

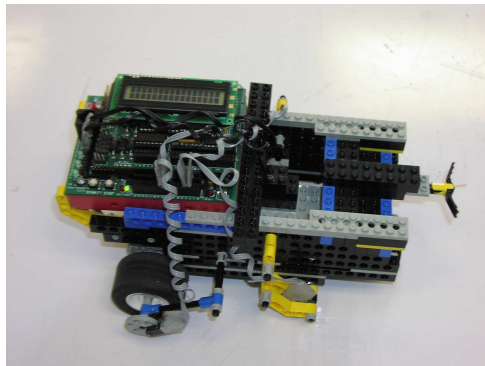
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## HARDWARE DESCRIPTION: GROUP #9 -- PROJECT #1

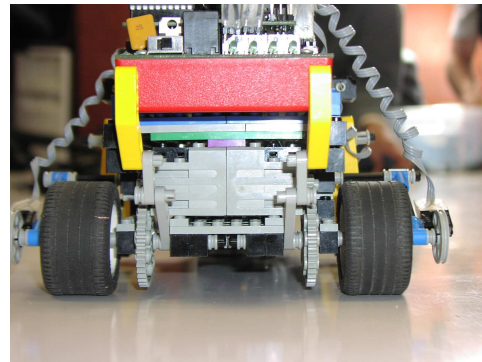
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11 FEBRUARY 2003

**General Description:** Group #9 constructed a robot that is 28cm long at its longest point, and 20cm wide at its widest. At its tallest point, the robot stands 14cm. The overall design is two wheels in the front, each wheel with its own axle and its own motor. A castor wheel in the rear supports the rear weight of the robot and allows for ease in turning. One encoder on either axle regulates the motor speed and keeps each motor moving at approximately the same speed. Directly behind the wheels on either side are L-shaped arms that come within .75cm of the floor. Each of these arms contains a light sensor. The handy board sits in a cradle over the front wheels. The pictures below give an overview of the general description of the robot.



Picture #1 Three-quarter view



Picture #2 Front View

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**Gear Assembly:** As seen above, each wheel has its own motor. Each motor has two gears connecting the motor to its wheel. The gears are arranged vertically, with the smallest of kit's gears attached directly to the motor, and the largest of the kit's gears attached to the axle. They provide all the forward motion and turning ability for the robot. See Figure #0.

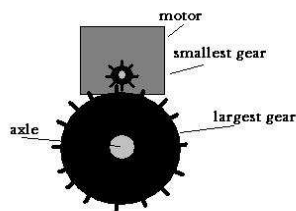
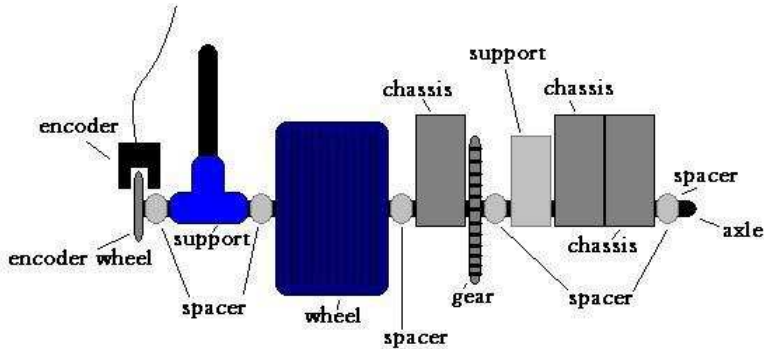


FIGURE #0 GEAR ASSEMBLY

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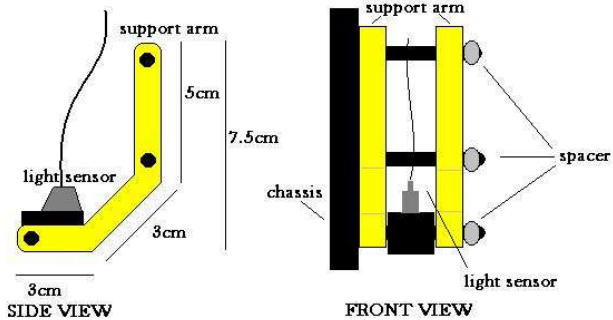
**Axle Assembly:** The axle ended up being a rather complicated affair. Each wheel had its own axle, independent of the other wheel. The wheels used were 3cm wide and carried a 5cm diameter. Proceeding from the outside inward, the axle had a small wheel on which the encoder was attached, followed by a spacer, and then a support strut which linked to another strut slightly to the rear, providing extra stability. Another spacer separated the strut from the wheel itself. A spacer separated the wheel from the outer wall of the chassis. Inside the chassis is the large gear,

followed by another spacer, a support beam, then two sections of the inner chassis, and finally a spacer capping off the inside of the axle. See Figure #1.



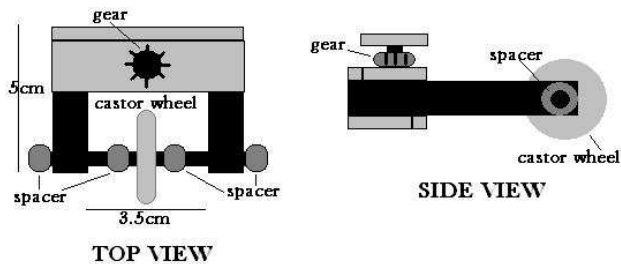
**FIGURE #1 AXLE ASSEMBLY**

**Light Sensor Support Arm:** Directly behind the wheels, curving gently to the rear are two support arms, one on either side. These arms cradle the light sensors, keeping them approximately .75cm off the maneuver surface. Each arm is composed of two of the yellow, L-shaped beams, connected in three places by short axles. The arm is directly attached to the chassis in all three locations. The light sensor is bound between the two beams. See Figure #2.



**FIGURE #2 LIGHT SENSOR ARM**

**Castor Wheel Assembly:** The castor wheel is in the rear of the robot and supports the rear weight. The assembly is simple, two beams connected in the front by a 4cm long axle. In the rear it is capped top and bottom with the thin LEGO slats. A short axle runs vertically out of a hole in the slats and connects with the chassis. See Figure #3.



**FIGURE #3 CASTOR WHEEL ASSEMBLY**

**Appendix:** The appendix provides a table listing all sensitive items used in the construction of project #1, as well as a table of relevant measurements of the robot, and a collection of additional pictures.

| <b><i>SENSITIVE PARTS INDEX</i></b> |               |
|-------------------------------------|---------------|
| 2                                   | Motors        |
| 2                                   | Encoders      |
| 2                                   | Light Sensors |
| 1                                   | Handy Board   |

| <b><i>DIMENSIONS</i></b> |       |                              |
|--------------------------|-------|------------------------------|
| <b><i>Width</i></b>      |       |                              |
|                          | 20cm  | encoder to encoder           |
|                          | 10cm  | chassis                      |
|                          | 16cm  | wheel to wheel               |
|                          | 15cm  | light sensor to light sensor |
|                          | 3cm   | wheel                        |
|                          | 3cm   | light sensor arm             |
|                          | 3.5cm | castor assembly              |
| <b><i>Length</i></b>     |       |                              |
|                          | 28cm  | front to rear                |
|                          | 9cm   | axles                        |
|                          | 4cm   | light sensor arm             |
|                          | 5cm   | castor assembly              |
| <b><i>Height</i></b>     |       |                              |
|                          | 14cm  | surface to handy board       |
|                          | 9cm   | surface to chassis           |
|                          | 5cm   | wheel                        |
|                          | 2.5cm | castor wheel                 |
|                          | 7.5cm | light encoder arm            |
|                          | .75cm | surface to light sensor      |

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*Additional Pictures:*

