

Project Guide

Robotic Fish Feeders

A 9th grade biology class had a problem – there was no one to feed their fish over the two-week winter break. We decided to try and develop a robotic solution.

Learning Goals and Skills

Students learned to program an Arduino, build simple circuits, and do some work with wood. Perhaps more importantly they got some experience solving a problem they initially had no idea how to solve. Their desire to provide for the fish lent urgency and importance to the project.

Facilities and tools at a glance:

- Basic wood shop
- Computers with internet connections

Materials at a glance:

- Arduino microcontroller(s)
- Scrap wood
- Fish

The fish food came in two varieties – pellets and powder. We started out by thinking about what might have been invented already. Who else had already worked on this problem? We defined the problem as “releasing a limited amount of something over a specific period of time” – pretty broad. It turns out that lots

of industrial processes solve this problem – think filling containers (Coke cans, putting pills into bottles), factory food production, industrial animal feeding, etc. We looked at how such machinery might work. We decided to split into two groups, one for powdered food, one for pellets.

Next we looked at what an Arduino can do and how it can create mechanical movement. Both groups settled on using a servo, a high-torque motor that can be rotated a specific number of degrees by the Arduino. After experimenting with some Arduino code and servo motors to understand how they work, the students started brainstorming. The powder group decided to load the powder into a vertical cylinder (a ballpoint pen with the innards removed) and have the servo flick a horizontal plate just under the pen to the side for a moment, allowing a small amount of powder to fall into the fishtank. The pellet group opted for a plywood plate with several holes sitting on a plate with one hole. Each time the servo moves the upper plate, one of the upper holes, which has a few pellets sitting in it, lines up with the bottom hole and the pellets fall into the tank.

After much troubleshooting and adjusting, they got both systems working. When winter break arrived we hooked both up and crossed our fingers that there wouldn't be any electrical failures. Everything worked and the fish lived.

For photos, see lindylabs.org. For questions and comments, jmerrow@riverdale.edu