

Challenge Five: *Ducklings/JoggingCompanion*

ROBOTIC AUTONOMY
Summer 2002

With a little more experience and programming, the CMUcam allows you to demonstrate autonomy and even more exciting forms of robotic interaction.

Ducklings (30 points)

This challenge requires visual tracking and following. Your team will choreograph at least two trikebots behaving like Mother Duck and her duckling. For extra credit, use all three of your team's trikebots. To use CMUcam, put something on Mother Duck so that, just like a real duckling, her brood visually follows her around. You must come up with some autonomous behavior for Mother Duck so that she navigates through a course. You'll design this course, somewhat like you did for Dance from a few weeks ago—remember Dance? Create a path with obstacles that demonstrates the ability of the duck family to happily stay together.



Hint: You should think about using different colors on different robots, if you have multiple ducklings running simultaneously.

Remember, tracking can run either autonomously from your code (on the iPAQ using `ActiveColorTracking()` or `ActiveWindowTracking()`) versus just using `TrackColor` on the laptop and not letting the iPAQ move the robot's head.

JoggingCompanion (30 points)

By tracking and following outdoors, you'll be the first people to have your own robotic jogging companion. Your invention will follow you around at a slow or fast pace using color tracking. Your challenge is to program and design so that one of your teammates can go for a walk or a slow jog outside and have the trikebot follow you reliably. We'll set up a course that you will have to walk or jog to demonstrate this ability. Each team will work out with their robot around this course for three laps. Each lap must be led by a different member of your team, so be sure everyone practices trikebot-leading. The winning team will successfully run the course with the fastest time.

Hint: You should consider what to do when the trikebot loses the person. It may be a good time to try different color parameters, for example. Or looking around. Do not forget about the difference between Poll Mode and Streaming Mode, especially if you intend to do `TrackColor`. Also, start practicing indoors, then move outdoors.

Open Source (20 points)

You will be open-source releasing your JoggingCompanion program. As with previous weeks, create a new folder (Week 5) and put in that folder your `UserWindow.java` and `UserThread.java`. We'll put in video and pictures and you'll add your writeup. Please explain not only about the program but also about what you use to get it to follow you.

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

Web Documentation (20 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 Ducklings challenge.
- 2) Make a sketch of your Ducklings course and indicate what the trikebots tracked.