Summer 2018 Research Project Proposal

Emily Evans

Big Picture

While the number of robots in the world has certainly been increasing, at large, they are inaccessible to the average user. This stems from a number of reasons: robots are complicated, costly, time consuming to make, and require specialized knowledge to design and build. Because of these factors, robots are hard to obtain, and the general population is not extremely interested in them. In order to get more robots out into the general population, these issues need to be addressed, and they are being addressed in a number of ways.

Work is being done to develop a robot compiler fabrication tool, RoCo, that would allow casual-end users to develop their own robots without needing the expertise and specialized knowledge normally needed to design one. This will help eliminate the issue of complication. To further reduce complication and cost, an emphasis is being put on the development of printable paper robots inspired by origami where a two dimensional template like the one below is printed on paper, cut out, then folded to make the three dimensional structure of the robot.

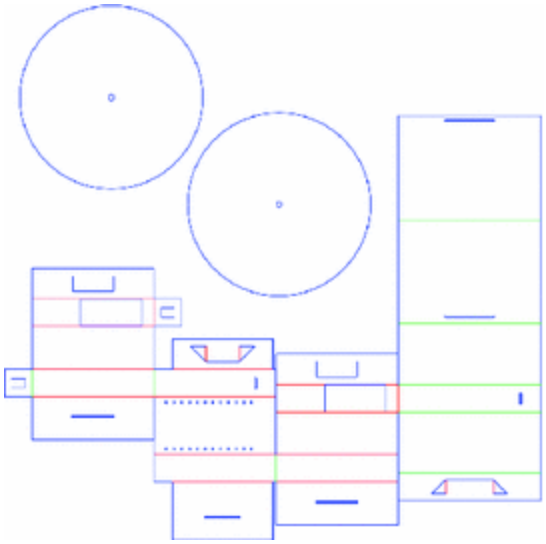

Figure 1: Template for a cut-and-fold robot

Specific Project Scope

The aspect of this project I will be working on is developing applications for the printable paper robot. The benefits of the printable paper robot is that it is extremely cost effective and accessible as most modern households have a printer. Some of the drawbacks, however, are the

folding process to make the robot can be a bit complicated, and even if a person could print out the template, they might not be able to figure out the electrical components that go into making the robot work. These benefits and drawbacks make the printable paper robot a great project for a class of high schoolers and possibly middle schoolers to take on with the proper guidance. My goal is to develop instructions for a project that could be taught to students for them to make their own paper robot. The simple materials needed would make this project low cost for the school or students, and the complexity is low enough that the students would learn a great deal, but not find the goal unachievable.

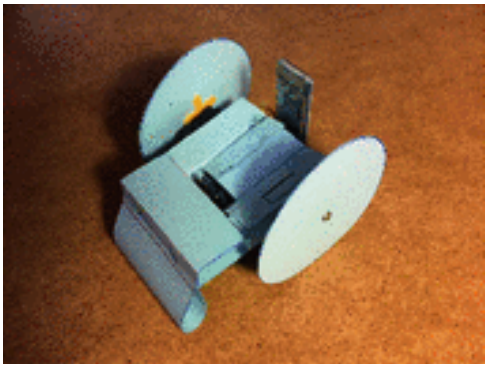

Figure 2: Cut-and-fold race car robot put together

Starting out with making a robot similar to the one in figure 2 or a simplified version of it, would be a good introduction to robot construction for the students. The goal would be to spark interest about robots and technology in the students, or at least make robots a less foreign concept to them. Further down the road as RoCo gets more developed, additional courses could be made to accompany this one where students would design their own robots and build them.

Goals and Deliverables

The ultimate goal of this project is to have the complete instructions on how to build a paper robot for the purpose of using the instructions to teach high school or middle school aged students on how to build their own robot from start to finish.

The deliverable would be the written instructions and possibly a put together kit that has all the materials needed to make the robot as well. The idea being that the kit could be easily handed out to the students at the beginning of the project and they could keep track of all their parts.

Project Timeline

7/2: Decide on best design to be taught. Learn how to make the paper robot.

7/9: Write instructions for race car robot and make kit for easy distribution.

7/16: Incorporate bigger picture elements of robot design into instructions.

7/23: Design another robot to be build from paper. Either humanoid or other.

7/30: Write instructions and make kit

8/6: Incorporate bigger picture lessons into instructions

8/13: Finalize presentation and poster. Present on work.

8/20: Develop plan for implementing project to the classroom

8/27: Wrap up project so the kits could easily be handed out to students and they could build their own robot

SUSP Deadlines

As a student in the Summer Undergraduate Scholars Program, these are the additional assignments to be completed over my time on this project.

7/23 - Journal Club Presentation #2 - project progress

8/1 - Final Abstract due

8/9 - Poster due

8/15 - Project presentations

8/17 - Poster Symposium

Reference

Mehta A. et al. (2016) A Design Environment for the Rapid Specification and Fabrication of Printable Robots. In: Hsieh M., Khatib O., Kumar V. (eds) Experimental Robotics. Springer Tracts in Advanced Robotics, vol 109. Springer, Cham