

Challenge Four: *Explorer/GoHome*

ROBOTIC AUTONOMY
Summer 2002

With CMUCam attached, your trikebots are now capable of "telepresence"! In other words you can receive the sights that your robot sees even though it is out of your sight.

Explorer (30 points)

This challenge simulates exploration of a Martian environment. There is significant communication delay to Mars, and so often only ONE command can be sent to a Mars rover each day. In this challenge, you will attempt to navigate from a Mars Lander across a field of obstacles to take a close-up photograph of a Martian Alien Frog. But, each "Martian Sol" you will only be allowed to send one command to your robot. Therefore, the challenge is to complete the task in the minimum number of days, or button-clicks. You may design complex button operations using multiple text fields. Each Action, or button push, constitutes one Martian Sol (entering information into TextFields is not penalized). We will show you the Martian landscape on Tuesday morning.

GoHome (30 points)

Your robot will be placed somewhere in Building 17 in any hallway, office, or classroom. There will be a defined Home location which your team will be clustered around. Your job will be to use any means to figure out where your robot is and get it Home as quickly as possible. Your entire team will be using a single computer and will be unable to move around. The robot will not be visible from your location, so figuring out where your robot is will be challenging. You may use buttons as well as the joystick controls for this challenge.

Vision Demonstrations (Extra Credit)

Any object is legal, except that the total object size must be small enough to fit inside a 2-foot cube.

- Visual tracking (Indoor): the team that demonstrates reliable tracking at the longest distance indoors, down the hall (4 points)
- Visual tracking (Outdoor): the team that demonstrates reliable tracking at the longest distance outside, on the pavement (4 points)

Open Source (15 points)

You will be open-source releasing your Explorer program. This means that your writeup needs to explain to people how your buttons work so that they can hope to use your button-click explorer interface. As with SmartWander last week, create a new folder (Week 4) and put in that folder your UserWindow.java and UserThread.java for Explorer together with the following written sections:

- Summary: what this program does
- Directions: how to run Wanderbot
- Performance: how you have tested Wanderbot and how well it did
- Limitations: how and what causes Wanderbot to perform poorly
- Suggested Improvements: what you would do next to improve Wanderbot

To support your description, we will ask you to help videotape a ten-second shot of your Wanderbot moving as well as two pictures showing it in normal circumstances. We will put these pictures and video in your team folder.

Web Documentation (15 points)

The questions to submit for your web site this week are:

- 1) Describe the key piece of code you wrote or modified to meet the GoHome challenge. What does it do? How?
- 2) Make an overhead sketch of the Martian environment your trikebot encountered in Explorer. Indicate for each obstacle your trikebot encountered how you and your trikebot responded. Give a general idea of it's just a sketch!