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Team 8

Hardware Design

General Description

The hardware design chosen for this project is a 4 wheel differential-steering model. Standard LEGO pieces were used to form a roughly square chassis that encloses the HandyBoard. Sensors were mounted either by hot glue or standard LEGO connectors. A servo (remnant from a previous design) is locked upright into the front part of the robot strictly with LEGO pieces, but was not used in the final operation.

Body

The HandyBoard is locked into the chassis using the holes provided in the side of the board and standard LEGO pegs. This combined with the use of locking pieces on the inside and outside of all 4 sides of the square chassis makes the base of the robot extremely stable and durable. The ground clearance of the robot is nominal since the terrain expected is that of a perfectly flat vinyl tile floor.

Motors and Gearing

The 2 motors used are standard LEGO Technic 9v gear reduction motors. These motors are positioned perpendicular to the robot's direction of travel on either side of the main chassis in the rear. Each motor independently drives one side of the robot allowing the right/left drives to operate in any combination. The gears used are in an 8:40 tooth ratio from the motor axle to the rear wheel axle respectively. This provides a 5 to 1 reduction to the rear drive wheels increasing the amount of torque available to the robot's drive train. The rear drive axle is not connected to the front wheels in this design.

Sensors

Two rangefinder sensors and four light sensors are attached to the robot chassis, as well as four switches. The initial design involved mounting a rangefinder and light sensor on a pole attached to a servo to act as a radar. This design scrapped in favor of statically mounting two rangefinders in strategic positions on the robot body, and mounting four light sensors facing 45° offset from each of the cardinal directions (see Figure 1). The four switches were used to form a forward bumper array that detected collisions with the rocks. A piece of steel wool is attached to the front of the robot to trigger the collision detecting mechanism of the light bases.

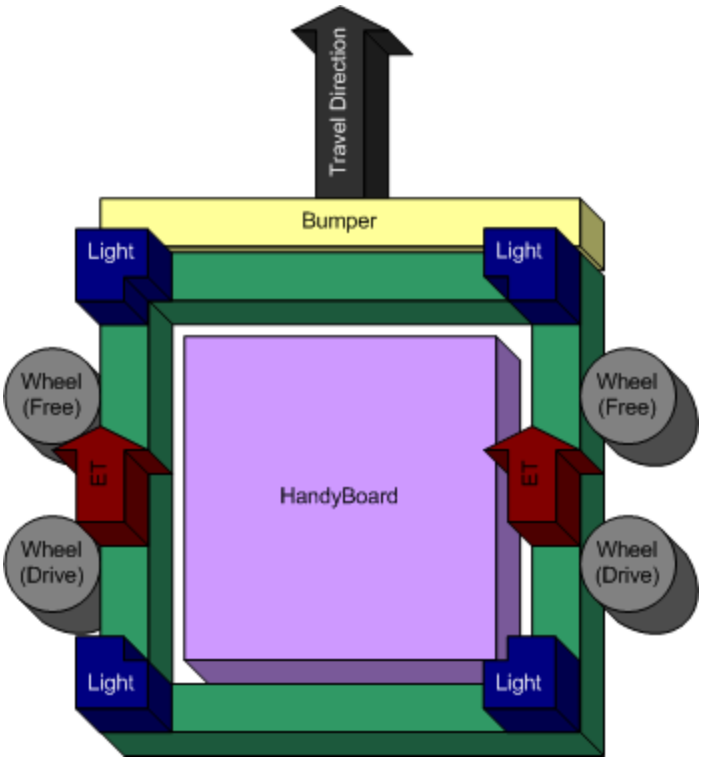

Figure 1

Robot Design Diagram