

# Investigation Into The Representation Of 4D Shapes

07-10-2021

# The Weeks Progress Report

- **Finding and reading papers surrounding the topics of**
  - Construction/visualisation of 4D geometry
  - 3D manipulation of geometry
  - Manipulation of 4D geometry
- **I have Read:**
  - [Arcball Rotation Control, Shoemake 1994](#)
  - [Polyvision: 4D Space Manipulation through Multiple Projections, Matsumoto et al. 2019](#)
  - [3D Scene manipulation with 2D Devices and Constraints, unknown](#)
  - [4D Rendering: Projection & Cross Section, Tianli. 2018](#)
  - [A visualization method of four-dimensional polytopes by oval display of parallel hyperplane slices, Kageyama, 2015](#)
- **I have a lot on my list but intend to look at more papers by Kageyama A. and Hanson A.**

# Questions

- Many papers are pay-for-access. Some sound interesting, but it is concerning to pay for something when it could be very irrelevant - i.e 4D “manipulation” in VR - but the abstract does not mention 4D rotation at all, only 3D.
- What do I do if a paper does not have important info, like a Date or Author or University?

<https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.26.5800&rep=rep1&type=pdf>

- If a paper has a title with an american spelling - i.e visualization. I presume I keep that title and don't change it to “visualisation”?

# Plan Ahead

Take 2 weeks (Weeks 3 and 4) to research papers focused in the fields of geometrical representation and interaction.

Week 4: take first steps into intuitive rotation

Week 5: attempt to implement an intuitive rotation mechanic using click and drag.

Week 6: attempt to implement an intuitive rotation mechanic using an arc ball.

Week 7: Implement and test onion skin interpretation of the 4th dimension. Implement a 3D perspective that in real time mimics the 4D object.

Week 8: Create intuitive UI for users to manipulate shapes with.

Week 9: Create a demo to "Identify the shape". Add more shapes - 4D cylinder, cone, capsule.

Week 10: Plan and script a walk through for users to play with shapes and attempt to identify them. Set up a new demo for shape matching.

Week 11: Tutorial videos that explain why shapes behave they do, and traits to identify what the shape is. Polish the program to be a "final product".

## Am I on schedule

Yes, I believe so, I am absorbing a lot from these papers and am keeping track of them.

Need to take more thorough notes about each paper I read.