Assembly Instructions for A+ Maze

Part 1: Construct the maze body:

1. Connect two 1” x 2” x 1m T-slotted rails (80/20 Inc. Part 1020) using the 4-hole straight flat plates (80/20 Inc. Part 4117) and 80/20 nut/bolts. Use a 4-hole plate at each end of the rail. This will create a 1” x 4” x 1m maze arm. Make three arms (East arm, West arm, North/South Arm).

2. Create the asymmetrical plus maze body by connecting the East and West arms in the middle of the North/South arm with the inside corner brackets (80/20 Inc. Part 4101). Use one bracket at each of the 4 corners.
Part 2: Construct the maze legs:

3. Connect the 2" x 2" x 24" T-slotted rail (80/20 Inc. Part 2020) to the mount caster base plate (80/20 Inc. Part 2418) with 4 head cap screws (80/20 Inc. Part 3064).

4. Connect the wheel/brake (80/20 Inc. Part 2333) to the base plate with 4 socket head cap screws (80/20 Inc. Part 3110)
5. Attach the syringe pump to the leg. You will need to tap the holes at the top of the syringe pump in order to screw in the wide inside corner bracket (80/20 Inc. Part 4113) into the syringe pump rail. Then use 80/20 nut/bolts to slide the syringe pump down the maze leg.

6. Make 4 legs. For the North and South legs, I attach the electronics tray on the back side of the leg instead of on the maze arm, which add some length to the north/south arms. If doing so, attach the electronics tray with 80/20 nut/bolts near the top of the leg. Then attach two inside corner brackets (80/20 Inc. Part 4101) to the top of the back side of each leg and attach a wide inside corner bracket (80/20 Inc. Part 4113) to the top of the inside of the leg.
7. Make the central leg of the maze. Attach the base plate (80/20 Inc. Part 2418) and wheel (80/20 Inc. Part 2333) to 2” x 2” x 24” leg (80/20 Inc. Part 2020). Attach two inside corner brackets (80/20 Inc. Part 4101) to the top of the back side of each leg and two inside corner brackets to the top of the front of each leg. Using duct tape, secure the 7-port USB hub and 4 port USB hub to the bottom of the leg.

Part 3: Assemble the maze:
8. Connect the legs to the maze one by one. You will need to temporarily remove the 4-hole straight flat plate at the end of each leg. Then slide the leg (via the nut/bolts in the corner brackets) into the center two rail lines on the underside of the maze. It may help to have the maze raised and each maze arm supported by something (e.g. chair). The central leg is attached to the North/South arm and tightened at the center. The other four legs are attached and tightened near the ends of each arm.
9. Attach response ports and electronics trays to the top side of the maze at the end of each arm using the 80/20 nut/bolts.
10. Attach the maze walls to each arm of the maze with 80/20 nut/bolts.

11. Slide each syringe pump to the top of its legs and tighten. Connect the stepper motor on each syringe pump to its stepper motor driver (top component of Arduino stack).
12. Connect each Arduino to the 7-port USB hub. Connect the USB cable from the 4-port USB hub to the top USB port on the 7-port hub. Then connect four 3ft USB extension cables in ports 2-5. Connect the other end of the extension cables to each Arduino USB cable in order of North (port 2), East (port 3), South (port 4) West (port 5).

Part 4: Construct 4 Speaker Backboard attachments:
13. Mark a center line along one of the 4” sides of the 4” x 8” x 8” Styrofoam block.
14. Insert the feeding tube structure into the Styrofoam block. It should be located near the bottom of the block and within the middle 4 inches, depending on where you want the reward to be dispensed over the response port.

15. Make a small hole for the USB speaker cable about 8" from the bottom and in the center of the 24" x 18" corrugated plastic pad. Stick the speaker cable through the hole and duct tape the cable to the block. The backboard is used to prevent the rats from being able to access the electronics behind the response ports.
16. Duct tape the block to the back of the corrugated plastic backboard.

17. Make a small hole in the backboard that will fit the nickel-plated male luer lock adapter. The hole should be centered according to the location of the feeding tube structure.
18. Make 3 more backboards. Attach each backboard to the maze by placing a backboard on top of each response port and wrapping the Styrofoam block with duct tape from the top of the block to the underside of the maze arms.
19. Connect each USB speaker to the 4-port USB hub with the 6ft USB extension cables. Connect the speakers to the USB hub in the order of North speaker (port 1), East speaker (port 2), South speaker (port 3), West speaker (port 4).
20. Attach a power strip to one of the maze legs with duct tape. Connect the power cable for each USB hub to the power strip.

21. Complete A+ maze: