Assignment 1
Squarebot

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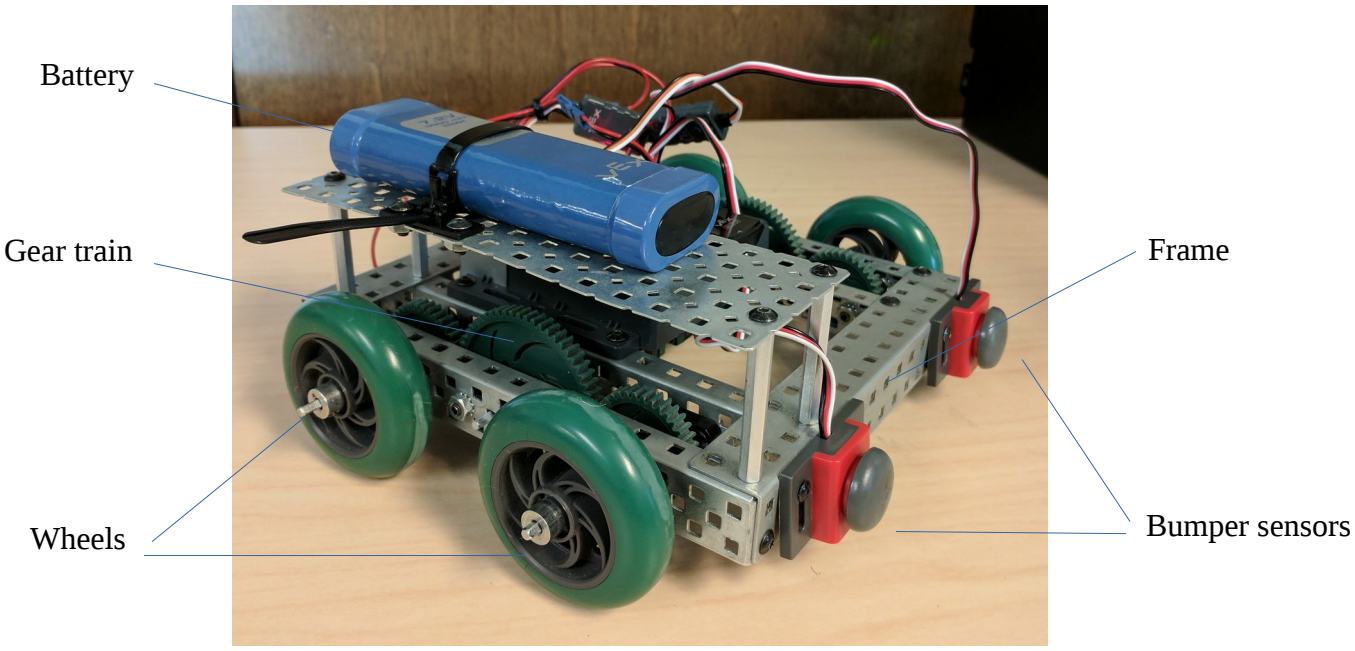
Team 10

Introduction

The purpose of this assignment was to familiarize ourselves with the hardware that we will be utilizing for subsequent assignments. The hardware that we use is the Vex robotics kit. Our task was to assemble Squarebot, a relatively simple robot capable of remote controlled operation and primitive autonomous behavior. This was a guided task which will not be the case for future assignments.

Design Summary

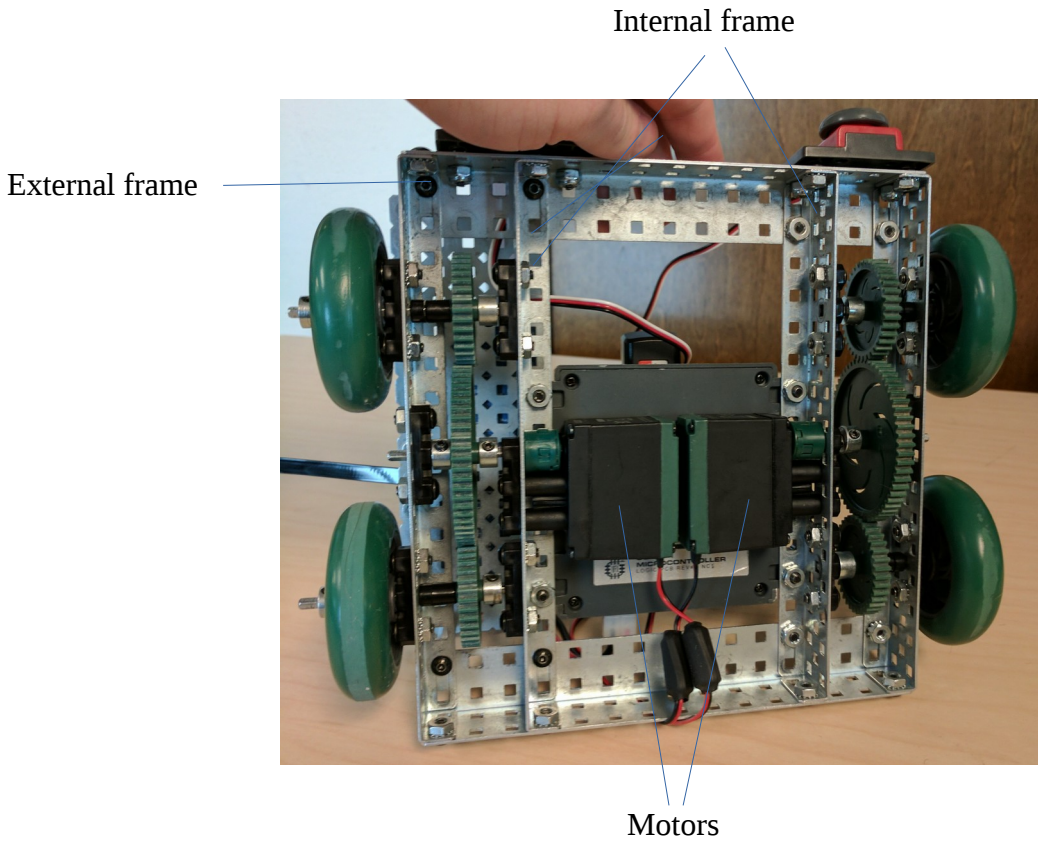
The design for squarebot was given to us with step by step instructions. Our end product only varies slightly from the predefined design, which we will cover later in this section. The overall design of squarebot looks as follows:



The robot consists of an internal frame which houses the motors and gear shafts and an external frame which secures the gear train between the two. These gear shafts then protrude to the exterior of the vehicle which provides a mounting location for the wheels to be placed. Only the large center gear in the gear train is powered, which in turn rotates the smaller gears that the wheels are connected to.

Only barely visible in the photo above, the microcontroller mounts perfectly on top of the internal frame. The microcontroller is the brain of the robot which contains all the logic that governs its operation. The battery, which provides the vehicle with power, is secured to the a risen mounting point to avoid interference with the gear train.

A view from the undercarriage provides a more detailed look of the the robots frame and control mechanisms.



Visible from this angle is a small amount of space between the bumper sensors and the external frame. This is the only variation, albeit a very small one, from the initial design. The screws that attach the internal and external frame together block mounting points for the sensors, so we only attached them using two screws at the top of the sensors, causing this upward angle. Our testing showed that this did not affect performance of the sensors.

Performance Evaluation

The objectives for performance of squarebot were teleoperation and autonomous mode. Our squarebot met both of these criteria. We experienced difficulty at first because our motors were running in opposite directions for reasons unbeknownst to us. This problem was addressed by using a jumper to enable the microcontroller to correct this behavior. With that problem behind us, our squarebot performed the expected behavior flawlessly.

Conclusion

This assignment did an excellent job of showing us the fundamentals to this robot kit. While our squarebot met the objectives of the assignment, I feel like there is room for improvement in our performance. We noted that the bumper sensors required a good deal more force to activate than initially thought. This may simply be a hardware issue that we will have to accommodate for in future projects, but I was wondering if that sensor could be calibrated to have a lower threshold for activation. Modifying the code was out of scope for this assignment though, so this will be something to explore for future work.