Group 7
Project 1 Presentation

Robert Moe
John Zumwalt
Mark Woehrer
Celi Sun

Team Organization.

- Consists of 2 teams.
  - Hardware Team (Robert Moe and Celi Sun).
  - Software Team(John Zumwalt and Mark Woehrer).
- Each Team has a Junior member and a Senior Member.
  - Robert Moe – Senior for Hardare
  - John Zumwalt – Senior for Software

Team Organization Cont.

- Senior members are required to coordinate each teams actions.
- Senior members are members who are most experienced with either the hardware or the software.
- Junior members then become Senior members in their team after each project and Senor members move to Junior.

Team Organization Cont.

- Our team stuck with the plan pretty close, as being the first project all members were fairly new so everyone helped out whether they were junior or senior members.
- Milestones were completed on time or ahead of schedule in every case.

Team Organization Cont.

- All team members participated in synchronizing the two hardware and software sections together for each milestone.
- All design ideas were accounted for and reviewed by all team members to determine if they are best suited for the project as a whole.

Team Organization - Future

- Our team will continue to use the team organization structure for the 2nd project that was used for this current project.
- One team member will stay behind in each team and the other two team members will swap teams and become Junior members.

Robot Design.

- Keep it simple
  - Our team agreed that the design should be as simple as possible to minimize any type of mechanical failure or diffuculty during the run.
  - Simple box cart type robot was constructed.
- 2 – wheel encoders.
  - This allowed us to calibrate the 90 degree turns inside the box.
  - Also measured distance traveled.

Robot Design – Sensors.

- 2 Infrared Sensors
  - Mounted at the front of the robot very close to the ground.
  - Allowed us to determine when we have crossed the black tape and what state the robot is in as it crosses the black tape.

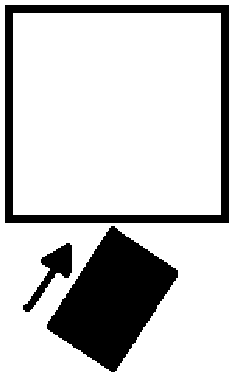
Robot Design – Gears.

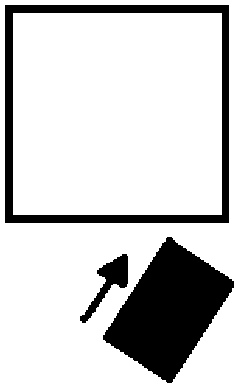
- Gearing
  - First design used a low torque high speed gear ratio but found that the motor was not equipped to handle that ratio.
  - Used a 5:1 gear ratio with a 8 tooth gear on the motor and a 40 tooth gear on the axle which allowed for high torque but low speed.
  - Advantage was the ability to more easily control the turning and approach of the robot.

Robot Design – Wheels

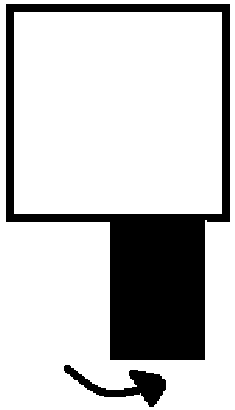
- First design we used a tricycle type design with rear wheel drive.
  - Could not get the robot to drive straight.
  - Added 2 wheels up front and rear wheel drive still did not drive straight
- Turned the robot around and made it front wheel drive.
  - Robot drove a lot straighter after matching motors.

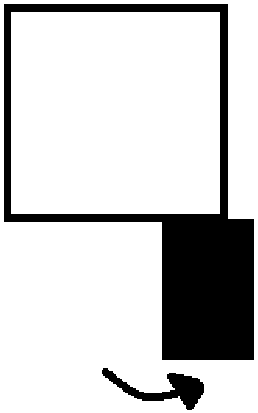
Approach





Adjust



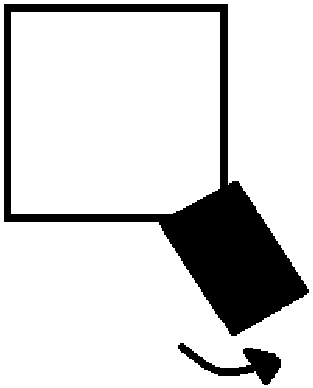


- Slight right bias in straights limits approach possibilities

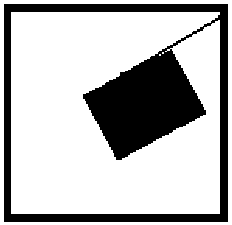
- If a sensor hits a black tape, then stop motor

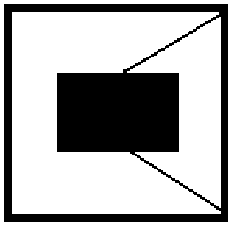
- Points the robot toward the middle of the square

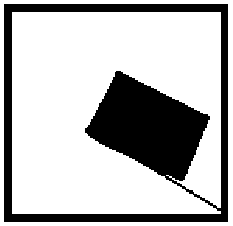
- Alignemt procedure allows for error in the turn



Move Forward and Turn







Robot Code – Main Loop

- DO UNTIL 3 cycles
- drive sraight
- IF traveled distance > 5ft THEN
- look for black tape
- IF looking for black tape AND left sensor found black tape THEN
- stop left motor
- left side in the box
- IF looking for black tape AND right sensor found black tape THEN
- stop right motor
- right side in the box
- IF right and left side in the box THEN
- move forward 6 inches
- turn
- allign

Robot Code – Turn Sequence

- turn:
- DO UNTIL 90 degrees
- IF left sensor found black tape THEN
- break the turn
- back up until right sensor is inside the box

Robot Code – Align (shimmy)

```
DO UNTIL aligned
    move forward slowly
    IF left sensor finds tape THEN
        apply left brakes
        left aligned
    IF right sensor finds tape THEN
        apply right brakes
        right aligned
    IF left aligned and right not aligned THEN
        twist robot counter-clockwise
    IF right aligned and left not aligned THEN
        twist robot clockwise
    IF left aligned and right aligned THEN
        rest for a time to allow the bot to settle
        IF current sensors are in an acceptable range THEN
            alligned
        ELSE
            continue
```

The End