

Bomb Squad Poster

Design Objective

The main objective of this project was to design a robot capable of locating and navigating to a sound producing device for retrieval purposes. The premise included the cartoon bomb ticking as a visual for it and brings with it the main goal of providing safety for those who would otherwise be near the hazardous location.

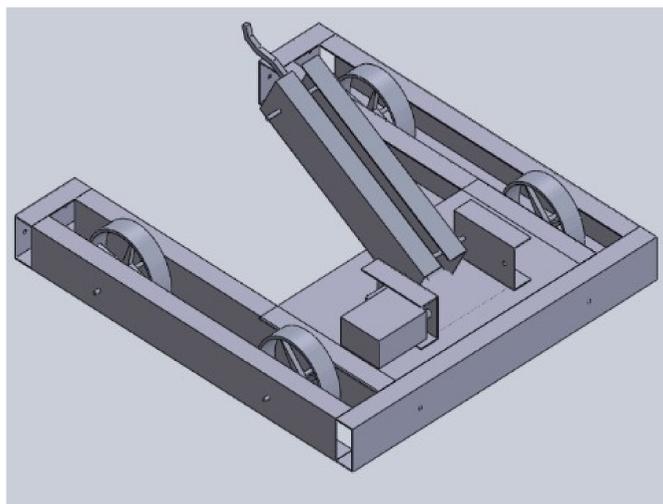


Figure 1. Concept CAD Drawing of Robot Design.

Idea Generation

In order to create a final design for the robot, it was necessary to take the ideas generated and compare them based on the pros and cons of each design. This process was executed using a Morphological Chart and Pugh Selection Matrix. The results from the selection matrix became the design used in order to ensure the most efficient operation process and the least risk of technical failure or difficulties.

Requirement	Weighting [1, 2, or 4]	Baseline Concept		Concept #1		Concept #2		Concept #3	
		rating	score	rating	score	rating	score	rating	score
Efficient	2	0	0	0	0	0	0	1	2
Simple	2	0	0	-1	-2	0	0	1	2
Accurate	4	0	0	1	4	0	0	0	0
Safe	4	0	0	0	0	0	0	0	0
Easy to build	2	0	0	-1	-2	-1	-2	0	0
Easy to use	2	0	0	-1	-2	0	0	0	0
Cost	4	0	0	-1	-4	1	4	0	0
Total			0		-6		2		4

Figure 2. Bomb Squad Pugh Selection Matrix.

Troubleshooting and Assembly

After the idea generation, the purchasing and receiving of parts was completed with an inspection. Following this inspection the chassis was assembled along with the other sub assemblies.

The programming and testing phase of the project began, after a functional prototype was built. RobotC was the platform used to create and troubleshoot the program for the VEX cortex, or the robot's brain.

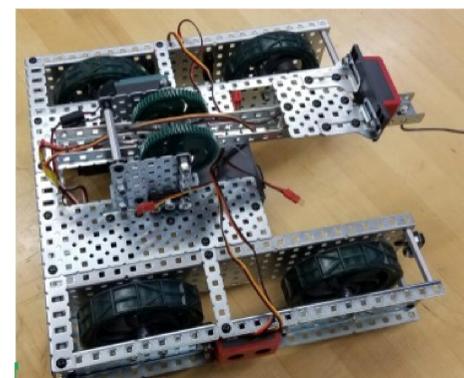


Figure 3. Initial Assembly before troubleshooting

Results

Capable of navigating about its environment by means of 3 ultrasonic sensors mounted to the front of the robot, one to the front of each wheelhouse and one to the top of the arm. Traverses using 2 powered VEX wheels in the rear and 2 free-spinning omni-wheels in the front. Unfortunately, the group was unable to get the sound sensors to operate completely, considering there was a cross-platform communications between programs. The group also needed more time than given to learn and effectively implement the knowledge.

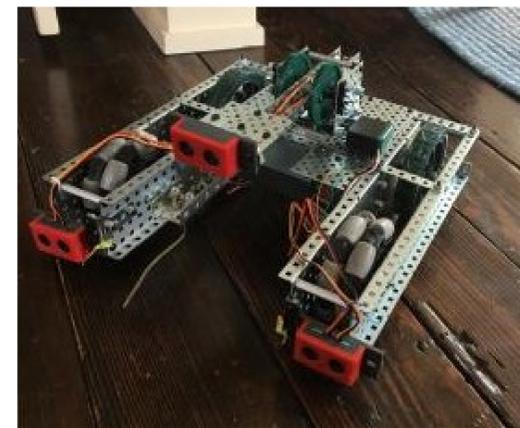


Figure 4. Troubleshoot Robot.

Conclusion

The group was unsuccessful in programming a completely functional bomb disposal robot due to the lack of skill in programming and time as well as due to the current global pandemic. However, the group was able to get the ultrasonic range finder to operate and get the robot to navigate through its surroundings. The group highly recommends the continuation of further investigation into the bomb disposal robot to provide safety to those who operate in hazardous conditions.

Acknowledgments

We would like to say thank you to Professor Speicher for the guidance he provided during this project.

References

Vex Robotics Website for research on Ultrasonic sensors, and motors.

RobotC programming website for tutorials on the programming language