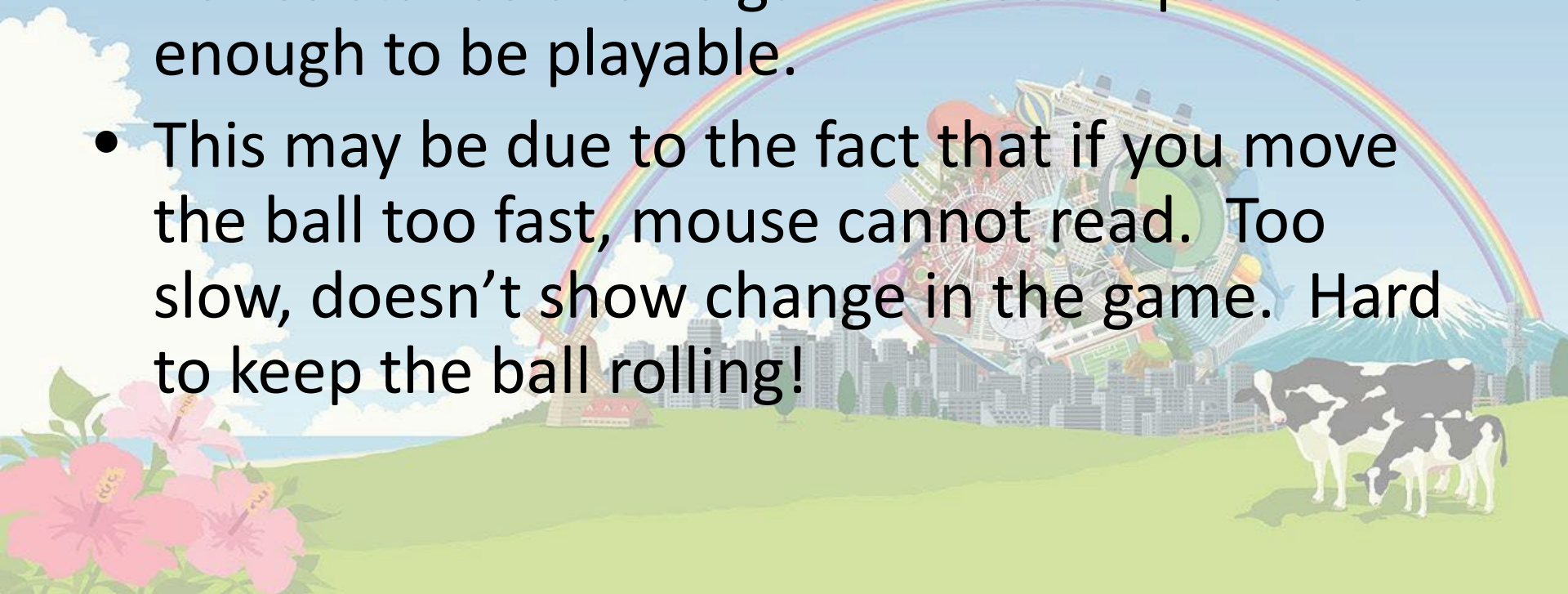


# Experimental Results-Usability



# *Insights from Measurements*

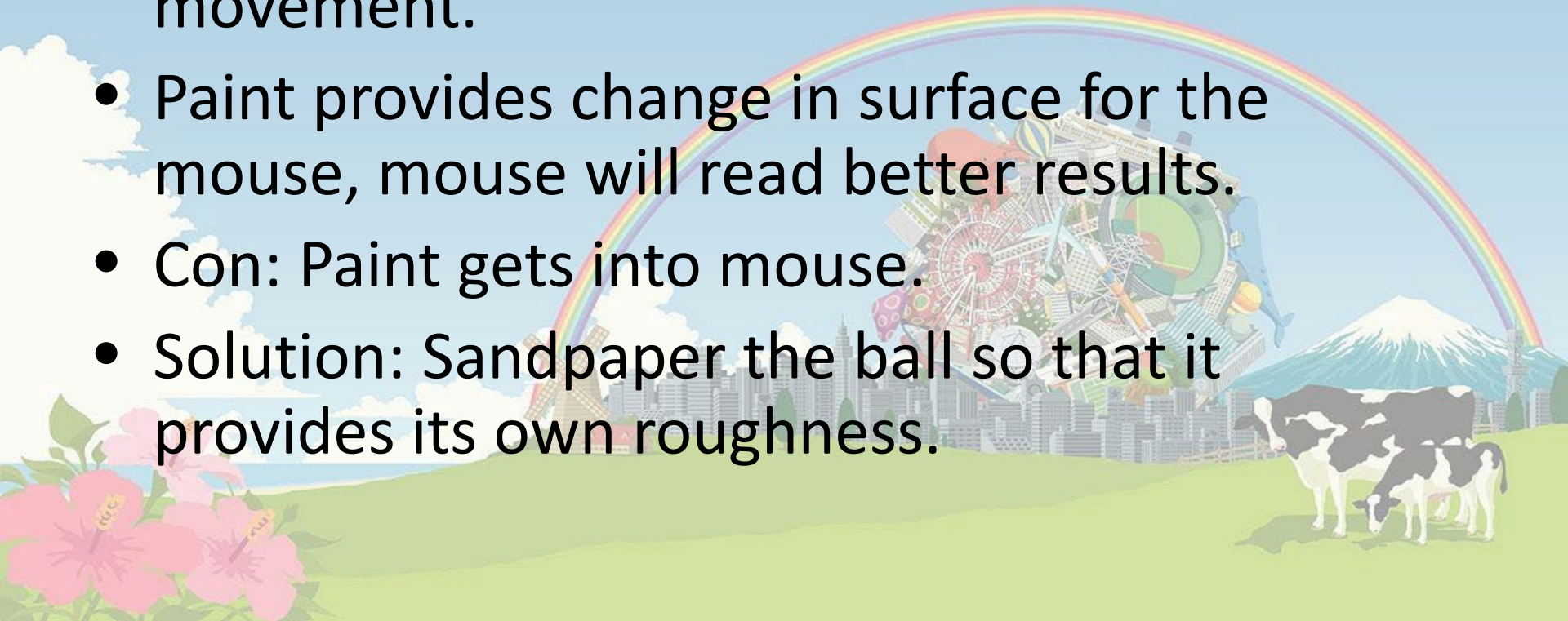
- **Sensitivity**
- Having a degree of change made it seem less responsive to us. Needing an absolute full or no resistance allows game to be responsive enough to be playable.
- This may be due to the fact that if you move the ball too fast, mouse cannot read. Too slow, doesn't show change in the game. Hard to keep the ball rolling!



# *Insights from Measurements*

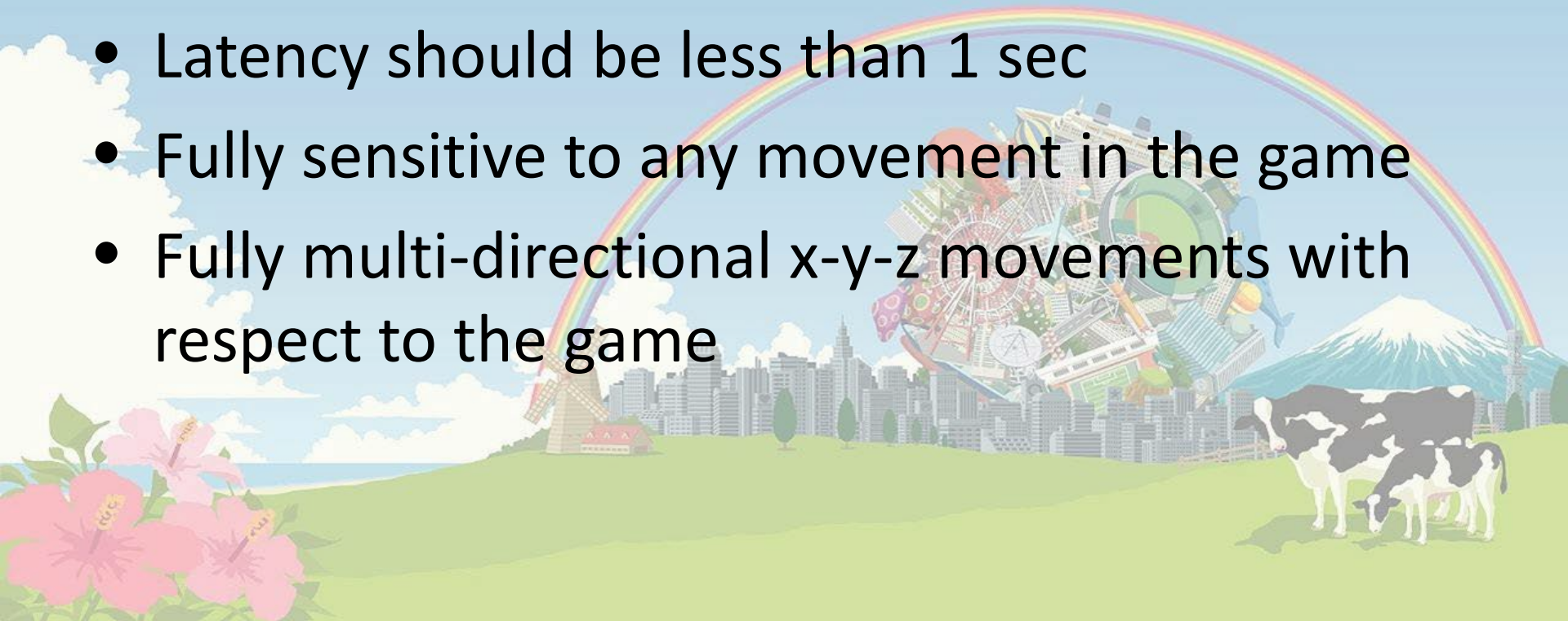
- **Usability**

- Dual mouse may be trickier, but it is great for rotating out of a wall. Allows another axis for movement.
- Paint provides change in surface for the mouse, mouse will read better results.
- Con: Paint gets into mouse.
- Solution: Sandpaper the ball so that it provides its own roughness.



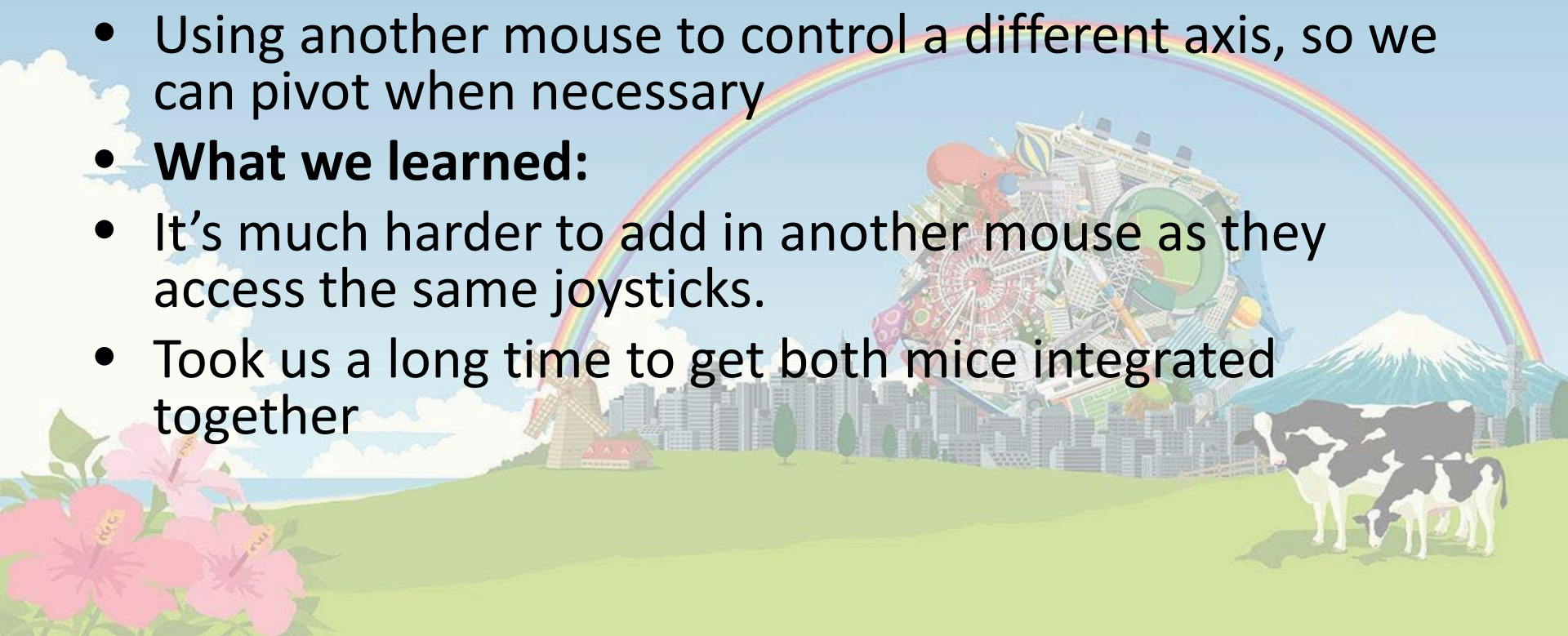
# *System Performance*

- With the usability test, we discovered that people want this game to feel natural
- This means:
- Latency should be less than 1 sec
- Fully sensitive to any movement in the game
- Fully multi-directional x-y-z movements with respect to the game



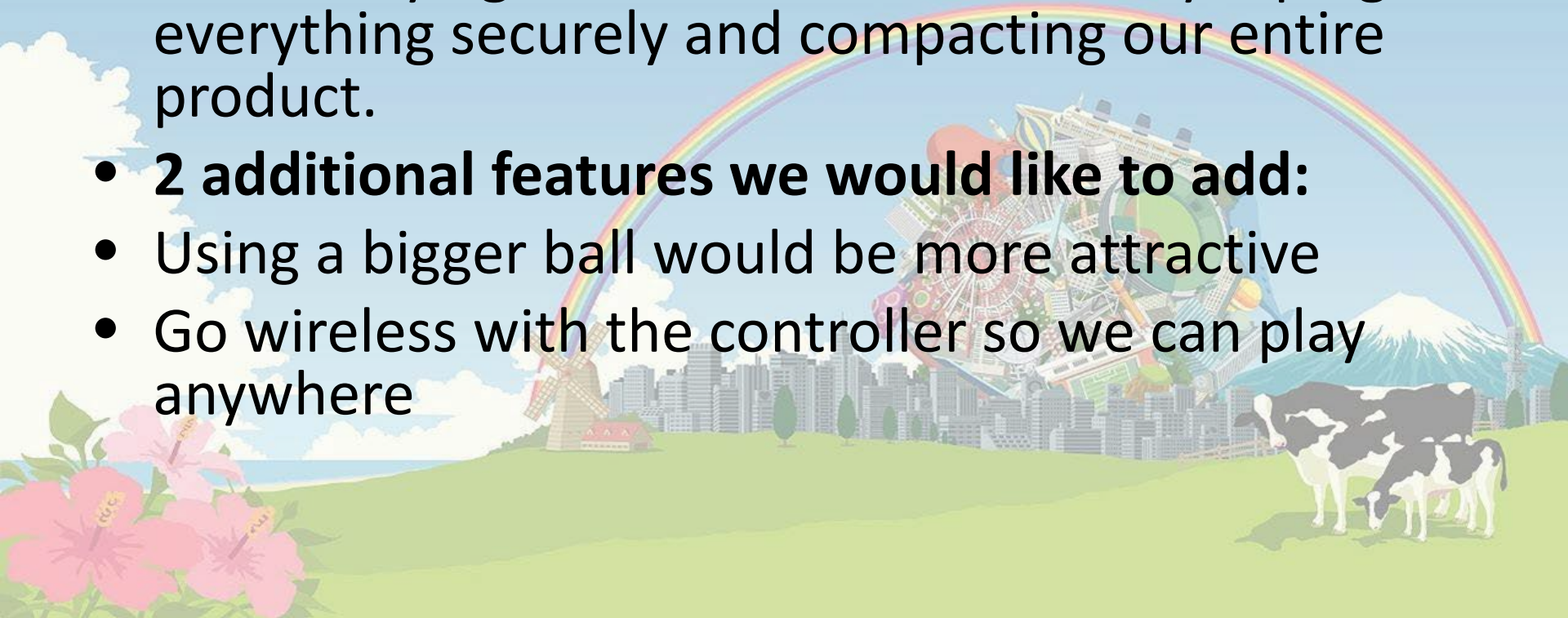
# *Other Features*

- **Control over “dash” function**
- Moving forward over a certain threshold, will make the Arduino Uno simulate a back and forth speed up
- **Control over “Quick Shift” function**
- Using another mouse to control a different axis, so we can pivot when necessary
- **What we learned:**
- It’s much harder to add in another mouse as they access the same joysticks.
- Took us a long time to get both mice integrated together



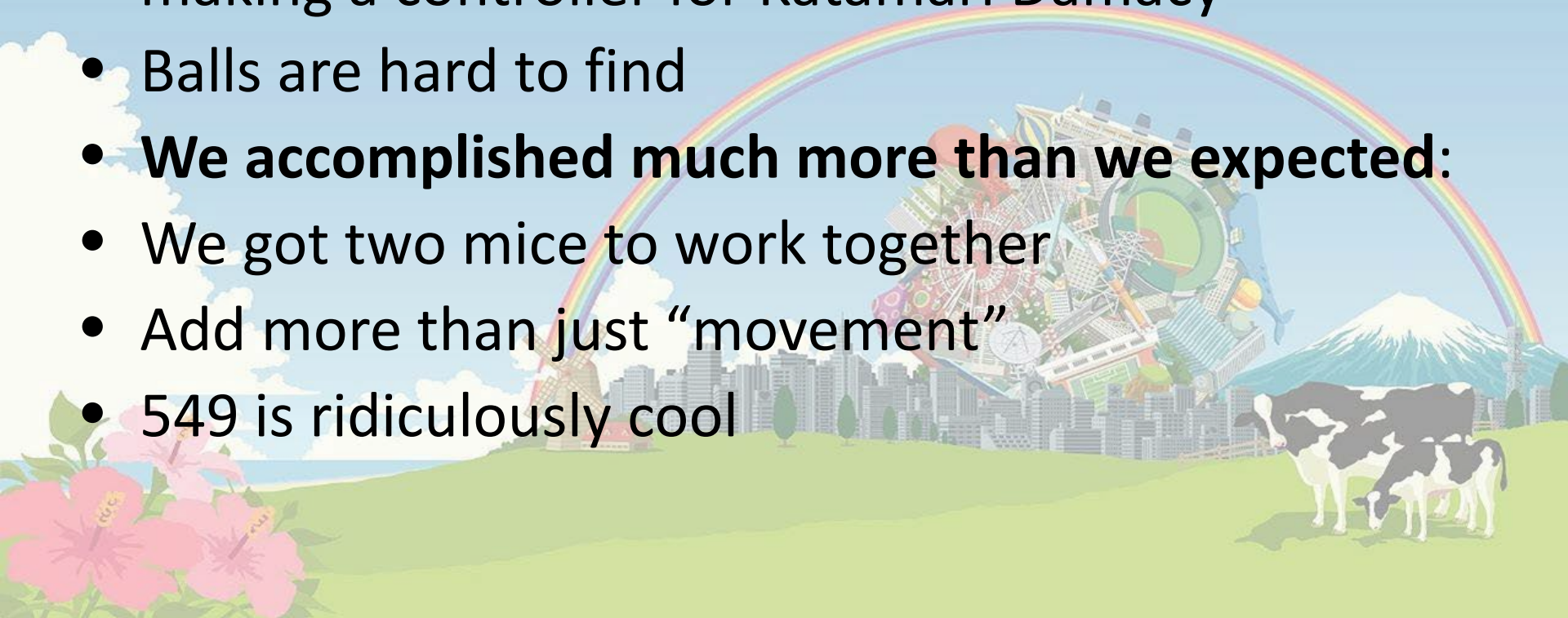
# *Open Issues*

- **Varying responses from our controller**
- We are getting different sensitivity every time we try our controller.
- We are trying to narrow the variance by taping everything securely and compacting our entire product.
- **2 additional features we would like to add:**
- Using a bigger ball would be more attractive
- Go wireless with the controller so we can play anywhere



# Conclusions

- Better to tap into controller than to generate our own PS2 packets
- People got excited when they heard that we were making a controller for Katamari Damacy
- Balls are hard to find
- **We accomplished much more than we expected:**
- We got two mice to work together
- Add more than just “movement”
- 549 is ridiculously cool





# Appendix

- 2004 Japan Good Design Award, featured TIME magazine best games of the year edition, "Excellence in Game Design" 2005 Game Developers Choice Awards
- Versions for PS2, PS3, PSP, PS Vita, Xbox 360, Nintendo Dsi, Ipad, and smart phones
- <http://www.gamespot.com/news/katamari-rolls-up-half-a-million-sales-in-japan-6142530>



Katamari approaches a parking lot- two cars parked on the left, one van on the right



Katamari picks up two cars parked on the left



Katamari then picks up van that was parked on the right