Group 10

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PROJECT 2: HARDWARE SYNOPSIS

Design Phase:

After inspecting the specifications of Project 2, a robot design was constructed around two principles: minimum floor area and even weight distribution. These were to be taken into consideration when performing the following seven tasks that would complete our hardware construction:

1. Chassis construction
2. Gearing system design and assembly
3. Constructing a cradle for mounting the Handy Board.
4. Mounting the light sensor on the turret.
5. Mounting the range sensor on the turret.
6. Mounting the bump sensors.
7. Mounting the servo.

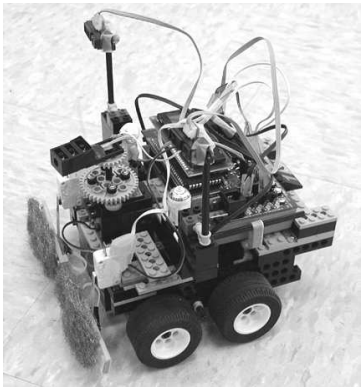
Hardware Phase:

For a compact design the axles were placed as close as possible. The robot has a 4-wheel drive with 2 motors. Each motor powered wheels on the same side. The gearing mechanism provides equal power to the front and rear wheel on the same side. The motor is connected to two 40-tooth gears by an 8-tooth gear. From here, a cradle was constructed for the Handy Board to sit vertically with a cage-like structure surrounding it. A rangefinder sensor and light sensor were mounted onto a 1x8 Lego piece that was then attached to the servo, forming a rotating sensor turret. This was to be used to form a 180 degree snapshot of the environment ahead. Finally, the servo was mounted onto the cage with the sensor turret rising just above the Handy Board. The bump sensor mounting was left for later.

This first design was not structurally sound and a redesign occurred, attempting to create a cradle that would allow the Handy Board to lay flat. Bump sensors were then mounted to the robot in time for the first day of demonstrations. During these two demonstrations, it was determined that the robot needed a more solid cradle, the bump sensors needed to be mounted more solidly and that the rangefinder was not functioning well on the turret.

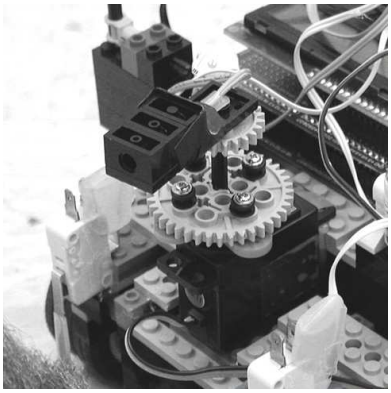
On Thursday night, one final redesign (Fig. 1) was held to fix these three specific problems. First, more Legos were positioned behind the Handy Board to keep it in place. The range finder (Fig. 2) was repositioned on a pole with a twin on the opposite side, leaving the light sensor (Fig. 3) alone on the turret with the 1x8 Lego removed. The steel wool used to complete the circuit was mounted onto thin 2x10 Legos which were then wrapped in tape and glued to the bump sensors wrapped in tape (Fig. 4). During testing

another problem presented itself when the wool/Lego combination was heavy enough to trigger the bump sensor during movement. To solve this problem, plastic ties were placed behind the bump sensors to provide enough resistance during movement but not during collision. During the second day of demonstrations, the robot performed significantly better with the final design.



(Figure 1)

(Figure 2)



(Figure 3)

(Figure 4)