MEAM 101 Project 3 Jake Spector, Robyn Schwartz, Wes Clagett - Documentation

March 23

We officially formed our group and uploaded our names onto the wiki.

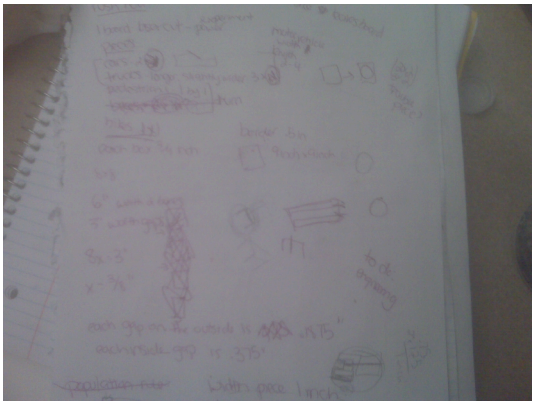
March 28

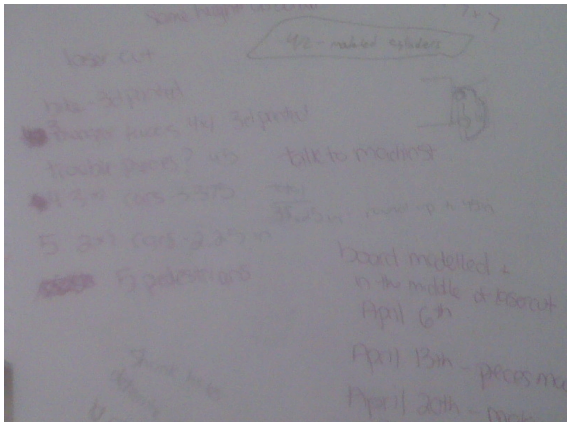
We met as a group for the first time and started to discuss ideas for our project. After discussing a few ideas, including possibly a Rubix Cube, we decided to make a version of the game "Rush Hour", where the car has to make its way out of the traffic jam. However, there are a few twists to our design. The real game has a board with 36 squares. Our board is going to be 10"x10" and will have 64 circles. The real game also only involves different sized cars, but our game will have pedestrians in addition to the vehicles, and they will be able to rotate around the cylindrical pegs.

After we decided the game, we figured out the dimensions of the board and each of the pieces. Then we decided the amount of pieces we wanted for our board: five 1"x1" pedestrians, five 2"x1" cars, four 3"x1" cars, and three 4"x1" monster trucks. Then we thought about designing a 2"x1" bike that would act as the piece that had to escape the board.

We then discussed how we would manufacture the game. We all agreed that we should laser cut the board. We were not sure how to go about manufacturing the pieces, so we held off on that decision for a later date.

The last thing we did was writing out a tentative schedule to follow over the course of this project.





March 30

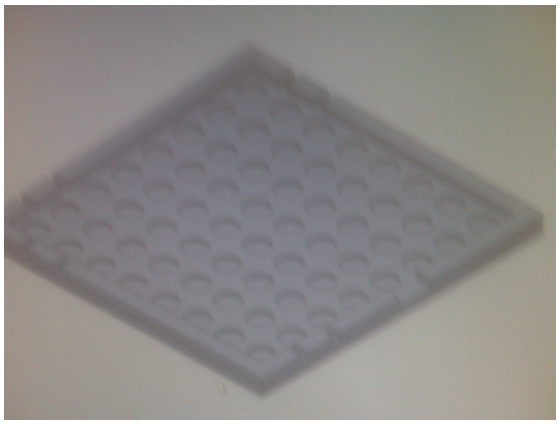
We met with Fiene and Jason to discuss our project idea they generally liked the idea and gave us a few tips to help us out. They thought it would be a good idea if we made our board in layers so it would be easier to fit the cylindrical pegs into the holes of the board. There would be one bottom layer, and thinner layer in the middle that has the holes that the cylindrical pegs would fit into, and another layer on top that would contain the passageway for the car to get out of.

They also thought it would be a good idea to place the vehicles on top of aluminum u-channels that can slide around the board.

They also thought it would be a good idea to create partitions that would allow us to decrease the size of the board in case people wanted to play with a smaller board.

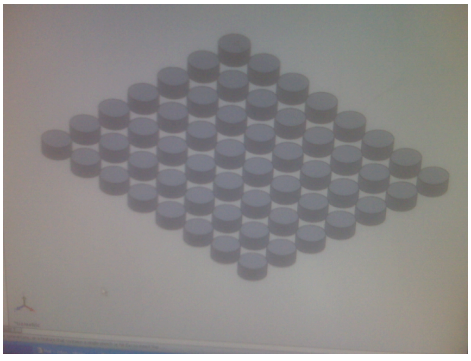
After our meeting, we decided that instead of a bike that would be the piece that has to escape the board, we would design a 2”x1” car that we would 3D-print to differentiate it from all of the other pieces. We were still unsure how to go about designing the other vehicles and the pedestrians.

We then designed the game board with all of its layers in Solidworks.



April 2

We designed the 64 cylindrical pegs that will fit into the game board in Solidworks.



April 5

We met with our machinist, Maria Kaufman, to get a sense of how her abilities could help us with this project. We all decided together that we could use aluminum blocks for the vehicles and that she could cut the blocks and the u-channels for us. She would then screw the blocks on top of the u-channels to make the vehicles pieces. It was then that we had to come up with a height requirement for all of the pieces since aluminum only goes up to a certain height.

April 11

We sent in an order for ¼" and 1/8" thick pieces of MDF for the game board and a piece of 3/8" thick acrylic for the cylindrical pegs.

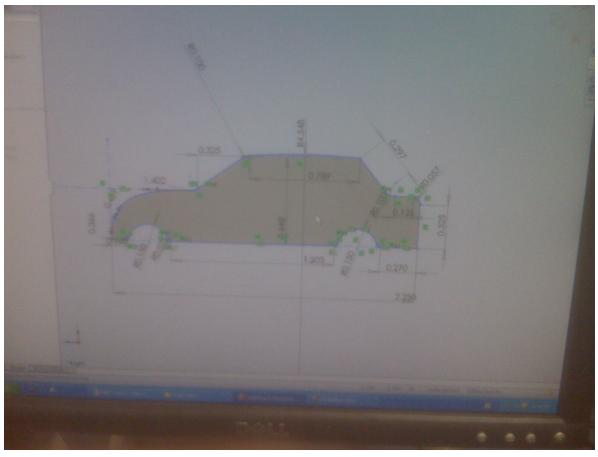
April 13

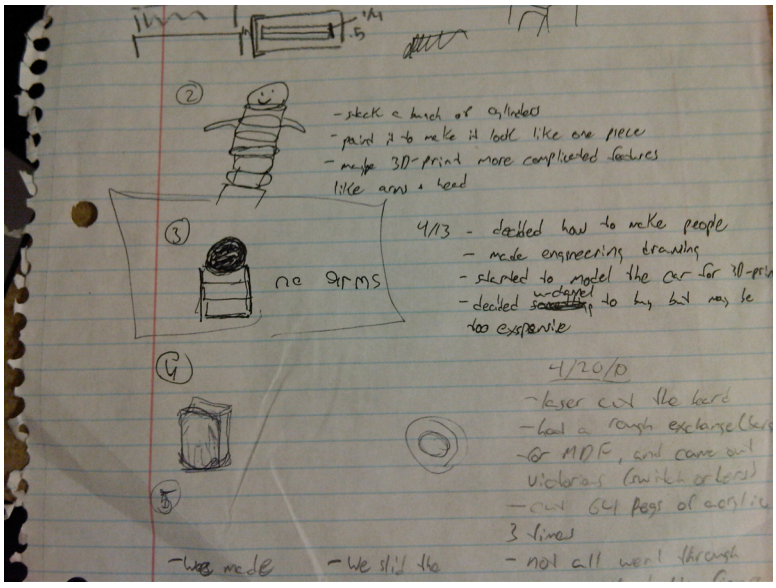
We brainstormed different ways to make the 1"x1" pedestrians, and we decided that the best way to make them was to laser cut three cylinders and stack them on top of each other, with the top cylinder having a doughnut shape so that a spherical head could be inserted. The head would either be 3D-printed or made out of some other material.

Then we researched the types of u-channels we could buy on mcmaster.com, but we quickly realized that it might be too expensive.

After that, we made engineering drawings for Maria of the aluminum blocks for her to machine later.

The last thing we did was start modeling the car for 3D-printing on Solidworks.



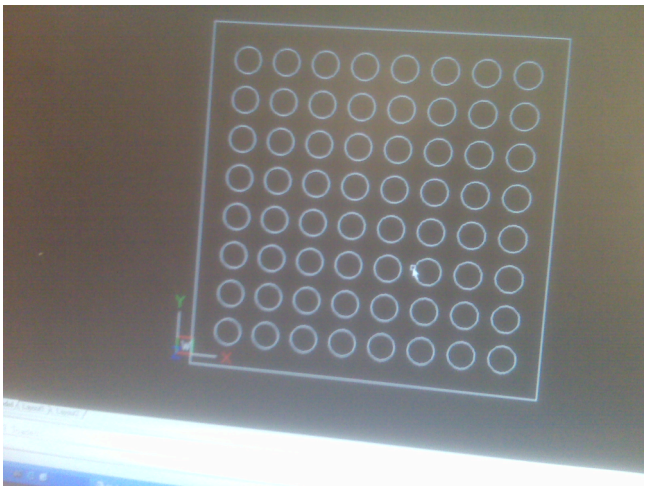


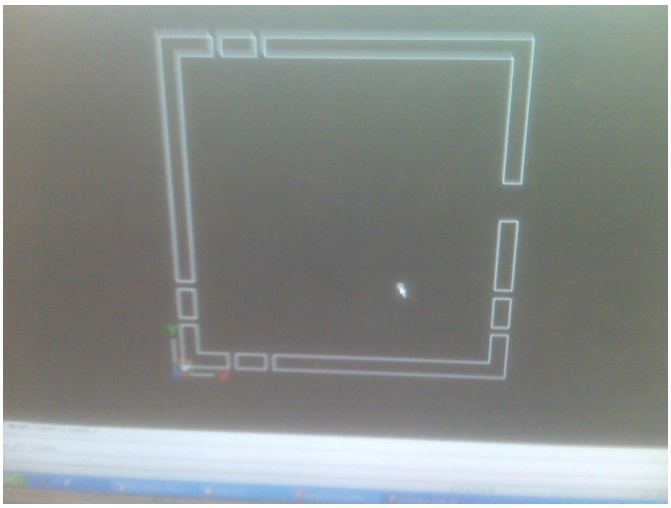
April 18

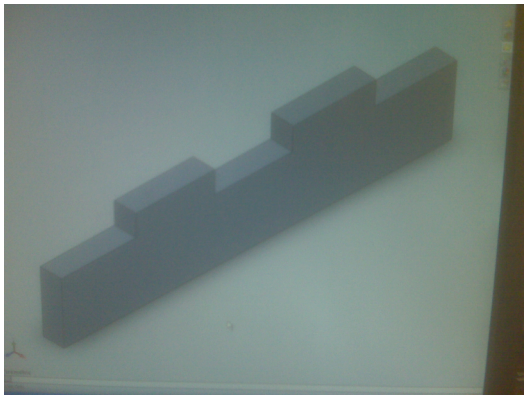
At this point, we realized that there was not going to be enough time to order any metal or u-channels, so we came up with an alternative plan. Instead of using metal u-channels, we were going to create our own "sliders" out of press-fitted MDF. We then designed the different-sized "sliders" on Solidworks while taking kerf into account.

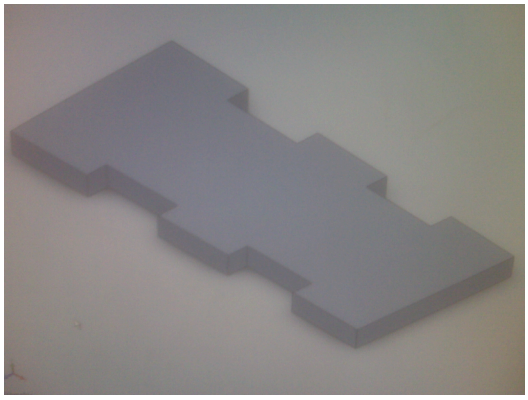
We also decided to make the vehicles that go on top of the sliders out of glued-together MDF with the vehicle designs vector-etched onto the MDF. We then started to design these pieces on Solidworks.

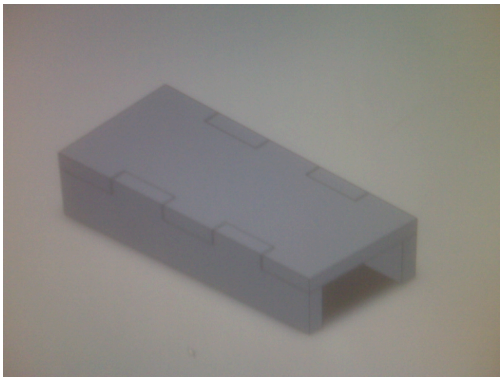
The last thing we did was made DWG files for the game board and the slider pieces.









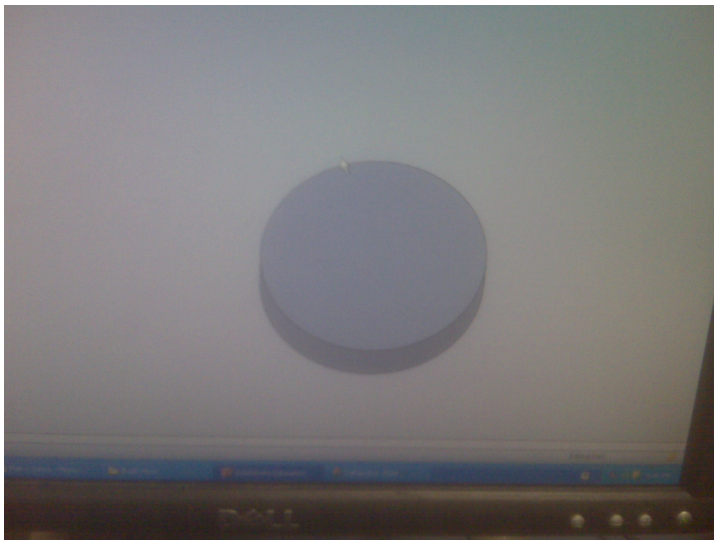


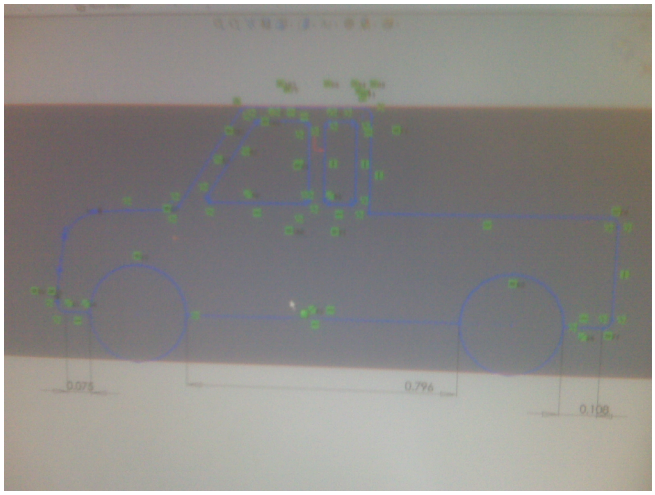
April 19

Our sheet goods that we ordered were cut, but another group took our materials by accident thinking that the material was theirs. Luckily, there was some extra 1/8” thick MDF in the laser cutter room. Using this MDF, we cut the pieces of the sliders and tested the kerf. Fortunately, the pieces press-fitted together on our first try. We cut and fitted together five 2”x1”pieces, four 3”x1” pieces, and three 4”x1” pieces.

Using the extra MDF, we also laser cut the middle layer of the board what had the holes in it for the cylindrical pegs to be fit into.

We also continued to design the etching for the pieces that are going to go on top of the sliders. We designed the cylinders, including the doughnut shaped one on the top, for the pedestrians.





April 20

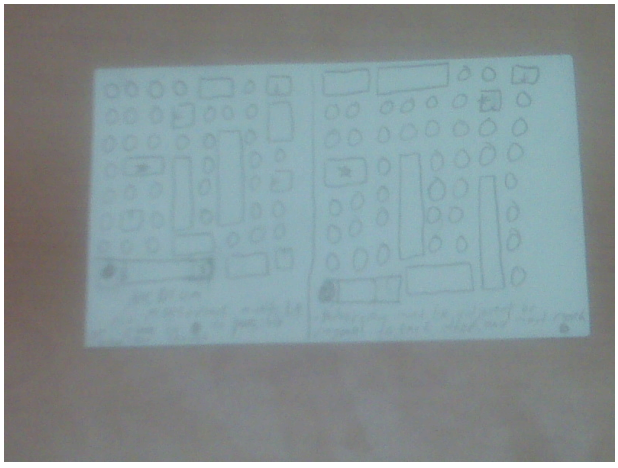
We met with the group that accidentally took our parts, and they returned our ¼" MDF and 3/8" acrylic. We then proceeded to laser cut the remaining layers of the board with the ¼" MDF and the 64 cylindrical pegs with the 3/8" acrylic. Not all of the pegs fell through, even after cutting through the acrylic three times, so we had to use our fingers and other tools to poke the rest of them out.

After taking off the stickers and sanding off the edges, we fit the cylindrical pegs into the board. We had to print two more pegs because two of them did not fit in properly.

After the pegs were inserted, we put the sliders onto the board and slid them around to make sure everything worked. Once we knew that the sliders were able to slide across the board easily, we glued the three layers of the board together using wood glue.

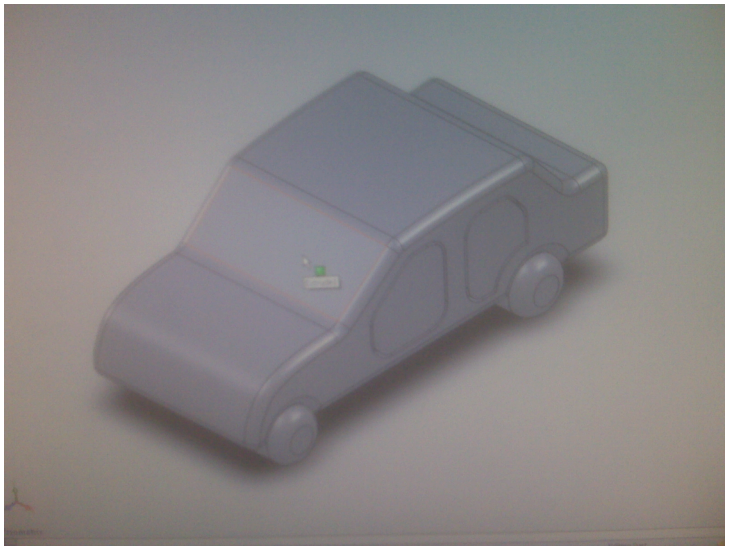
We also found some small marbles and other spheres in Towne 205 that we could use as heads for the pedestrians.

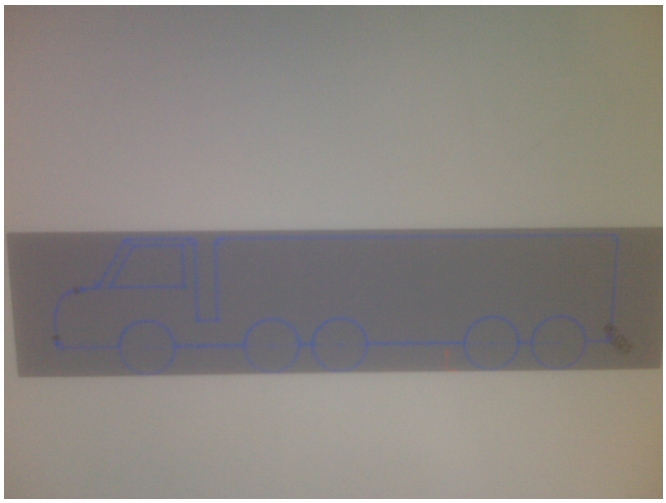
The last thing we did was start making configuration designs for actual game play.

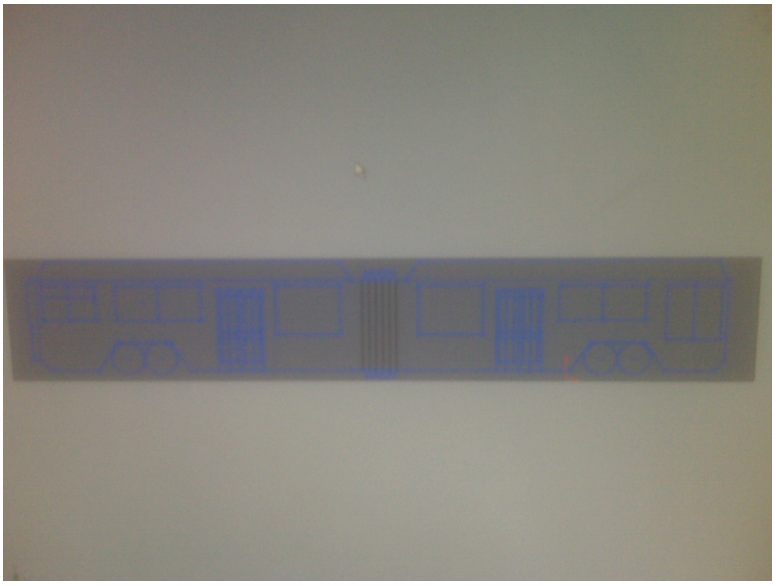


April 21

The designs for the vector-etched 3”x1” monster truck and 4”x1” trolley pieces were completed. We also finished designing the 2”x1” car, and we sent the file was also sent to the printer for 3D-printing.



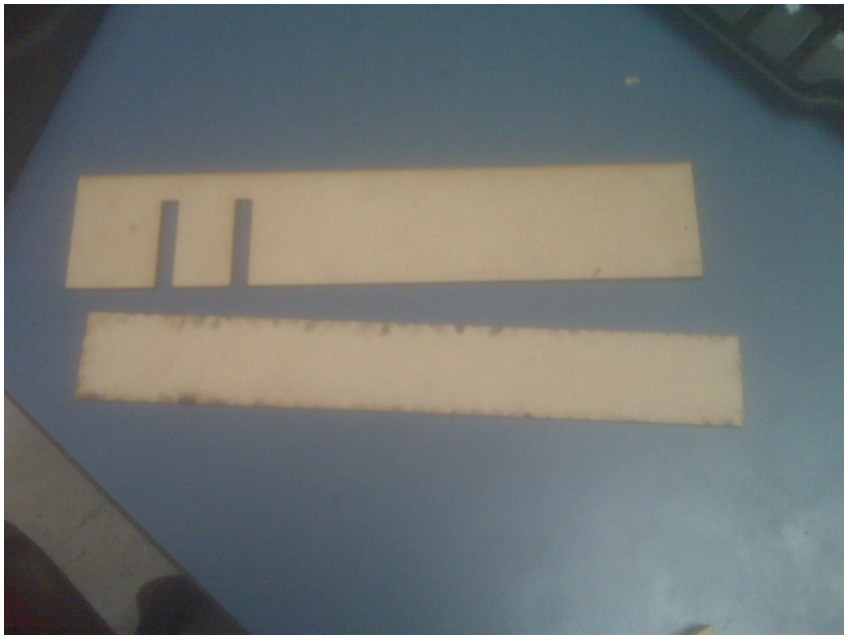




April 22

We realized that we forgot to print the 1”x1” sliders for the pedestrians and an extra 2”x1” slider for the 3D-printed piece to go on top of. We designed the 1”x1” slider pieces, made the DWG for them, and then laser cut them and fitted them together. We then tested them on the board. Since the pegs are cylindrical, the 1”x1” sliders can rotate on the board.

We also laser cut partitions for the board to make it smaller. We tested it first by making them out of 2-ply cardboard, but that did not hold up very well. We then tried using 1/8” MDF and that worked a lot better.



April 23

We started by making DWG files for the pedestrians and the vector-etched pieces that will go on top of the sliders. Using ¼" MDF, we laser cut the cylinders and tested the fit between the doughnut-shaped radius and the spherical heads. They did not fit on the first try, but they fit after we altered the radius of the inner circle of the doughnut-shaped cylinder. We then glued the three cylinders and sphere together to make the pedestrian, and then glued the pedestrian to its slider.

After that, we laser cut the two sides of the vector-etched pieces using ¼" MDF. Initially, we thought we could make a box with no etching on the front and back, but the etched pieces on the sides. We tried to design a top view of a vehicle that would act as the top surface of the box. After realizing that designing a top view would be too difficult to design a top view and that the car would not look very good if only two of the five visible sides had etching on them, we decided to only use the two sides the had etching and glue them together on top of the slider.

April 25

A few of the cylindrical pegs were loose on the board, so we used superglue to attach them to the board more securely. We were also able to pick up our 3D-printed car and glue it on to its 2”x1” slider.

The final thing we did was create more puzzle configurations for the game. We are now done with everything and are ready to present our game.