Hardware Description

Group 9 – Project 2 – 07 March 2003
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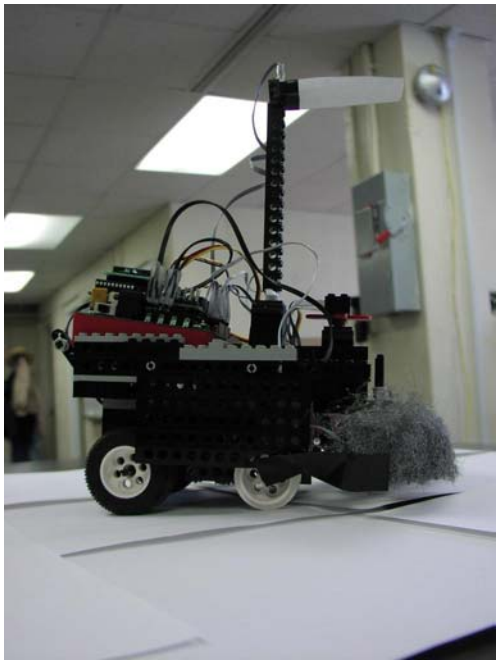
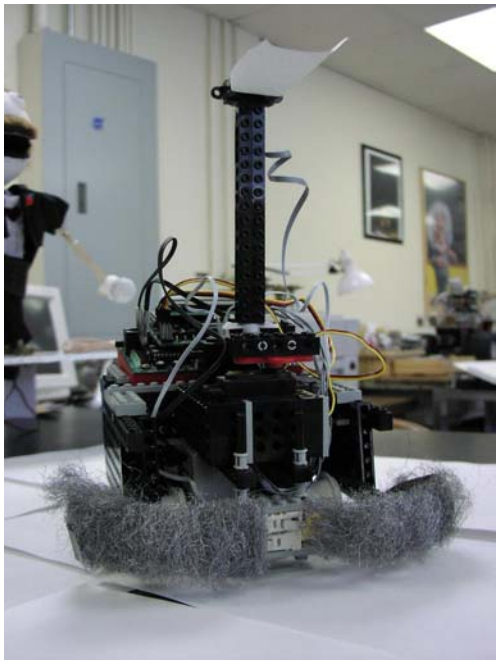
General Description:

Group #9 constructed a robot that is 21cm long at its longest point, and 15cm wide at its widest. At its tallest point, the robot stands 10.5cm. The overall design is a rear-wheel-drive suspension with the two wheels in the front not having rubber tires. This is to lessen the friction when turning caused by the tread against the surface. Each rear-wheel has its own motor to help in turning the robot and its own axle. The handy board sits in a cradle over the front wheels and the range sensor and light sensors are assembled in the top-front of the vehicle. The pictures below give an overview of the general description of the robot.





Gear Assembly:

In our assembly of the gears and motors, we used two motors, a turning motor and a motor to power the robot forward and backward. The front wheels have no gears or motors attached. These wheels are used to stabilize the robot and help in turning. The robot used an adder/subtractor system for movement, with a double differential with approximately 15 gears. The primary motor fired both wheels forward and backward, and the secondary motor was only used for turning. Each motor is connected to a geartrain differential that includes bevel gears. These bevel gears are used to change the direction of rotation, thus giving us the ability to turn. See Figure 1 below.

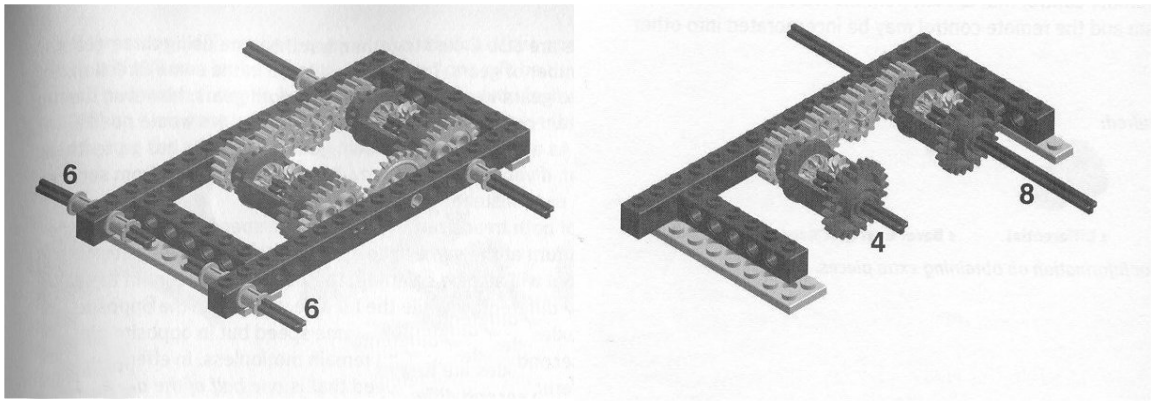


Figure 1.

Axle Assembly:

Each wheel had its own axle, independent of the other wheel. The rear wheels used were 3cm wide and carried a 5cm diameter. These wheels were connected by the geartrain and bevel gears to give the robot a more robust action. A spacer separated the wheel from the outer wall of the chassis. Inside the chassis the gears support the inside of the axis. See Figure #2 below.

Sensors:

For the sensors, we used 3 light sensors and only 1 range-finder sensor. We decided on only 1 range sensor because we were receiving strange readings when we used two. We placed the range sensor 27 cm from the ground so that it would not read any object, including the light, except for the large buckets. The sensor was glued to a servo motor to give it a range of 180 degrees. We glued paper directly under the sensor extending out a few inches to block the sensor from detecting any light. In order to detect the lamp, we used 3 light sensors that were placed 12 cm from the ground. We encased the light sensors into a Lego block in order to block out any errant light. These. sensors were also placed onto a servo motor to give the search for light a range of 180 degrees. We used two touch sensors as a bumper and wrapped steel wool around curved Legos glued to the sensors to complete the circuits on the lamps. See the pictures below.

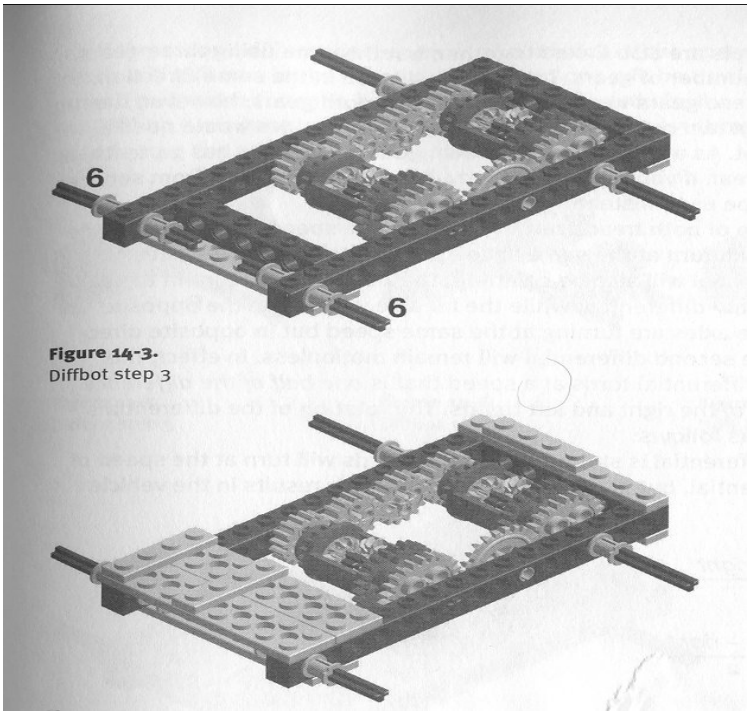
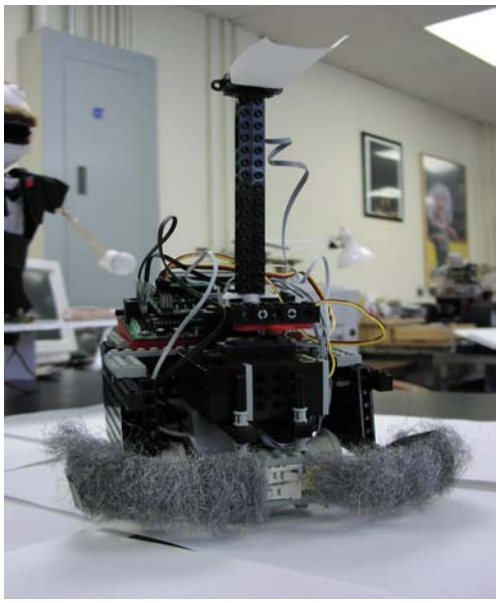
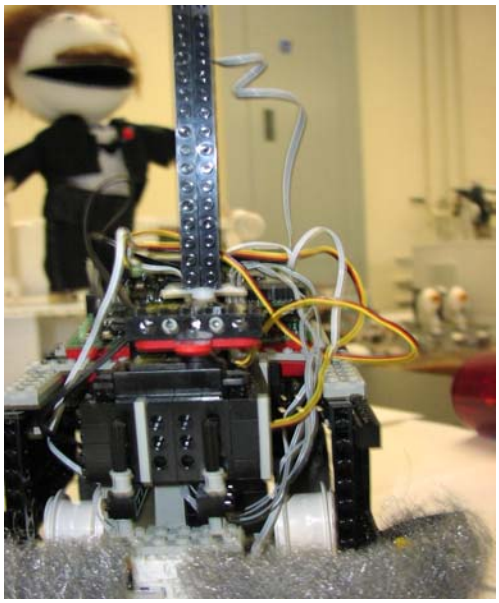


Figure 2





Appendix:

The appendix provides a table listing all sensitive items used in the construction of project #2, as well as a table of relevant measurements of the robot, and a collection of additional pictures.

SENSITIVE PARTS INDEX	
2	Motors
1	Range-Finder Sensor
3	Light Sensors
1	Handy Board

DIMENSIONS		
Width		
	6.5 cm	Chassis
	9.5 cm	Wheel-to-wheel
	3 cm	Rear wheels
	2.5 cm	Front wheels
Length		
	13 cm	Chassis
	1 cm	Range to light sensor
	8 cm	Axles
Height		
	5 cm	Surface to Chassis
	5 cm	Rear wheels
	3.5 cm	Front wheels
	9.5 cm	Surface to Handy Board
	27 cm	Surface to Range Sensor
	12 cm	Surface to Light Sensors