Hardware Cost

An IR sensor will be used to detect the outer perimeter that is marked by a black line. The IR sensor has an IR transmitter module that emits infrared radiation, and the reflected radiation is detected by the IR receiver module. The black line will absorb the radiation and allows the robot to detect the outer perimeter. As the robot only needs to detect the black line, as opposed to differentiating between different surface colours, a digital sensor is chosen. Three sensors will also be mounted to the front base of the robot body and must detect the line with a range of 0.5 mm. The Infrared Sensor Module (TCRT5000) is selected as it satisfies all criteria. This sensor can be purchased from Canada Robotix for $3.19 CAD.

An ultrasonic sensor will be used to detect moving and stationary obstacles. The ultrasonic sensor has a transmitter module that emits sound waves, and the reflected wave is detected by the receiver module. Using Sound navigation and Ranging (sonar) the robot can detect and avoid objects in its path allowing it to safely achieve its goal of clearing snow from designated areas. The sensor must be able to detect objects from 10 cm to 300 cm. The sensor must also have a measuring angle of 30 degrees. The HC-SR04 Ultrasonic Ranging Sensor is selected as it satisfies all criteria. The sensor can be purchased from Canada Robotix for $5.09 CAD.