At our first day of planning, the team came up with three game strategies that we believed would be the best way to efficiently earn points. Our first strategy was to put a bulldozer on the Create and have it collect the pieces in the middle and put them in our peak, while the Legobot, with its mounted gripper, would go around the board picking up the turbines and mounting them on the foundations. Our second strategy was to have a double gripper with a basket on the Create to get the pom poms and Botguy, while the Legobot would be sent to block their slope with arms. Our third strategy was to have the create rush over to their starting box at the beginning of the round to block them from getting out, while the Legobot would act as a dump truck with a gripper, picking up the pom poms and water balls.

We had two different ways of simulating our strategies. It was our priority to have the board built the day before so that we could simulate the robot’s actions the day after. The first way we simulated our strategies was by having a team member step on the board and pretends he or she was the robot. We used this type of simulation for all of our strategies. The second way we simulated our strategies was by remote control.

Using the first type of simulation, we decided on what path the robot would take. Our team member acting as the robot would go step by step to all of the different areas the robot would actually go to. For each segment, we dissected the situation and asked ourselves how the robot was going to get there, what sensors it would use, and how hard it would be to accomplish this segment. For example, for our strategy of blocking their starting box with the Create, we had Will stand in the starting box. We told him to step out from the box and decided we would use the Create’s simple drive function to get out. We would then starting turning left until we find something yellow (The turbine) and then go toward it using the drive function again. We would go to the left of the yellow object to make sure we block their starting box. As Will stood as the Create, we also thought of how we could strengthen the blocking strategy. We decided to use the bump sensors on the Create to detect anything shoving it. If it was being bumped, we would use our drive method to put force back on the other robot. We would have two IR range finding sensors to help determine if the Create was moving or not. If both of the distances were getting smaller, that would mean that we would have to put more power into pushing the other robot.

We had Jesse pose as the Legobot for one of the simulations as well. For this simulation, Jesse’s purpose was to get to their slope as fast as possible. We had him step out of the starting box. We decided that we would simply have both drive motors go forward for this part. We would mount an IR range finding sensor on the back of the Legobot so that it would know when it was fully out of the starting box. Jesse then turned left to go toward their slope. The design for the robot was either a tricycle design with a skid or hanging wheel, or a four wheel robot with two wheels that turned, similar to a car. The robot would then use the camera to the closest yellow object (the turbine) and then start going toward it. We had Jesse knock the turbine over but moving past it. Jesse followed the black tape up the slope until it hit the perpendicular part of the tape. We would probably implement this using two Top Hat IR sensors on the left and right sides. If the robot sensors black on one of the sides, it would turn its wheel the other way. When both Top Hat IR sensors find black lines, the robot would then deploy its arms. The arms would probably be mounted on servos in order to deploy them quickly. The robot would then park here until the end of the round.

After simulating all the strategies, we decided that we should try them using a remote control. We built two D-pads using square pieces of cardboard with sides measuring 6 centimeters. We then put holes in the cardboard and put our touch sensors through. We labeled the sides up, down, left, and right respectably. The end results were two D-pads that were usable for remote controlling each robot. We wrote simple pieces of code that would move the robots in the certain direction as long as we held the button. For example, if we held the up button, the robot would move forward.

For these simulations, we used just the Create and the Legobot base. We placed them both in the starting box and then used the D-pads to simulate their movements. For example, Joel had control of the Create controller while Mark had control of the other. To simulate the first strategy, Joey pushed the Create up to the pom poms and Botguy. To simulate the bulldozer (because we didn’t actually have a bulldozer on the Create) we took the items off the board. We then took the Create and drove it up to our slope and had it stay there. We had the Legobot pull out of the starting box and then drive up next to each of the turbines on the field to simulate it picking them up. We then drove the Legobot to the top of the slope to drop off the turbines. This type of simulation was very helpful because it allowed us to actually see our robots in motion without having to sit and program for hours.

Using these simulation methods, we had a very good idea on what we wanted our robots to do. It also helped us reject ideas that were too complicated. We didn’t use the KISS C simulator because we felt that the remote control would gave us a better idea of what we needed to do for the Create. After last year’s Botball disaster, the team leaders thought it would be best to stay with the KISS, or keep it simple, principle. We decided that going for the turbines was too complicated and that blocking was easier and as effective. Due to this principle, we also decided that building baskets and a double gripper like the previous year would be thrown out as well. With one design from each robot out of the picture, we only have to choose between two strategies, one with the Create blocking and one with the Legobot blocking. Without this simulation, we might have ended up doing some complicated strategy similar to last year.