Using Sensors to Manipulate the Ball

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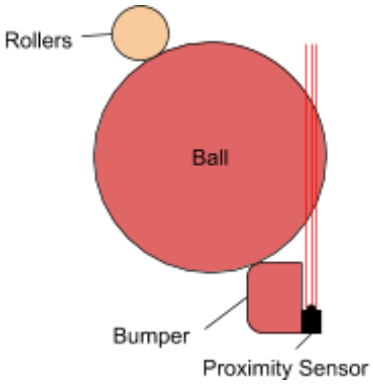
Control of the ball is very important in this game. To assist our drivers in handling the ball, we use three sensors, a proximity sensor, a gear tooth sensor, and the drivetrain encoders.

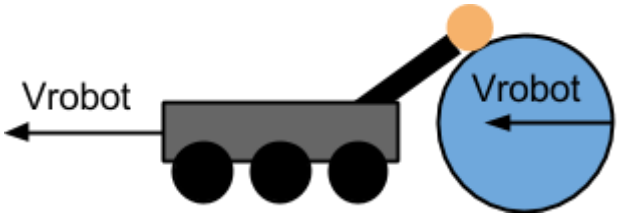
Ball Collection and Detection

A proximity sensor behind the bumper automatically spins the rollers until it detects that a ball has been collected over the bumper. Whenever the proximity sensor detects that the ball has slipped out of the robot, the rollers quickly spin the ball back into the robot. In addition, to keep the ball from slipping out the bumper during driving, small constant power is supplied to the motor.



Dribbling with Speed Control

To maintain control of the ball on the ground without collecting into the robot, the drivetrain encoder values are used to control the collector roller motor power so that the surface speed of the rollers matches the speed of the robot.



Controlling Passing Speed Independently of Driving

A gear tooth sensor and the drivetrain encoders are used to control the ground speed of the ball when passing. Similarly to dribbling, the drivetrain encoders are used to set the roller motor power. For increased accuracy, an additional gear tooth sensor on the rollers is used to detect when the rollers are spinning at the desired speed. The collector arm is then lifted, leaving the ball at the desired ground speed independent of driving speed. This is especially spectacular when the robot drops the ball still on the ground even while driving at full speed.