

## Challenge 06

Amidst cheers and people trying to get out of the way, “Red the Robot” rolled from our kitchen, down the corridor, took several turns and eventually emptied its container of water in a bucket! This was D day for Challenge 06 which Paul had given to two teams on our staff, the Red team and the Blue team. The aim was to build a robot capable of acquiring, transporting and watering a plant in our lobby. This fun exercise was designed to promote critical thinking, planning, designing, team work and ability to execute.

The two teams were each given a robot kit as a basic

tool but were allowed to order any other supplies needed. The robot had to carry at least 8 oz. of water but each additional ounce carried would score an extra point. One point would also be added for



*Red the Robot: the winning entry of Challenge 06. Red weighed 2.25 lbs., carried one gallon of water, and had an ingenious design incorporating optical encoders around the wheels and bumper switches at the front.*

Both teams had working, autonomous robots. The Blue team’s robot took a wrong turn and spilt its water, wetting the electronics. The Red team’s robot performed flawlessly until the very end. Theirs was also the lighter of the two, and carried more water. Their ingenious design incorporated optical encoders and front bumpers. To ensure the robot went straight even if the motors powering each side were going at different speeds, optical encoders were

used to compare the revolutions made by each motor and correct them so they were kept the same. To correct for any error still built up along the course, two bumper switches mounted on the front of the robot triggered upon contact with the bucket depending on whether the robot was facing the bucket or not. For instance, if only the left bumper switch was depressed then the robot knew it was too far to the right and corrected for this by backing up and turning left slightly, repeating



*Blue Robot in action... filling a bucket (instead of overwatering the plant).*



*Suzanne Colvin, from M&T Bank, and Paul present the awards.*

each ounce that the robot weighed less than 8 lbs. A totally autonomous robot, completing his task without human intervention or radio control, would have its score doubled.

Each team met twice a week from mid May to mid August while keeping their progress a secret. Three independent judges as well as other guests were invited to our annual picnic. The teams were required to make a short presentation documenting their project before setting their robot to work. The judges scored on presentation, creativity and ingenuity.



*Red Team enjoying their prize: spending the day visiting the Smithsonian Museums in Washington, D.C.*



*The winning Red Team (clockwise starting with back row) Cathy, Ken, Hanh, Ricardo, Eric and Russell (Captain).*

until both bumper switches were triggered, indicating the robot was centered facing the bucket and ready to dispense its water.

Much fun was had by all who attended. Got any ideas for Challenge 07 or know of any engineers looking for employment? Email us at microwt@aol.com.

**Terri’s Notes...** When Chris asked me to be a judge for “Challenge 06” I had no idea what was in store. She gave me a cool new embroidered shirt and a packet full of instructions. Having no scientific background whatsoever, I was wondering if I was in over my head. It was a bit intimidating, but also intriguing. The creativity involved in just the concept of the challenge was extraordinary (who thinks of these things??), how on earth could the challenge be successfully met? It seemed impossible.

The day of the event, I was nothing but amazed. Totally blown away, would be a better description. The thought, planning, engineering and execution of these robots was phenomenal. Watching them perform, everyone was caught up in the excitement of the moment(s). We all shared the disappointment when the Blue Team had difficulties, and the thrill of success for the Red team’s triumph. **Kudos to both teams for an amazing accomplishment!**

I have no idea how they can top this, but I hope I am invited back again next year to find out.



*Judges: Terri, Charlie and Tom*