



OmNom

The Waste Disposal System With Personality

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THESIS

Positive emotional feedback reinforces good waste disposal practices. I created a waste bin (which I've named OmNom) that can communicate its wants and needs, making waste disposal more fun and rewarding while reinforcing users' good habits. By providing understandable emotive feedback to influence users' behavior, I'm capitalizing on the phenomenon in which people anthropomorphize nonhuman agents, often in an attempt to understand the motivations of nonhumans.

DOMAINS

OmNom is an intelligent consumer product that operates in the realms of environmental awareness, behavior modification and waste disposal. OmNom started out as a way to encourage and reinforce recycling habits, but it quickly became apparent that the bin could also be used on any sort of waste bin to encourage proper waste disposal of all kinds. OmNom provides emotive feedback by using light, sound and animation to encourage and direct users' actions.

SUMMARY

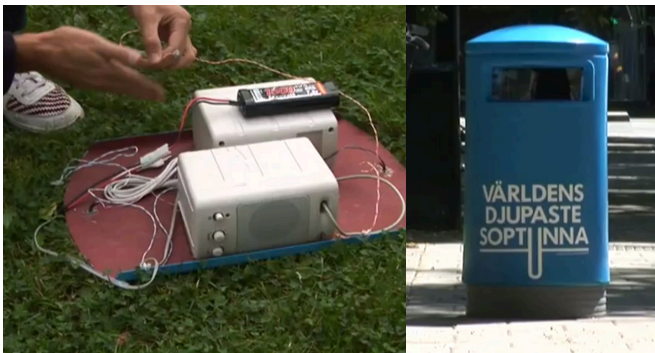
OmNom is a product that brings your waste bin to life. OmNom consists of an LCD screen, Arduino Mega, a variety of sensors, LEDs and a Piezo buzzer. OmNom will roar happily when you open him and will beg for food while left open. If you leave him open for a while, he'll get silly and stick his tongue out at a you. After you feed OmNom, he'll thank you audibly. As OmNom gets full, his eyes will change color, transitioning from green to orange, based on how full he is. When OmNom is completely stuffed, his eyes will blink red and he'll audibly alert you that he's full and needs attention. When you open OmNom while he's full, he'll whine unhappily. After you empty OmNom, he'll cheer happily and his eyes will turn from red back to green. If the room he lives in is dark, OmNom will be sleeping, his eyes will be blue and he won't make any noise. The emotive feedback OmNom provides promotes proper waste disposal by making the experience less of a chore because you feel like you're maintaining a pet that really appreciates all you do for it.

PRECEDENTS



PING, by Katrina Bekessy

Katrina graduated from the MFADT program in 2009, her thesis, Ping, is a smart trash bin that collects both waste and recycling materials and sends data about its usage to the Internet. This data is then measured and relayed back to users—both through a website and through the trash bin itself—to show how people's consumption can impact the environment both positively and negatively. Ping operates in the same domains as OmNom, but takes the stance that the more information users are given, the more likely they are to change their behavior on their own. OmNom, on the other hand, takes a much more scaled-back approach, making the waste disposal process fun by transforming your waste into sustenance for a creature you need to care for.



THE WORLD'S DEEPEST BIN, by the Fun Theory

This project gets users to throw rubbish in the bin instead of onto the ground, which shouldn't be so hard, but many people fail to do so. Using a hidden speaker and sensor to detect a piece of rubbish being thrown in, the World's Deepest Bin plays a comic sound effect of an object being thrown down a very deep hole which culminates in a satisfying deep thud a few seconds later. This project is similar to my own in that it encourages behavior by making the experience surprising, playful and enjoyable. This project was intended for public waste bins in parks, where

this one-trick pony wouldn't get old because each user would probably only encounter it once a visit.



TOO SMART TRASHCAN, by JooYoun Paek and David Jimison

Too Smart Tashcan is a sleek metal bin that analyzes what is being discarded. If a user throws the wrong trash away, the Smart Trashcan throws it right back at them. This project is more of a critical design piece operating within the same realms as OmNom. Whereas my project attempts to influence users with emotional responses and cues, this project antagonizes users into proper use.

BUILDING/TESTING

OmNom started out as a simple sketch as a way to modify my own behavior. At the time I didn't have a recycling bin and would simply place my recyclables in plastic grocery bags and occasionally take them outside to our building's large bins. When I was busy, though, I'd get lazy and just throw recyclables away. Often my girlfriend was the only reason I'd make the effort to sort my rubbish because she'd be annoyed when I threw away things I shouldn't and would be pleased when I'd recycle and dispose of my waste in a timely manner. I thought: What if the bin itself could provide this sort of feedback for lazy bachelors like me? So I set about trying to make this a reality.

The sketch that set me in motion was a simple Photoshopped story board that portrayed my waste bin as a sort of creature that fed on my recyclables. The can opened, it roared with delight and happily begged for food while left open; the user would toss in his recyclables and and close the lid/mouth, and the bin would munch happily and thank the user for feeding it. This simple idea captured my imagination, so my next steps were to determine all the actions a step-style waste bin could afford. A waste bin can be opened, you can place things inside, the lid can close, the bin can be full and the bin can be emptied—with these actions in mind, I decided I'd need to create

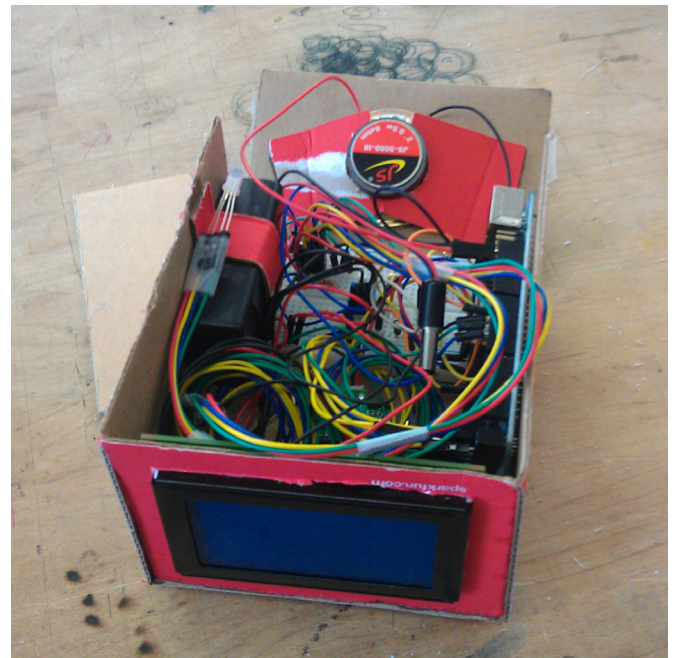


some sort of emotional feedback for each, but with what and how?

I'd need an LCD screen for the mouth, which would munch on food and add whimsy to the project. First experimenting with Graphic ST7565 LCD, which had a green screen and black pixels, I found out that the mouth and pixels were difficult to distinguish and the color of the screen was too prominent. I discovered a much better alternative in Graphic KS0108, with a dark screen and bright, high-contrast white pixels. It had the added benefit of a much higher refresh rate, which would allow for smoother mouth animations. The rest of the materials were fairly straightforward: RGB LEDs for expressive eyes, speakers (I tested multiple kinds), tilt switch

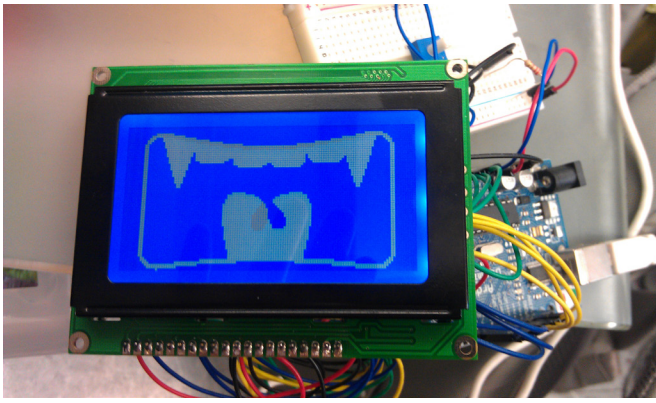
to detect when the lid was open or closed, a photo resistor to determine the brightness of the room and to confirm whether the lid was open or closed, and an IR range finder to determine the fullness of the bin.

My next step was getting the LCD screen up and running so I could experiment with its fidelity to determine the amount of detail I'd need for my animations. Fortunately for me, a library exists for converting bitmaps into a format that's compatible with Arduino. Once I was able to see the fidelity of the screen and the speed with which it could refresh, I set about sketching and designing personalities for the can. Initially I designed three distinct identities: a monster with pointy teeth, an 8-bit-inspired creature that appropriated sound conventions of early video games, and a more peaceful, blunt-toothed herbivore. I designed animations for roaring open, mouth munching, and getting upset. Simultaneously I was experimenting with sounds to match these animations. Very quickly I needed to see how all these pieces worked together.



Being fully engaged in the recycling spirit, I cut apart all the cardboard boxes my parts came in, hot-glued a basic box-style housing for OmNom, and taped him to the underside of my trash bin. A few things quickly became apparent. My initial sounds for opening the lid were entirely too complicated and took too long to resolve. The entire process of opening the bin and tossing a recyclable takes two to three seconds, on average. My sounds would need to be concise and short. I also found that when the bin was closed, the speakers weren't loud enough to be heard clearly from within the bin, so OmNom wouldn't be able to thank users properly for using him or alert





them audibly when he was full and needed emptying. For this reason I switched from speakers to a piezo buzzer. Piezo buzzers are much louder but they don't reproduce tones very accurately, so my audio feedback would now need to be short, concise and tonally simple. With these issues in mind I set about creating another iteration.

After developing new sounds, I built another cardboard housing prototype that was shallower and longer, so OmNom occupied less space within the bin itself. I also explored new methods for attaching OmNom to the waste bin. I wanted the process to require as little installation as possible; if OmNom was going to be a product someone would buy and install on any step-style waste bins him- or herself, it needed to be simple and require little to no modification to their waste bin. Velcro seemed to be a good solution; all users would need to do was attach some Velcro to the underside of their waste bin and slap OmNom on. Unfortunately regular Velcro wasn't quite strong enough, and OmNom would frequently detach and fall into the bin with the trash. Then I found an industrial-style Velcro made for mounting heavier objects, and this worked quite well. I was ready for some real user testing.

Users loved OmNom. Very often, on their first use, they burst out laughing when they opened the bin and were greeted by a roaring mouth, blinking eyes and sound. Users liked the monster personality



much more than the others, with some exceptions related to specific sounds. I also noticed users tended to "pet" OmNom after using him. Users also kept opening OmNom purposely trying to see what else he could do. All of this refocused my direction to create one super-personality with more reactions and a few new interactions. I decided to add an Easter egg, so if a user left the bin open for a long time, OmNom would stick out his tongue and blow a raspberry. I also bought and incorporated a vibration sensor so users could pat OmNom proudly while he's closed and he'd blink his eyes and provide a satisfied audio response. In addition, I created many more opening expressions and an algorithmically generated begging noise so users wouldn't get bored or get used to the opening and closing actions (those which get performed most often).

The last improvement I made was designing a higher-quality housing, laser-cut from eight-inch black acrylic. Unfortunately this new housing wouldn't work with industrial Velcro; the Velcro was stronger than the bond the backing made with the acrylic. I turned to button snaps, the kind you may find on a Western-style button-down shirt. The difficulty with this was finding a way to adhere the snaps to the bin's lid. Super glue didn't work, gorilla glue didn't work, some crazy glue that causes cancer only in California didn't work. Neither did hot glue or a quick-setting epoxy. I finally found a two-part epoxy that would bond to both metal and the kind of plastic my bin's lid was made of. OmNom now could snap easily on and off any bin, requiring only a few snaps to be glued on the underside of any lid. This is essentially the form in which OmNom exists today.

EVALUATION

OmNom is incredibly fun and whimsical, a product people want OmNom in their homes. Because



of this, I believe OmNom is a successful consumer product. OmNom succeeds in encouraging proper, timely waste disposal in a novel way. I'd have liked OmNom to specifically promote recycling, but OmNom is completely agnostic as to what kind of waste it helps dispose of. I'm quite pleased that the illusion of life is complete: people refer to the bin as OmNom, not the trash bin. People understand and respond to all the emotions and reactions built into OmNom and prefer using it over a normal waste bin.

FUTURE

I'd like to develop OmNom into a viable consumer product, but there are still many hurdles for me to overcome. Chief among them is funding. I will reappear to Kickstarter in an attempt to generate some angel funding because the next steps in OmNom's development are quite expensive. OmNom needs to be more efficient, lighter and cheaper, which means building or finding a custom controller for OmNom's brain. The Arduino Mega alone costs about sixty dollars and is fairly large. A custom board that only performs the actions OmNom requires could probably be a quarter of the size and eliminate the need for a breadboard or even a PCB board. A custom controller would have all the sensors and chips built in and would just require a battery and a screen. My hope is that OmNom could be reduced to the size of a pack of cards with perhaps two AA batteries tacked onto the back. In addition I'd like to develop the person-

ality of OmNom even further and modify the algorithms of the opening responses so that every time OmNom is opened you get a different response—so the action never gets stale.

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