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Product Design Challenge Description
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Vex Holonomic Robot Description

The robot design that I have decided to enter into the Product Design Challenge is my three-wheel Holonomic robot. The purpose I had in mind when building this robot was to make an interesting, easy to use, remote controlled toy that could show the benefits of a holonomic drive. For a robot to be considered to have a holonomic drive system it must be able to move in all degrees of freedom on a 2D plane. This means it must be able to move forward, backward, side to side and rotate on the y-axis.

There are a few ways to create a holonomic drive platform for a robot. One example is a crab drive system. A crab drive uses either four wheels that can all rotate 360º, or have the front two wheels rotate and have an omni-directional wheel in the back for balance. Another way to achieve a holonomic drive is through mecanum wheels. Mecanum wheels have rollers placed at 45º angles on the surface of the wheel. Mecanum wheels act the same as regular wheels but when rotated in specific directions will create lateral movement. The final way to create a holonomic drive is to use independently driven omni-directional wheels. In this type of holonomic drive, three or four wheels are placed at 60º and 45º angles respectively. Depending on the speed and direction of each individual wheel, the robot will be able to travel in all directions on a 2D plane.

For my robot I chose to make a three wheel holonomic. I felt it would be the easiest to construct and the most challenging to program of all the holonomic drive types. I mounted the wheels on the chassis rail and geared the wheels at a 1:3 ratio for a balance of speed and power. To get slightly more speed I chose to use the large omni wheels. Everything else mounted on the chassis is for either support or structure. The frame of the robot is very simple but the programming is complex.

To give the robot an easy control system I had to write a program to convert the x and y values of the controller to the movement of the robot. This ease of use was vital in achieving the goal of an simply controlled robot platform that could be used in other applications as well as entertainment. In the future I plan to widen the base and use it as a platform for a game like Elevation or adapt it to help the elderly in their homes with simple but vital tasks.