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Design Documentation Micromouse UQMARS 2023

I decided to use an acrylic board 3mm at a maximum size possible for our chassis. The size constraints required the micromouse to be within 8cm height, and 16cm length and width.

I decided to attach the two motors (of the wheels) to the top side of the board instead of the underside, although this would occupy important space for other components. This is because this would allow more usable vertical space for other components and help stay under the height limit of 8cm.

Originally, I wanted the micromouse to take up the 16cm x 16cm constraint almost entirely. I measured the wheels to be approximately 2.6 centimetres wide, and these wheels had to be attached to the side of the board, which means this had to be accounted for in the total width. I rounded the width allocated to wheel movement up to 3cm.

$$16 - 3 * 2 = 10cm$$

Now, I planned to have a 10cm x 16cm acrylic board as the chassis. Fortunately I realised the diagonals of the board would exceed the 16.8 width of the maze corridors, which meant it would be incapable of turning, and thus needs to be changed. As of now, the diagonals of the board would be:

$$\sqrt{16^2 + 10^2} \approx 18.86cm$$

Which is clearly more than 16.8cm. I calculated the maximum size for the board while ensuring the diagonals meet the length restriction (which I rounded to 16 for more tolerance and simpler calculation) like so:

$$\sqrt{x^2 + 10^2} \leq 16cm$$

$$x^2 + 10^2 \leq 256$$

$$x^2 \leq 256 - 100$$

$$x \leq \sqrt{156}$$

X is always positive because we are working with physical items.

$$x \leq 12.49cm$$

Therefore it was decided that the acrylic board was 10cm x 12cm. I did a 5mm fillet on each corner for more "space" as well.