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RESEARCH ARTICLE

SMELL-O-VISION-THE FUTURE DIGITAL DISPLAY DEVICE

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Abstract— The smelling screen is a new olfactory display that can generate a localized odor distribution on a two-dimensional display screen. The generated odor distribution is as if an odor source had been placed on the screen, and leads the user to perceive the odor as emanating from a specific region of the screen. The position of this virtual odor source can be shifted to an arbitrary position on the screen. The user can freely move his/her head to sniff at various locations on the screen, and can experience realistic changes in the odor intensity with respect to the sniffing location. Smell-O-Vision works by continuously feeding odours from vaporizing gel pellets into four air streams, one in each corner of the screen. These air streams are blown out parallel to the screen's surface by fans, and varying the strength and direction of them spreads the scent to any given spot on the screen. Now Smell-O-Vision becomes the digital display device.

Keywords— Smell; vision; odor; screen; position

I. INTRODUCTION

Smell-O-Vision works by continuously feeding odours from vaporizing gel pellets into four air streams, one in each corner of the screen. These air streams are blown out parallel to the screen's surface by fans, and varying the strength and direction of them spreads the scent to any given spot on the screen. The airflow is gentle enough that the teams have been able to create the illusion that the smell is actually wafting from a digital object on-screen. The current system only pumps out one scent at a time, but experts say the next stage is to incorporate a cartridge, like those for printers, which allows smells to be changed easily.

For anyone who's ever wished he could smell the buttery casserole Paula Deen's concocting on TV, that fantasy is one step closer to becoming a reality, thanks to a partnership between Samsung and researchers at the University of California, San iego. The team has developed a compact box capable of generating 10,000 different smells, conceived to coincide with what's unfolding on your favourite shows. An odor-producing box, containing a 100x100 matrix of thin metal wires, would be attached to a television set. An electric current would heat up any one of the "smell-forming" liquid solutions at each of the 10,000 intersections of that square matrix, "allowing for 10,000 different smells," says Kyle Wagner at Gizmodo. Presumably, TV shows of the future would be pre-programmed to give this smell box its marching orders, so that certain odors would be released at appropriate moments in the program.

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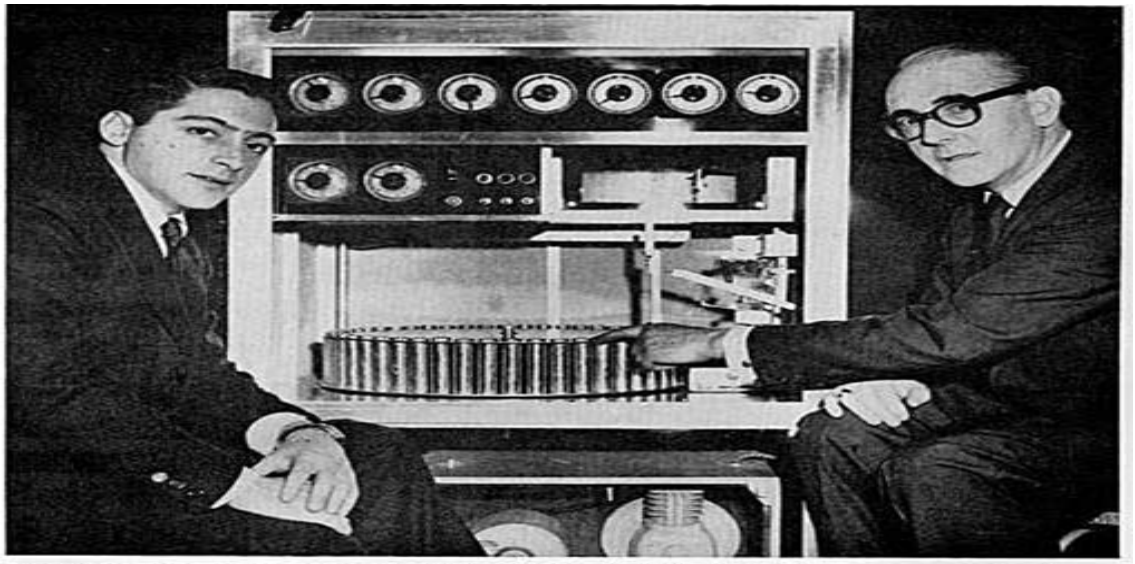
The main issue with smell-o-vision machines is that it can become very expensive to have to continually replace the scented oils, and also that it requires a fair bit of extra coding in order for the game or movie to tell the machine when to release the appropriate oils. A team of Japanese researchers haven't tackled these issues yet, but they have created a smell-o-vision system that not only releases scents through the actual TV or monitor, but can pinpoint exactly where the smelly object is on-screen, and make the scents seem like they're coming from those very pixels.

II.History of Smell-O-Vision

The idea made its first widespread appearance with the 1960 film Scent Of Mystery (also known, less puntastically, as Holiday In Spain), which timed odours to specific points in the narrative. The film opened in three specially equipped theatres in in New York City, Los Angeles, and Chicago. Unfortunately, the mechanism did not work properly and audience members complained of a hissing noise accompanying the scents - as well as a delay between the actions and their corresponding smells. As a result the film failed miserably, even after the mechanism was fixed.

Smell-o-vision has been on the tech industry's radar for what seems like forever now, and made its first widespread appearance over 50 years ago in the conveniently titled 1960 film Scent of Mystery. However, there are documented cases of scents being used in conjunction with theatre dating back to over 100 years ago. Cotton was soaked in rose oil, and then placed in front of a fan in order to waft the scent around. A bit of cotton soaked in one specific oil isn't dynamic, though, and can't change scents based on what is happening on-screen. Fortunately, this isn't difficult to overcome. A typical smell-o-vision machine is essentially a box of various scented oils with some kind of spreading mechanism, like a fan. The box receives a signal from, for example, a video game, which tells the box to release an ocean scent. Like a box of crayons, if you don't have the exact color you want, you can just mix some of the ones that are available. So, if single ocean-scented oil isn't available, other oils would mix to create something close to that desired ocean scent.



THE BRAINS OF SMELL-O-VISION—Michael Todd, Jr. (left) sits beside master control and scent energizer of the Smell-O-Vision system with its inventor Hans Lube. Latter points to the multitude of vials each containing a different scent which is selectively projected through tubes to every seat in theatre on signal triggered from picture's sound track.

Figure 1.Smell-O-Vision in 1960

Nearly two centuries later, however, in the 1970s, the Swiss fragrance chemist Roman Kaiser developed the odor-preservation technique he dubbed headspace capture a process meant to analyze and manufacturer the fragrances of the natural world. Kaiser used his technique to measure and then recreate the scents of a tropical rainforest; scientists and perfumers have since adapted the process, however, to recreate scents of a more quotidian variety.

In the 1980s, the scent scientist Braja Mookherjee, working for the fragrance firm IFF, invented a process that allowed technicians to extract fragrant molecules from living flowers, with the ultimate goal of recreating their smells. In the late 1990s, Japanese scientists began developing an "odor recorder" that promised to capture

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and replicate the world's scents. Today, the odor artist Sissel Tolas uses headspace technology to create "scratch and sniff" maps of the world. Olivia Alice uses a similar technique to preserve the scents of loved ones that linger on their clothes — by "deconstructing the clothing and extracting its composite and essential elements." These works are incremental steps, and they are as much about making a point as they are making a memory. But they suggest what might happen when headspace capture further develops, when scent scientists combine with technologists to produce new ways of rendering aroma as a record of the world.

While it's likely that the future will see more commercial uses for scent — the scent of Subway bread, exuded onto a city sidewalk; the aroma of coffee, squirted into a bus; the Smell-o-vision idea, put to marketing purposes it's just as likely that scent capture will find itself in the hands of everyday people. A 2007 survey of tech experts predicted that scent will be, by 2015, convertible into digital data — leading to, yes, a smellable Internet.

III. Smell-O-Vision TV

"The possible scenarios are endless," according to the research team at UCSD. Imagine a romantic comedy where a couple meets in a coffee shop and you, as a viewer, are "too distracted by the hazelnut latte that looks so good you think you can smell it. And you can." If characters are eating pizza, or an attractive lady walks into a room wearing perfume, you'd be able to smell that, too. And when scents emanating from the TV begin to fade, you'd simply replace the odor-generating device like you would an "ink cartridge on your printer."

Figure 2.Smelling Screen

A team from Tokyo University of Agriculture and Technology in Japan have invented a 'smelling screen' that makes smells waft from the spot on a display that their corresponding objects appear. Created by Haruka Matsukura and a team of colleagues at Tokyo University of Agriculture and Technology, the display is called the “smelling screen,” and dispenses with the need for an extra box full of oil. As New Scientist points out, the display is a standard LCD, but has an air stream in each corner of the screen. From those screen corners, gel pellets are vaporized and sent into the air streams, which are then sent out to the specific portions of the screen via fans. The power and direction of the fans are efficient enough to send, for example, the smell of fried chicken to the drumstick displayed at the bottom of the screen. Currently, the smell-o-system can only produce one scent at a time, but the team aims to create interchangeable cartridges so you can easily swap out which smells you want your display to produce.

Unfortunately, if the system is going to employ interchangeable cartridges, then it does seem like the next logical step is to employ the usual box-packed-with-vials-of-oil setup. The difference with Matsukura’s system, though, would at least be that the scents can waft from a specific place on-screen, so it would provide some sense of the food being in a given location, rather than just floating around the air.

It’s strange that the technology has existed for such a long time, and yet no one has a smell-o-vision box sitting on top of their TV. Perhaps if displays can begin using Matsukura’s built-in system, smell-o-vision can become

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more prevalent in consumer homes, and we can literally stop and smell the roses in the games we play and shows we watch. The development promises to make adverts for fried chicken or fresh coffee even more appealing - or alternatively add an as yet undreamed of realism to documentary programmes like Life of Grime. But perhaps it was just an idea whose time had not yet arrived - for the latest Japanese technology seems to promise a new frontier in smell-related multimedia entertainment. The invention is 'a new olfactory display that can generate a localized odour distribution on a two-dimensional display screen,' the researchers say. 'The generated odour distribution is as if an odour source had been placed on the screen, and leads the user to perceive the odour as emanating from a specific region of the screen.'

Figure 3.KFC adverts smell the recipe

Smell the secret recipe: The system could bring a whole new dimension to, for example, KFC adverts

IV. How Smell-O-Vision Works:

It works, New Scientist explains, by feeding odours from gel pellets into four air streams situated in each corner of the screen which are blown across the displays surface. Varying the strength and direction of the air-streams using fans moves the scent to any particular spot on the screen, giving the illusion that it is emanating from the digital object displayed. Olfaction is defined as the act of smelling, where as to smell is to receive the scent of something by means of the olfactory nerves. Odorants are substances who characteristics can be determined by chemical analysis. A person's olfactory system operates in a fashion similar to other sensing processes in the body. Air bone molecules of volatile substances come in contact with membranes of receptor sells located in the upper part of the nostrils. The olfactory epithelium, the smell organ covers a 4-10 cm^2 area and consists of 6-10 million olfactory hairs, cilia, that detect different smells of compounds. Excited receptors send pulses to the olfactory bulbs, a part of cortex with a pattern of receptors activity indicating a particular scent.

An unusual gadget named ScentScape is an innovative digital scent delivery system. Simply connect this device to your computer; you'll get an instant experience of sight, sound, and smell. To spice up your movie watching experience, ScentSciences has released this ScentScape programmable aroma generator. This plug-and-play USB device could be synchronized with content over your computer, which then emits scents at different cues. While initial set up being quite easy, if you use the company's own SceneEditor software, you can load a video clip as well as attach scents to different points in the video. This gadget is sure to give your future customer presentation that superfluous sizzle, by smelling like bacon. Costing on $69, it comes along with a scent cartridge holding up to 20 different smells. Tons of research showing the association between aroma and memory is enough for giving a try to this aromatic programmable device.

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Figure 4.ScentScape programmable aroma generator

This new technology has till date is able to use our sense of sight and sound quite successfully in bringing virtual reality and nearer to reality. Consequently you have realistic-looking games, and graphic cards that are capable of rendering them; mice that let you experience the terrain you are traversing, whether in an application, on the internet, or on a CD-ROM; and sound and music, thanks to MP3 and the like, which bring alive your experience in the virtual world. Virtual reality has, since the onset several decades ago, been dominated by visual stimuli, with tactile and auditory information research and added to the sense in the latter years.

Olfactor information has been mainly ignored as input to the virtual environment participant, in spite of the fact that olfactory receptors provide such a rich source of information to the human. To enhance this virtual experience, technology now targets on nose and tongue for the experience of smell and taste. That is, you will soon the able to smell and taste the virtual world's offerings, and not just see or hear them.

V.Advantages of Smell-O-Vision:

Figure 5 .Japanese smell-o-vision TV releases scents with per-pixel accuracy

By now, the media and electronics industries have mastered the home theatre. We have sharp HD television and movies, crystal clear surround sound, and can access whatever we want to watch or listen to in a moment’s notice with the help of the internet. What our home entertainment setups still don’t have, though, is smell-o-vision.

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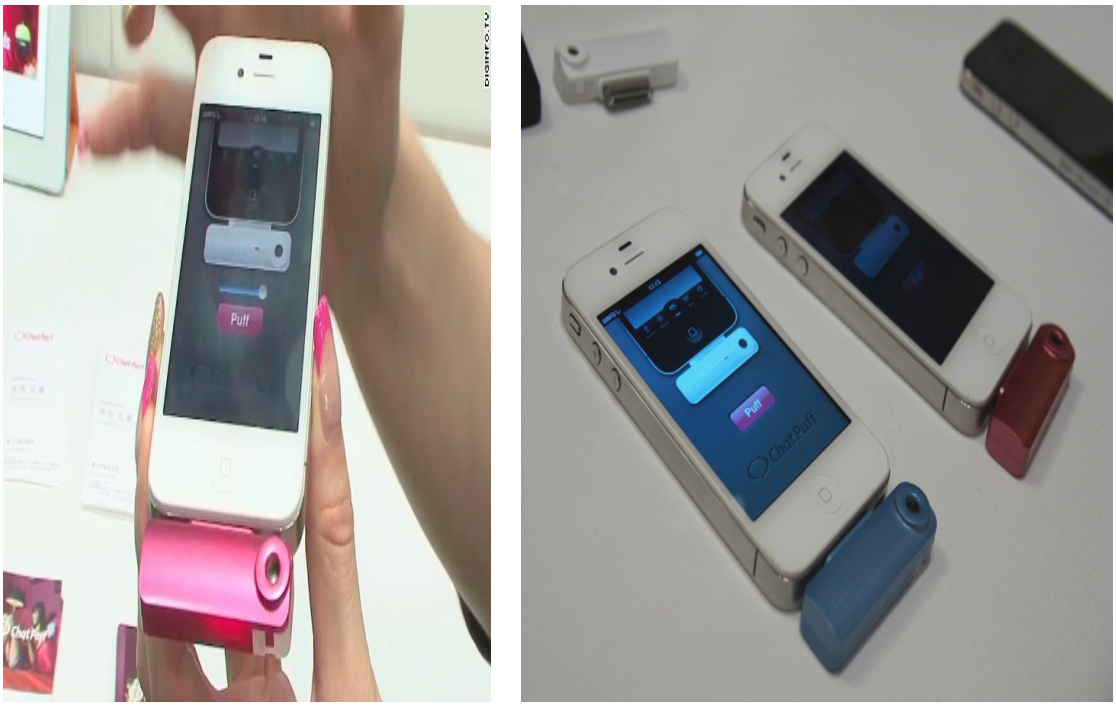

Figure 6. Smell-O-Vision for your phone

VI. How technology is slowly developing its sense of smell

Figure 7.pseudo-gustatory display

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We don't know the precise set of "odor components" needed to recreate any given specific smell at the moment, but Nakatomo claims around 30 such components are sufficient to at least achieve "approximation," reducing the exploratory area to help researchers search for more precise reproductions.

Here, the Virtual Ice Cream Shop produces aromas that are supposed to remind the user of basic ice cream flavours such as strawberry and chocolate — it has a graphical user interface that allows flavour blends (performed in the vapour phase) and the whole thing is hooked up to a MIDI keyboard, with flavours paired with supposedly appropriate musical timbres. It was fun to try, if a bit strange. Nowhere near as strange as Meta Cookie, though.

Meta Cookie is an experimental "pseudo-gustatory display" (the finest phrase I have ever noted down, incidentally) that attempts to modify the perception of flavour by changing the food item's appearance and masking its true smell with another, simulated scent. It's a truly bizarre set of headgear that combines augmented reality with a series of tubes for emitting smells in front of the user's nose.
It doesn't work terribly well. Scent quality aside, Meta Cookie relies on the system recognizing a symbol branded onto a plain cookie, so it can superimpose a picture of a strawberry or maple or chocolate cookie over it. As soon as you eat part of the symbol, it ceases to work — hence, I found myself having to nibble around the edges of the symbol, like a squirrel wearing a flatulent robotic squid on its head.
Then we have the smelly devices that may seem little more than gimmicks, but that are — let's face it — the likeliest to be commercialized in the near future. Here's the Multi Aroma Shooter, developed at Japan's National Institute of Information and Communications Technology (NICT).

Figure 8.Picture of a woman eating various fruits is accompanied by the appropriate smells

Not much to explain here: the associated research has to do with temporal and spatial control of odor production, and the Shooter is a USB-powered device that is supposed to emit well-timed smells to augment scenes in games and movies. In this demonstration, a video of a woman eating various fruits is accompanied by the appropriate smells at the appropriate times. There's no clever blending going on here in fact, the most accurate preset smells were using good old essential oils, such as rose and orange.

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On the smell *detection* side of things, we may not have moved beyond simple gas sensors, but there's still some interesting research being done in that area. Axe Body Spray is its own kind of technological achievement. But Axe Body Spray is also a testament to our biases when it comes to scent: the technologies we've developed in the name of science zing scent have treated fragrance largely as additive rather than preservative: they have sought to add manufactured odors to the ones that have naturally evolved in the world.
So while we have long had tools that record images and sounds, we have not really had tools do the same thing for scent. We have not, in general, thought of scent as something that can be processed and preserved into a vessel for memory.

VII SUMMARY:

It's easy to be sniffy about the concept of sending odors through the internet, but researchers are nonetheless hard at work on folding the sense of smell into the digital repertoire. Fresh-brewed coffee. Towels, just out of the dryer. The sour-sweet of a summer sidewalk. Sweat. Ocean. Brownies baking. Lilies blooming. Musk. Most of us tend to classify scent according to the way we experience it: as a sensation that is fleeting and ephemeral and ethereal, powerful in large part because of intangibility.
To smell, after all, is to engage in an act of autonomic intimacy: it's to take in invisible bits of the world, to process them into sensation, and to associate them with something familiar whether that something be a plastic trash bag or fresh-cut grass or Grandma's kitchen. Smell is perhaps the sense that has been most neglected by human technology. Smell is perhaps the sense that has been most neglected by human technology. Our media, from our books and our magazines to our television and our Internet, are biased toward vision and hearing, sight and sound. Our devices and their interfaces — tangible, tactile — exploit the nuances of touch. Even taste, that oh-so-sensory of senses, marches forward armed with technological augmentation: we are, as a culture, obsessed with innovation in food preparation, using new machines and new chemicals to create flavors and textures never before imagined.

VIII REFERENCES

[1] Anliker, J. A., Bartoshuk, L., Ferris, A. N., & Hooks, L. D. (2013). Children's food preferences and genetic sensitivity to the bitter tastes of 6-*n*-propythiouracil (PROP).*American Journal of Clinical Nutrition,***54**, 316–320.
[2] Apter, A. J., Gent, J. F., & Frank, M. E. (2012). Fluctuating olfactory sensitivity and distorted odor perception in allergic rhinitis.*Archives of Otolaryngology: Head & Neck Surgery,***125**, 1005–1010..
[3] Bar-Hillel, M., & Wagenaar, W. A. (2013). The perception of randomness. In C. L. Gideon Keren (Ed.),*A handbook for data analysis in the behavioral sciences: Methodological issues* (pp. 369–393). Hillsdale, NJ: Erlbaum.
[4] http://en.wikipedia.org/wiki/Smell-O-Vision
[5] http://theinstitute.ieee.org/technology-focus/technology-topic/smellovision-coming-to-a-living-room-near-you.
[6] http://www.extremetech.com/electronics/155615-scent-messaging-gadget-brings-smell-o-vision-to-smartphones.
[7] //www.newscientist.com/article/mg21729105.900-smellovision-screens-let-you-really-smell-the-coffee.html M. Shell. (2002) IEEEtran homepage on CTAN. [Online]. Available: http://www.ctan.org/tex-archive/macros/latex/contrib/supported/IEEEtran/
[8] http://www.digitaltrends.com/computing/smelling-screen-brings-the-smell-o-vision-back.
[9] http://www.extremetech.com/extreme/152086-japanese-smell-o-vision-tv-releases-scents-with-per-pixel-accuracy.
[10] http://www.mobilemag.com/2013/04/03/smell-o-vision-screen-technology-in-the-works

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