
Microwave Racing: An Interactive Activity To Enthuse Students About HCI

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Abstract

We report on a day of 'microwave racing' at a science festival in Brighton, England, as a way of enthusing school-age children about HCI. This transforms an award-winning CHI video showcase idea into an engaging interactive exercise. We describe the concept and setup of the races, as well as feedback from the participants. We discuss how, after engaging with our exhibit, children picked up key messages about HCI in general, and a research project on interface design of medical devices in particular.

Author Keywords

human computer interaction; interface design; teaching; public engagement; K12; schools.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous; K.3.2 Computer and Information Science Education: Literacy.

Introduction

We describe a science festival activity that combined teams from a public engagement project (cs4fn: www.cs4fn.org) and a research project (CHI+MED:

www.chi-med.ac.uk). Both projects aim to enthuse children about HCI.

The Computer Science for Fun project (cs4fn) has, since 2005, presented university-level computer science research in ways that are engaging for schoolchildren at primary and secondary levels. One of the ways we do this is through the use of engaging, relevant and interactive stalls and activities at science festivals. We explain new research and computing fundamentals with fun kinaesthetic games in which young people can participate.

CHI+MED is a large programme grant in the UK that examines human factors in medical device design, showing how devices can be made easier to use and medical errors can be reduced. Part of the CHI+MED programme is dedicated to engaging the public about the importance of HCI, the members of the CHI+MED team also work closely with cs4fn.

In February 2012, the cs4fn and CHI+MED teams jointly participated in a day of hands-on exhibits for families at a science festival in Brighton, England. Most of the children attending were between 8 and 14 years old. Given a classroom to ourselves for the day, we filled it with activities that aimed to convey research on human error, and the importance of HCI both in everyday design and more specifically in a medical setting. At one end of the room we piloted 'microwave racing' as a hands-on activity, based on an award-winning CHI video [1]. In this paper we explain the microwave racing activity, and how we used it to engage young people with HCI. With reference to post-event feedback we will also discuss some aspects that

were particularly successful, and others that we will improve for the next time.

The setup for microwave racing

The microwave racing activity challenged pairs of participants to be the first to correctly set the power level and time on a shop-purchased domestic microwave, then start cooking. The task was the same for everyone, but the two microwaves involved used different interfaces. Although some of the fun of this activity comes from the competition between the participants to finish first, this is really (as we explained to the participants) a competition not between people, but between interface designs. The most usable design would be the one that, on average, allowed new users to accomplish their task most rapidly and correctly.

In preparation for the activity, members of the CHI+MED team bought two microwaves with different interface designs. One used a numeric keypad setup, while the other was set using a combination of buttons and a knob. The team also bought packs of microwave popcorn: partially so that the microwaves would not have to be unsafely run while empty, but mostly because the promise of popcorn made a fun attractor for participants. Both of the microwaves were of the same wattage, to ensure that both participants' popcorn was cooked properly.

The races themselves were straightforward and uncomplicated. To begin, participants sat in front of their chosen microwave. Members of the CHI+MED/cs4fn team gave a short explanation about the how we would be testing the interface design of the microwaves with a race, then giving the participants their task. On 'go!' the team used stopwatches to time

how long each participant took to set the microwave and press the start button. Occasionally they would offer hints to participants who got stuck.

After each trial, we recorded the participants' names and task completion times on posters next to each microwave. This allowed us to chart trends in the times to see which microwave was easiest to use, and added an extra element to the feel of the competition. The popcorn cooking time also gave team members a chance to talk more about interface design; for example, asking participants what advice they might offer to the microwave's designer to improve the interface. Team members explained how important interface design is for medical devices: making an error when setting a microwave is not particularly dangerous, but errors in setting an infusion pump could prove fatal. The conditions of a race also helped demonstrate to participants how stress can hinder usability.

Post-event evaluation

The feedback for microwave racing from participants at the science festival was very positive: when asked what they enjoyed the most about our exhibit, 81% of respondents (21 out of 26) mentioned the microwave racing. Approximately 150 people participated in microwave racing over the course of the day, with many more watching. The comparatively small number of feedback forms received could be the result of a few factors. There were three different paper activities or forms for participants to fill in, which was likely too many. Team members were busy interacting with participants, so there was no one dedicated to prompting feedback. Finally, the forms were left near the exit of the exhibit, which means that people would

only see them at the point where they had already decided they would leave.

We saw solid indications that we were able to convey key parts of our message to participants. These indications came from a prize competition aimed at the children who attended, in which we asked multiple-choice questions based on issues in HCI we discussed in the exhibit. All who answered the questions (33 participants in total) said that the way a machine is designed can make it easier to use, and that a nurse's job relies on having machines that are easy to use to prevent people getting hurt.

We also asked participants what we could do better in the exhibit. Many remarked that the queues for the activity were too long. Because each race took about 3-4 minutes to run (taking into account the setup and popcorn cooking time), having only two microwaves demanded a lot of patience from those who wanted to take part. In some cases, families felt they couldn't spend the time waiting and decided not to participate. Some were not pleased with the popcorn: one commenter said we should provide a healthier snack!. Over the course of the day the smell of popcorn overwhelmed the room, which some participants found disagreeable. On the other hand, many participants commented to the team that the popcorn smell had attracted them to the exhibit in the first place. When away from the exhibit two different team members were asked how to get to the popcorn room.

In some cases, participants gave suggestions for improving the microwave interface design on our feedback questionnaire. Participants suggested adding a "bigger start button", said that "the words near the

buttons could be made more understandable”, and suggested we could “make the labelling on the microwave better”. This gives indirect evidence that our message that clearer interface design improves machines registered even with young participants.

Parents and adults also took the opportunity to race and engaged in discussion about interaction design. For example, one father commented that he hates his microwave because it is so difficult to use but he has bought “the thing” now and is stuck with it. Other parents said they would think more about the design of these devices before they purchased them in future. We stressed that the same interaction design principles that make microwaves easier or harder to use also apply to televisions, mobile phones, websites and the devices that nurses and doctors need to use in hospital.

Discussion

Our trial run of microwave racing showed that it is an activity with the potential to engage children with research in HCI. Not only were children enthusiastic about the activity, they also showed that they picked up key messages about the importance of interface design. Some even offered critiques of the designs of our microwaves themselves.

Microwave racing was run as a fun, fast, quasi-usability test of a walk-up-and-use system. Whether a microwave is a walk-up-and-use system is a point of debate that we discussed with some parents. However, this did not detract from the fact that the microwaves

References

1. Furniss, D. (2011). Microwave Racing. CHI video showcase 2011. DOI: 10.1145/1979742.1979558

could be designed to be easier to use for common tasks. Indeed, questions about instructions and expertise allowed us to talk about the difference between walk-up and use systems and expert systems, which provided further learning for our participants.

Microwave racing provides an easily replicated model for HCI engagement, and surmounts a potential difficulty in conveying CHI+MED’s research on safer medical devices to children, most of whom will never have been in a hospital situation. By demonstrating how interface design affects the use of an identifiable everyday appliance, we are able to bridge the gap so that children can see how important HCI can be both generally and in a medical setting.

It is important for the future of HCI research that children are aware of interface design as a discipline within computing. It is common for academics interested in the computing curriculum to think about encouraging the next generation of programmers, for example, but a nudge towards awareness of interface issues could effectively encourage the next generation of HCI researchers.

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