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March 26: Brainstorming

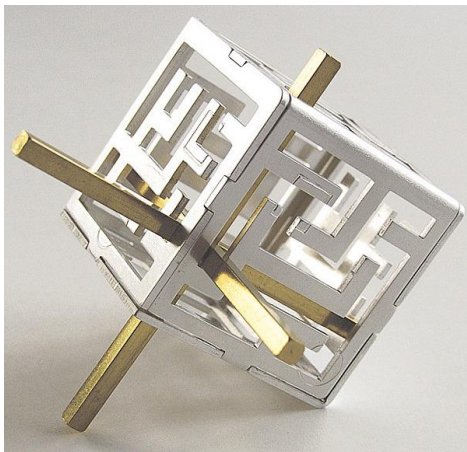
- 3D cube maze puzzle trying to get a rolling ball from start to finish around the 6 surfaces
- Same concept as above but more difficult with holes where ball can fall through and game ends
- Pinball machine with manually controlled flippers (1 or 2 person versus)
- Puzzle/lock box that requires sliding or rotating a series of connected panels/doors in the right sequence before the box can open
- Smaller scale foosball with some variation added
- Jack in the box toy minus the music with variation
- Plinko like on the Price is Right with variation
- Connect 4 with variation
- Wooden puzzles (assembling/disassembling a cube or pyramid)

March 30: Finalizing the idea

We knew that we wanted to create some kind of maze game in the shape of a cube or sphere. Originally we thought of a multi-level cube with holes that a ball can fall through; the user has to get the ball from one corner to another. We ultimately decided on the following.

Concept: A game in which the user must navigate a maze in three dimensions.

Design: The object is a cube on which each set of opposite sides has pathways cut out. The player interacts with a rod protruding from each side; these rods are connected in the center of the cube. The user must get the rod assembly from one corner to the other. This is known as an Oskar's Cube, as displayed below.



April 6: Specifications

We decided on the materials and manufacturing methods for our design.

The sides of the cube will be laser cut on 1/4" acrylic. The holes in the maze will also be 1/4". This means that the thickness of the rods will have to be slightly smaller so that they can move freely through the maze.

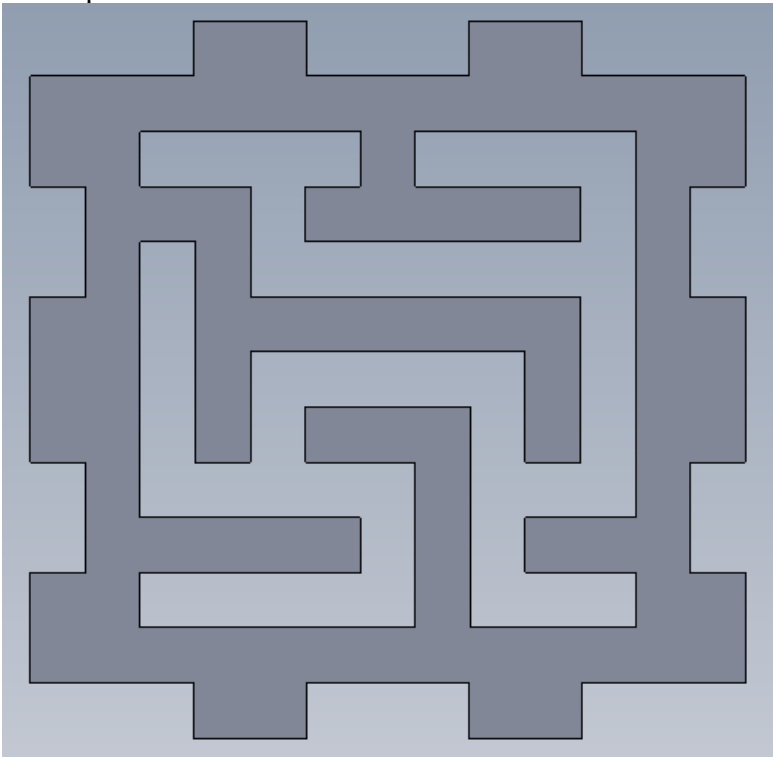
Six rods of 3" long each will be made of aluminum, compliments of Dieter. The rods will be square shaped, and we believe a thickness 3/16" will allow the rods to navigate fine while still being easy to hold and control. These rods will connect into a center piece.

The center piece will be 3-d printed and will be a cube. It will be about 1/2" long on each side. The center of each face will feature a square hole of 3/16" for the rods to slide into. We hope the rods will sit as press fits, but may need to use glue to hold them in place.

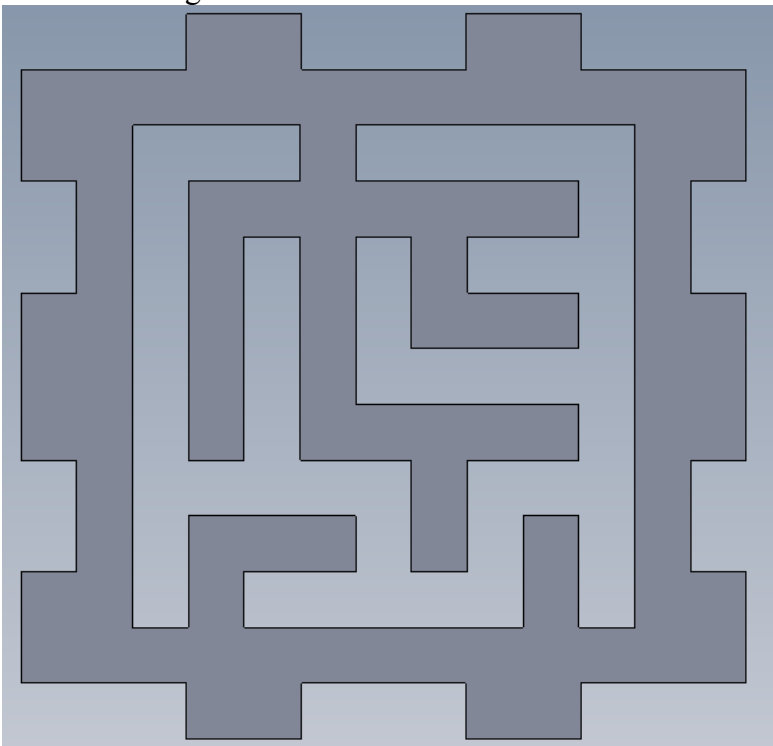
April 13-15: Designing in SolidWorks

The faces of the cube and the center piece were designed in SolidWorks. The faces were created by making a linear pattern of points in a grid with each point spaced 1/4" apart. This allowed us to easily draw the lines for the maze by "connecting the dots". There were two difficult aspects of the design. The first was creating sides that would allow a solvable yet difficult puzzle. This was solved by creating a few designs and actually solving through them ourselves. The second difficulty was designing the press fits for the sides. The pegs and slots needed to be placed in such a way that they would not interfere with the maze. In order to do this we had to make each side larger and cut away from the extra length.

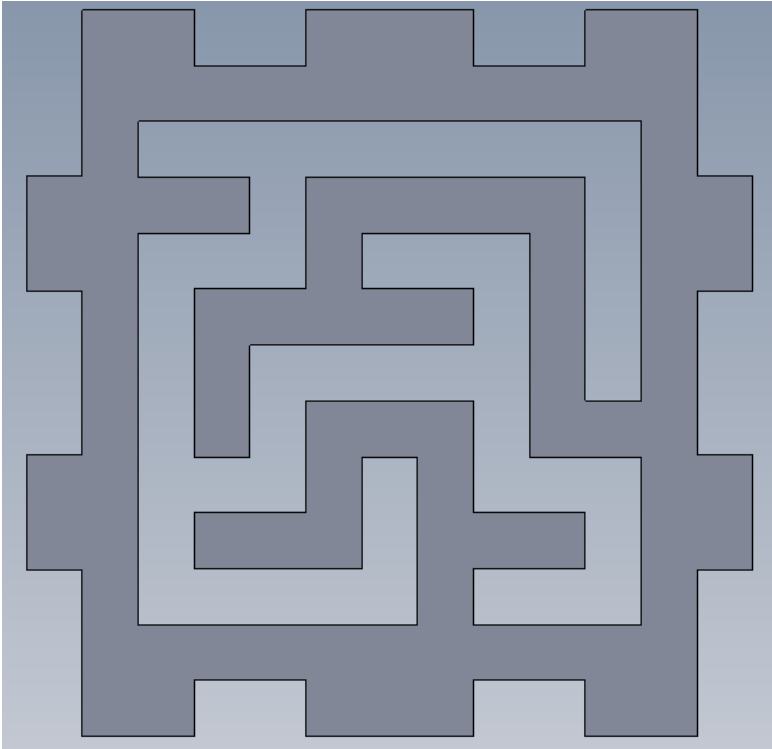
The top and bottom faces:



The left and right faces:



The front and back faces:



The center piece was fairly simple as it consisted of just a cube with a hole cut in each face.

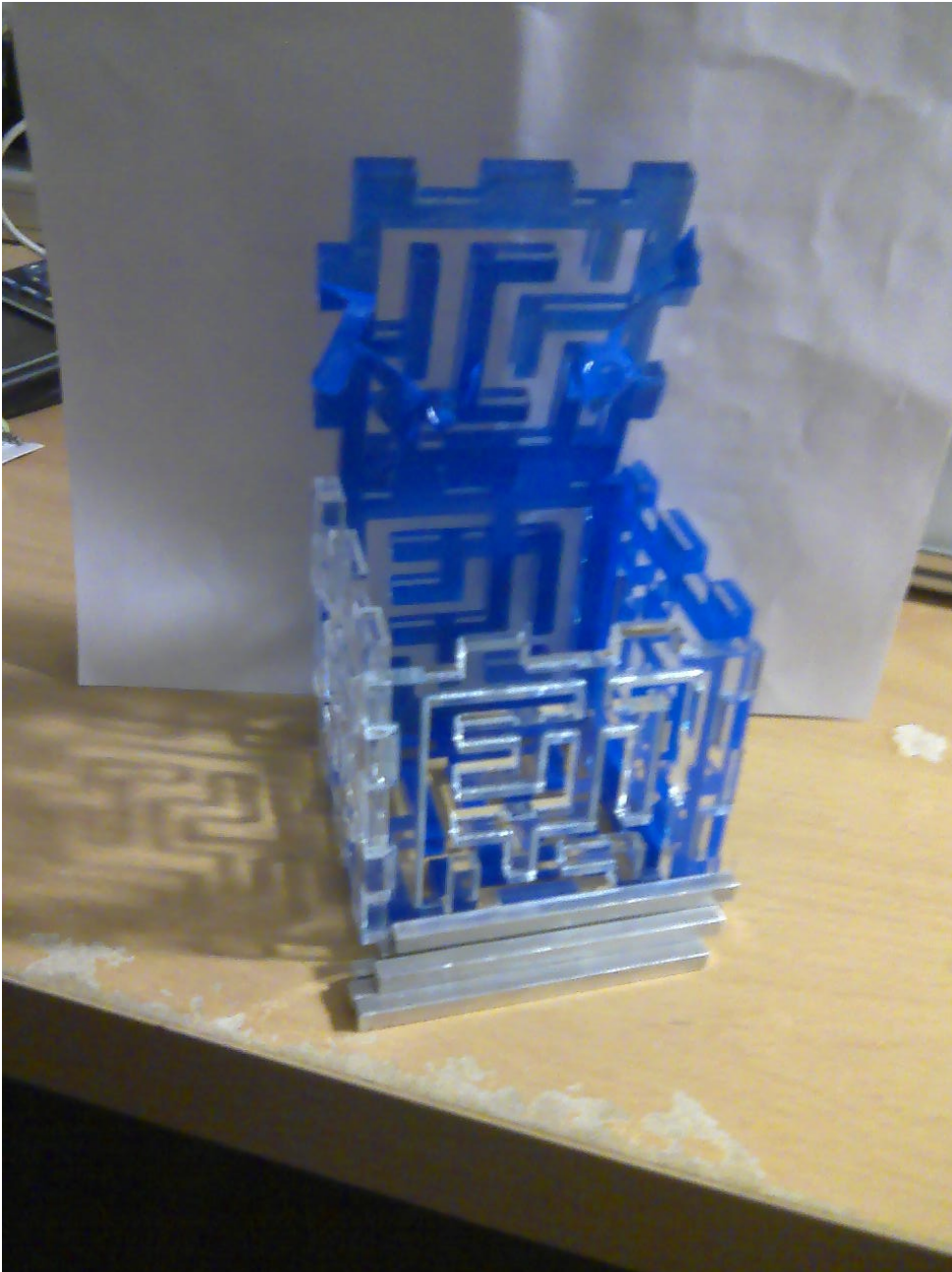
April 22-25: Construction

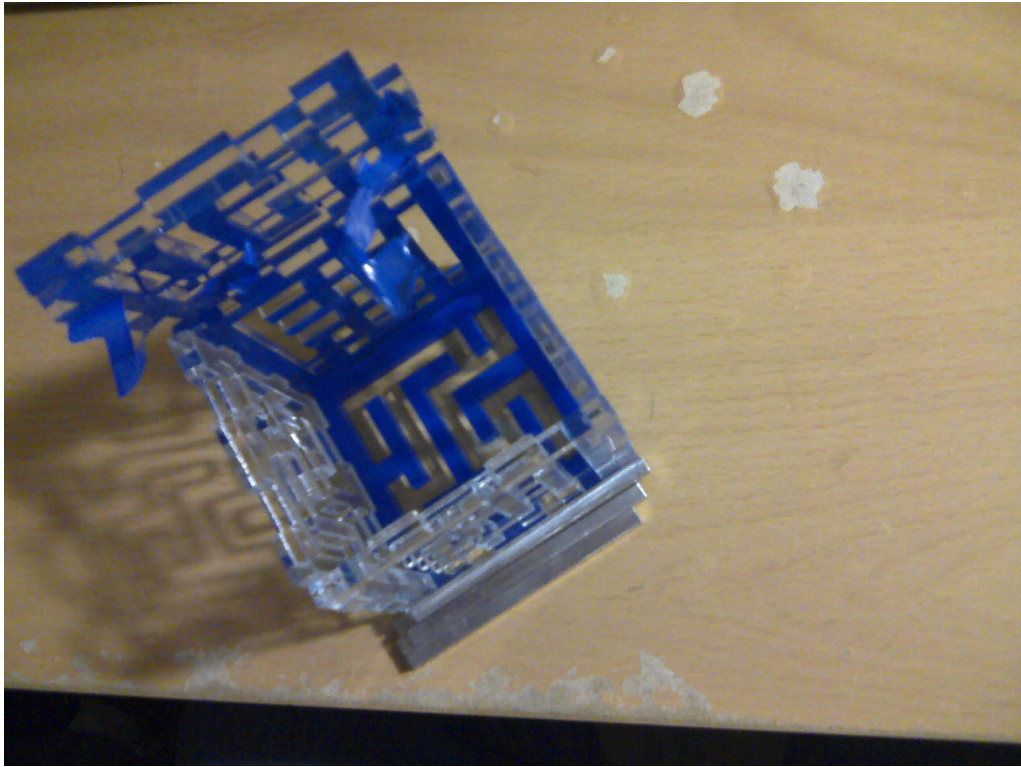
The faces of the cube were laser cut from clear acrylic, the center piece was 3-d printed, and Dieter cut the aluminum rods.

The rods were also sanded to give them a shiny appearance.

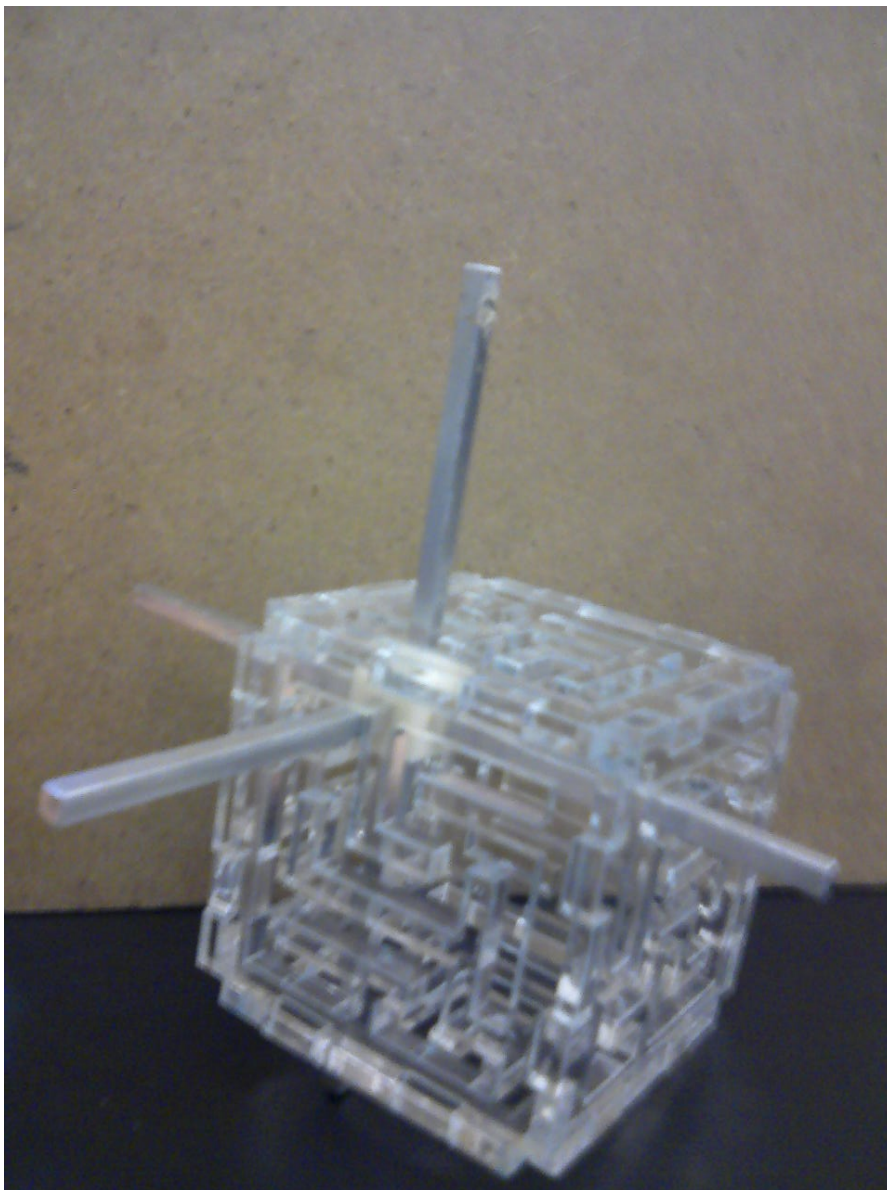
The finished product ended up being more fragile than we expected; a few of the faces broke during assembly and had to be recut.

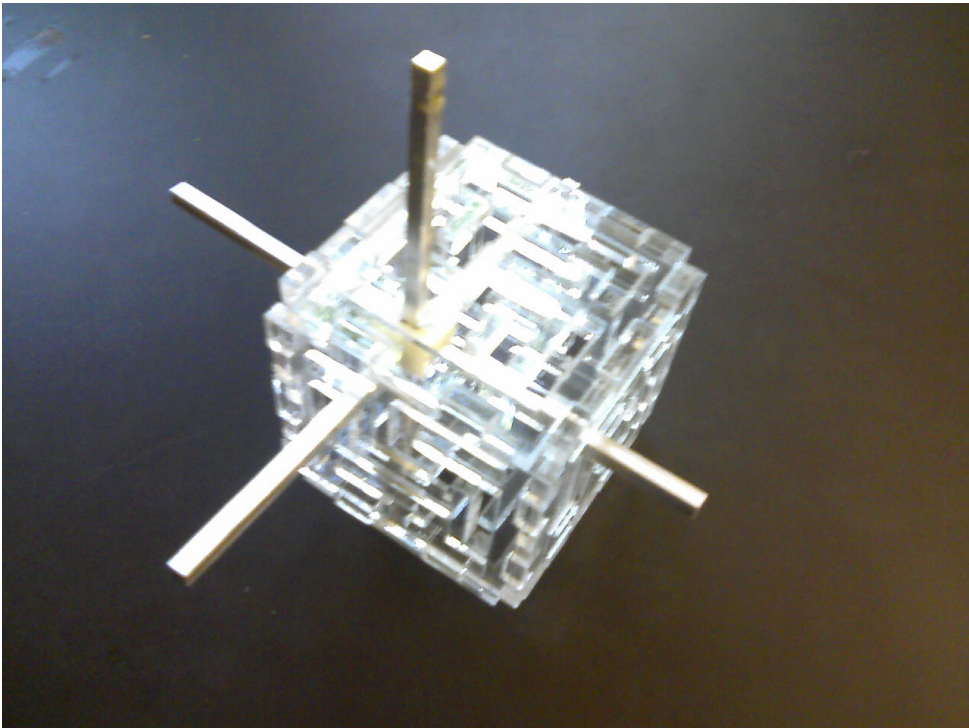
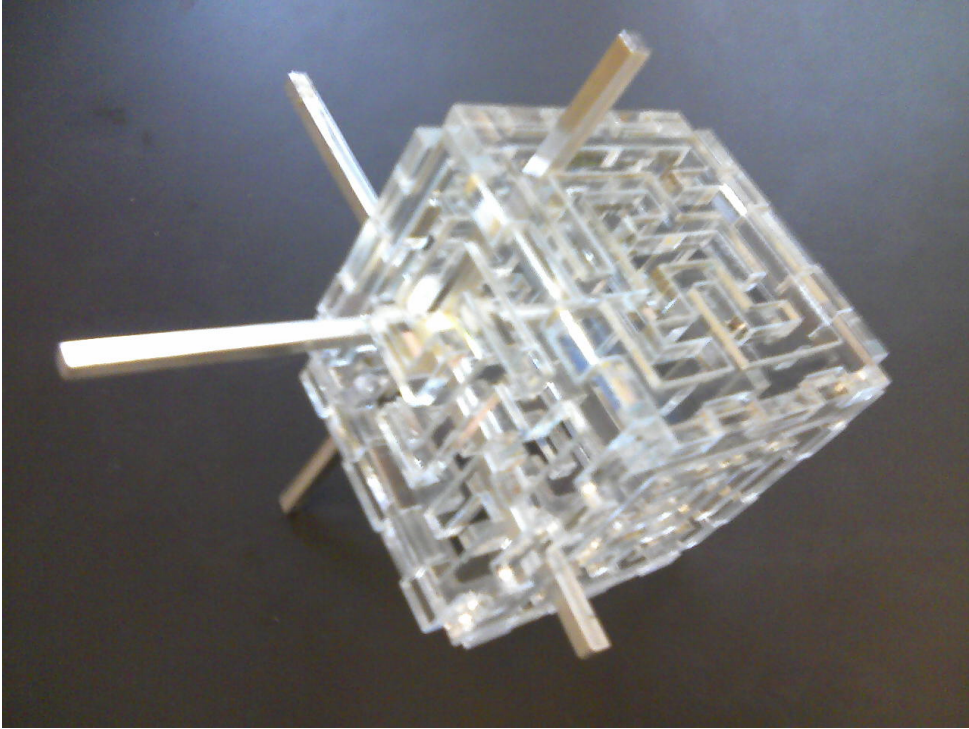
Assembly:





The finished game:





Overall we were very satisfied with the finished project. The game functions as expected and looks pretty cool.