Lowering Barriers Workshop Application

Proposal Title: Vibration Motor-based Robot Kits as a Foundation for Basic Mechatronics Skills

1. *Participant/author list:* Naomi T. Fitter, Oregon State University, naomi.fitter@oregonstate.edu (primary contact)
2. *Expected participation mode:* remote
3. *Application type:* Demonstration, and playtest if possible
4. *Demonstration details:*
   o Description of kit/activity: An Adafruit Trinket-based robot that locomotes using low-cost vibration motors. This hands-on activity aims to guide novice makers through constructing a simple-yet-programmable robot at a roughly $20 price point.
   o Target audience: Older K-12 students or other STEM learners (e.g., older adults who are continuing their STEM education).
   o Necessary background/infrastructure: The main pre-requisite to being able to engage with the kit is to have a computer that can interface with an Adafruit Trinket. In future iterations, the kit could be redesigned to run off of other similar microcontrollers.
   o Expected outcomes of kit/activity: The kit is intended to be part of educational outreach activities that would run over multiple hours, leaving participants with a working robot by the end of the session, and with the tools needed to take their robot home and continue updating it and programming it for continued learning. The associated outreach activities are intended to introduce participants to key mechatronics skills in exciting and relatively unintimidating ways.
5. *Playtest details:*
   o I am an assistant professor of robotics at Oregon State University, and up to this point in my career, I have led and participated in various types of K-12 outreach that focused on teaching robotics skills to children, in addition to running outreach events for older adults/continued learners to access robotics and teaching undergraduate courses in mechanical engineering curricula relevant to essential robotics training.
   o In my core research, my lab often designs and builds new robotic systems to satisfy our research objectives. Accordingly, skills such as programming in typical Robot Operating System-compatible languages, as well as working with Arduino or other similar microcontrollers, are familiar to my group and me. We also frequently carry out rapid prototyping such as 3D printing and laser cutting, as well as circuit assembly, rework, etc.

- o Personally, for fun and outreach, I also have experience working with e-textiles; an example of this type of effort is captured by the above demonstration blurb.

6. *Brief biography:*
   - o Dr. Naomi T. Fitter is an Assistant Professor in the School of Mechanical, Industrial, and Manufacturing Engineering at Oregon State University. Her past degrees include a B.S. and B.A. in mechanical engineering and Spanish from the University of Cincinnati and an M.S.E. and Ph.D. in robotics and mechanical engineering and applied mechanics from the University of Pennsylvania, and she completed her postdoctoral work at the University of Southern California. As a member of the Collaborative Robotics and Intelligent Systems (CoRIS) Institute, Dr. Fitter aims to equip robots with the ability to engage and empower people in interactions from playful high-fives to challenging physical therapy routines.