

Kekoa Data

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Technical Documentation

Waterproofing Thrusters:

A problem with the thrusters on the WAM-V is that they need to be waterproofed. If they are not waterproofed, then water will enter the hole at the top of the thrusters and damage the internal parts. The XT-60 connector that power the thrusters also need to be waterproofed. To waterproof the hole at the top of the thruster pole you first use duct tape to cover the hole. Make sure the edges of the hole are securely covered and tape around the wire coming out of the hole. After securing the hole with duct tape, flip the thruster upside down so that the hole is facing the ground. Using the two small holes on the side of the thruster pole, put glue into the thruster pole using a hot glue gun. Fill the pole with hot glue until the glue just starts oozing out of the small holes on the side of the thruster pole. Turn the thruster back upright and wait around 10-15 minutes for the glue to dry and harden. After the glue has hardened and cooled, remove the duct tape. The thruster is now waterproofed because the glue stops any water from entering the internal parts of the thrusters. To waterproof the XT-60 connector, use a medium size zip tie and zip tie around the XT-60 connector vertically. The zip tie will prevent the connector from accidentally disconnecting from tugging. Once the zip tie is tightened use a hot glue gun and glue around the XT-60 connector until a thick layer of glue covers the connector completely.

Make sure there is glue under and over the zip tie. The hot glue will prevent any water from going into the XT-60 connector. Let the hot glue dry for around 10-15 minutes. The internal and electrical components of the thrusters are now waterproofed.



Figure 1: Thruster pole hole filled with hot glue.

Cable Management:

The cables that are around the WAM-V need to be properly secured to prevent cables from breaking or disconnecting while the WAM-V is in motion. First, the WAM-V needs to be fully setup, this including the cameras, thrusters, hard boxes, and the light pole. Once all the cables have been connected and set up, bunch the cables that are following a similar path around the WAM-V. By bunching the cables this will prevent us from using excess Velcro and help you

organize the cables better. Next, grab a set of cables and loop them to prevent the cables from hanging low from the boat. Using the frame of the WAM-V, which are the black metal bars underneath the WAM-V platform, attach the wrapped-up cables to the bars with Velcro. Check to see if any of the cables dangle or look like they can easily be caught by a rock when the WAM-V is traveling in the water.



Figure 2: Metal sidebar of the WAM-V, a spot where the cables can go.

Scan the Code Shapes:

For the Scan the Code task that our WAM-V must do in the competition, we first need to make shapes that the WAM-V can observe. To make the shapes, you first need to cut a 3x3 ft square out of the vinyl paper using a tape measure and scissors. You will need a total of 9 vinyl

sheet squares for the 9 shapes. The shapes needed are triangle, crucifix, and circle. The colors needed are red, green, and blue with each color needed for each shape. Since some of the shapes have already been made, we used those as examples to create the new shapes. Using the tape measure and a pencil, we sketched the outline of the shapes onto the vinyl paper using the dimensions from the already made shapes. Once we have all the outlines made, use painters' tape to cover the edges of the outline so the shape edges look straight. Then fill the shapes in with paint. Hang the newly painted shapes overnight. After the paint dries, we will need to glue PVC boards onto the back of the shapes so that it does not flap in the wind. Cut nine 3x3 ft square with scissors out of the PVC boards. Using the spray-on adhesive, spray the PVC boards with the glue and lay it on the back side of the shapes. Smooth out the backing on the shape's vinyl sheets to make sure it sticks firmly.

Scan the Code Shader:

For the Scan the Code light pole we need a shader to help block sunlight from shining onto the light. To do this I used a piece of cardboard. Using a X-Acto knife, cut the cardboard 1 meter long and 1 meter wide. In the middle of the square cut out a circle that is 6 inches in diameter. Next cover the surface of the cardboard with duct tape with one layer of duct tape going in one direction. Add another layer of duct tape going in the other direction, covering the first layer of duct tape. Put duct tape to both sides of the cardboard shader. To make the shader stiffer use 0.5 inch PVC pipes. Cut one PVC pipe that is 1 meter long. Then lay that pipe diagonally across the square shader, making sure the pipe does not cover the hole in the middle of the shader. Attach the pipe to the shader using duct tape. Next, cut two pieces of PVC pipes that are both 7 inches long. Lay one pipe diagonally on one side of the shader and the other pipe

on the other side. Apply duct tape to both of the pipes so it sticks to the shader. All the pipes should almost resemble an “X” shape. This will prevent the shader from bending when it is covering the light on the Scan the Code light pole.



Figure 3: Duct tape covered cardboard with PVC pipes.