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Digital Scent Technology

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ABSTRACT :- Up until now, the focus of technology has primarily been on enhancing our visual and auditory experiences. This has led to the development of incredibly lifelike games and advanced graphics cards. However, imagine the possibility of incorporating scents like spice and flowers into pictures.

In the realm of digital scent technology, we now possess the capability to detect, transmit, and receive scents over the internet. This breakthrough allows us to experience fragrances online before making a purchase, evaluate the freshness of food ordered online, catch a whiff of burning rubber while playing our favorite racing games, or even send scented e-cards through scent-enabled websites. As this technology continues to advance, its potential knows no bounds in the virtual world. Imagine being able to detect scents through a computer-connected device. Digital scent technologies are making this vision a reality. This article provides a comprehensive examination of scent broadcasting, hardware devices, and the various applications of digital scent technology.

KEYWORDS: Digital Scent Technology, Broadcasting of Smell, virtual World

I. INTRODUCTION

A few years ago, online communication only involved three of our senses: hearing, touch, and sight. The ability to transmit smell through the internet was not widely popular at that time. However, there is ongoing development in technology to incorporate our sense of smell. Digital scent, a concept in virtual reality, offers valuable features to computer systems. It involves a combination of hardware and software. The hardware generates specific smells, while the software evaluates scent equations and produces corresponding signals. A device then emits the desired smell. Through digital scent technology, it becomes possible to sense, transmit, reproduce, and capture smells, flavors, and fragrances digitally. This can be accomplished using a USB-powered device that releases appropriate scents at precise moments. A company called Digiscents Inc., based in California, has created the iSmell personal scent synthesizer. This device connects to a computer via a serial port and has its own driver. Digiscents, an interactive media company, is also developing new software called iSmell Digital Scent Technology, which enables scent broadcasting over the web. Another developer named Aroma-Jet introduced a scent-based computer interface device in 2001, successfully transmitting smells over the internet. They marketed it for entertainment purposes as well as medical use. Incorporating scent into advertisements using digital scent technology could have a significant impact on consumer emotions, as the olfactory nerve is closely connected to brain regions associated with powerful sensory experiences. The potential for marketing using scent is enormous. Regardless of the industry, digital scent technology can enhance users' well-being and emotional experiences in an effective and intelligent manner. This technology also aids in character design and provides a sense of emotional presence. Its applications in communication are vast, including websites with scent, scent-based entertainment, games, movies, and music. Furthermore, it adds an enticing and enjoyable aspect to e-commerce, making online shopping more engaging. In the near future, the internet will not only allow us to see things but also to smell them.

II. EVOLUTION OF DIGITAL SMELL

Over the past five to six years, scientists have extensively embraced the concept of virtual reality across various domains. One of their explorations led to the development of a novel idea known as virtual theatre. This innovative concept incorporates electronic gloves, immersive 3D goggles, multi-point sound systems, adjustable seats, and even the integration of digital scent technology. Subsequently, in order to enhance the authenticity of experiences in movies and games, researchers introduced the groundbreaking application of digital smell.

The origin of digital scent technology can be attributed to the brilliant minds of Dexter Smith and Joel Lloyd Bellenson, renowned specialists in bioinformatics and genomics. The initial concept was inspired by fragrance companies seeking innovative ways to promote their perfumes, leading to the creation of this remarkable technological advancement.

During the early 1950s, Hans Laube introduced a revolutionary concept known as smell-o-vision. In 1999, a company called DigiScents unveiled their iSmell device. Unfortunately, DigiScents experienced financial setbacks and had to cease operations in 2001. However, in 2003, TriSenx stepped forward and launched the Scent Dome, a device designed to detect and identify specific smells through unique codes. Around the same time in 2004, the Japanese firm "K-Opticom" installed special units called Kaori web, featuring six different cartridges for distinct smells, in their internet cafes for experimentation until March 20, 2005. Additionally, Sandeep Gupta, an Indian inventor, claimed to have a prototype of a scent-generating device showcased at CES 2005. The University of Huelva researchers developed XML Smell in 2005, focusing on reducing its size. Simultaneously, Thanko released the P@D Aroma generator, a USB device, and Japanese researchers announced their work on a 3D television with touch and smell capabilities set for release by 2020. Scentcom, an Israeli company, conducted a demonstration of a scent-generating device. In March 2013, Japanese researchers unveiled their creation, "the Smelling Screen." This field is continuously witnessing numerous advancements and ongoing research.

III. PHYSIOLOGICAL ASPECTS OF SMELL

The act of perceiving scents, known as olfaction, involves the reception of odors by the olfactory nerves. Odorants are substances that can be analyzed chemically to determine their characteristics. Similar to other sensory processes in the human body, the olfactory system functions accordingly. The olfactory organ, called the olfactory epithelium, spans an area ranging from 4 to 10 cm² and contains 6 to 10 million cilia, which are olfactory hairs responsible for detecting various types of smells. Stimulated receptors transmit signals to the olfactory bulbs, which are a region of the cortex that exhibits a specific pattern of receptor activity corresponding to a particular scent.

IV. METHODOLOGY

The utilization of this technology involves the integration of an Olfactometer and an Electronic nose. An olfactometer serves as a tool for identifying and quantifying the concentration of odors. It is employed to assess the minimum level at which odors can be detected. Olfactometers introduce a scented gas as a reference for measuring the intensity of other odors. On the other hand, an electronic nose (e-nose) is a device capable of identifying the specific constituents of an odor by analyzing the chemical composition of those constituents. It comprises two functions: chemical detection and pattern recognition.

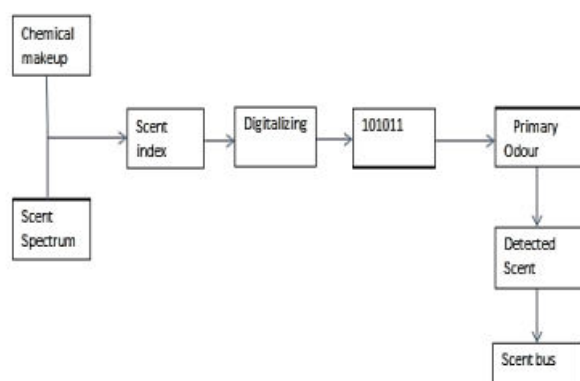


Fig: 1 Transmission Model of Digital Scent Technology

The electronic nose functions as a receiver to perceive scents. Similar to the range of colors, there exists a spectrum of scents, and every smell can be classified according to the fundamental smells in this scent spectrum. Through analyzing the chemical composition and its placement in the scent spectrum, the e-nose is capable of detecting a wide array of smells, amounting to thousands of different varieties. The identification and categorization of scents by the e-nose are primarily determined by their chemical composition and their position within the scent spectrum.

V. HARDWARE DEVICES

A. Smell Synthesizer

The smell-producing apparatus is referred to as a smell synthesizer. There are various kinds of scent synthesizers accessible in the market, but the particular one in question is manufactured by a company named Digiscents.

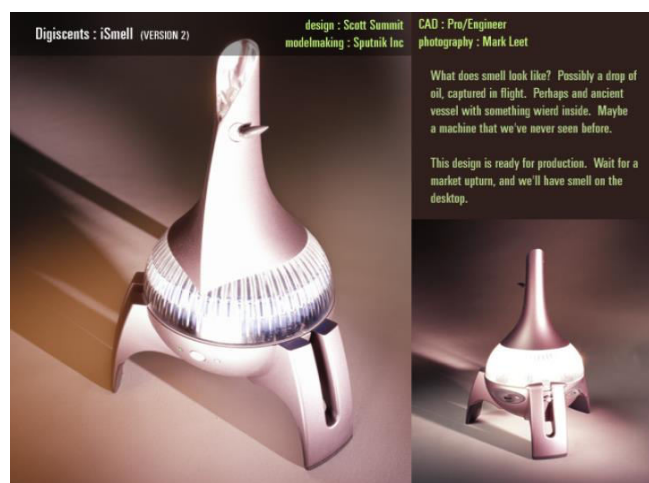
B. iSmell

The company Digiscents introduces a product called iSmell, which is a computer attachment capable of emitting various scents. To connect iSmell to a personal computer, a driver named ScentStream is used via USB. ScentStream converts the smells into digital codes that can be saved either on laser discs or as computer files. Remarkably, iSmell has the capability to generate a staggering 10,000 different scents.

Digiscents ismell version 1



Digiscents ismell version 2



C.Cartridge:-

The paragraph can be paraphrased as follows:

"The cartridge will contain a selection of substances, including regular oils and artificial fragrances, which can be activated by either heat or pressure when a signal is sent from a computer. This digital notification device has the potential to enhance the sensory experience of a computer game. Currently, a cartridge holds 128 chemicals, similar to the replaceable cartridge found in an inkjet printer. These oils are stored in the company's iSmell device and can be electrically stimulated in various combinations to produce specific odors based on programmed instructions in applications such as website features, computer games, digital music, and movies. However, over time, as users become more..."

Cartridge



It Contain

- 1. Natural Oils**
- 2. Synthetic Fragrances**
- 3. Activated by Heat or Air Pressure**
- 4. 128 chemicals stored**

D.Scentography:-

Scentography is a unique form of expression that combines fragrances with traditional digital multimedia such as games, DVDs, and websites. By introducing the ability to communicate through scents, Scentography adds a new level of richness and sophistication to web pages and almost any other form of electronic communication. The digitization and transmission of aromas will revolutionize the way sellers and buyers interact, allowing scented mail to be sent, establishing interactive scent-enabled electronic kiosks, creating and watching scented DVDs, and engaging in scented games and simulations. Scentography promises a significant expansion of sensory experiences, with far-reaching implications. According to Bellenson, our connection to the sense of smell has been lost as a species. Our noses are no longer focused on the ground, as we no longer need to search for food. Fragrance became an art form dominated by large perfume houses in Europe, excluding the average person from its benefits.

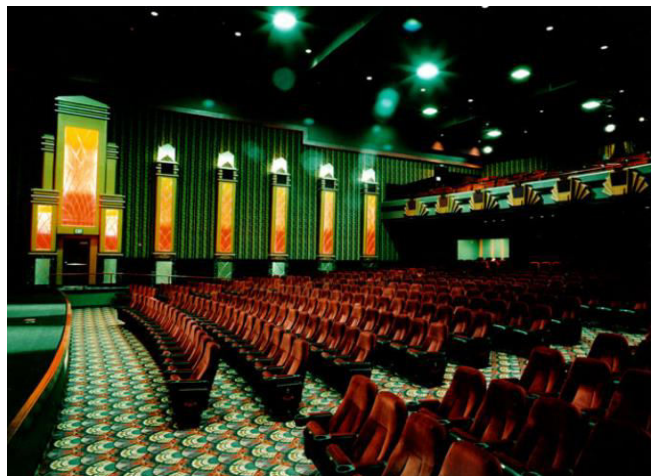


Scentography analogue camera captures smell

VI. EFFECTS OF DIGITAL SMELL FOR DIFFERENT SITE:-

1. Over the Theater:

"In the future, virtual venues will enter the market, introducing the concept of virtual reality to the realm of theater. These venues will feature advanced technology such as electronic hand gloves, a computerized notice synthesizer, a surround sound system with multiple speakers, seats that can be controlled for movement, and 3D goggles. Building upon this concept, they have successfully implemented the multipoint surround sound system, 3D goggles, and movable seats. To enhance the immersive experience for viewers, they have also introduced a new feature called digital scent, which allows for the inclusion of realistic smells in movies or games. For instance, if we are watching a movie where something is burning, the theater will replicate that scent."



2. Over the Television:

In recent times, with the advent of advanced sound technology, there have been remarkable transformations in our household televisions. They are constantly evolving to deliver increasingly powerful audio experiences. In the future, we can expect televisions to offer enhanced picture clarity, improved sound quality, and even incorporate innovative features like scent-emitting devices, making the television-watching experience even more captivating.



3. Over the Internet:-

The innovative advancements by DigiScents aim to introduce a novel aspect to e-commerce and entertainment technology. This includes incorporating fragrance into movies, online advertisements, and interactive games, among other potential applications. The initial focus will be on internet greeting cards, where fragrances will be digitized, transmitted through the internet, and analyzed for their molecular structure and sensory perception. This information will be encoded into software. The iSmell device, comparable in size to an electronic pencil sharpener, will serve as a peripheral device connected via a USB port. Resembling a color printer cartridge, the aroma cartridge will contain 128 fragrance components that can be combined to create a vast number of scent mixtures. It is estimated that humans can recognize approximately 10,000 smells during their lifetime, and DigiScents aims to develop the fundamental building blocks of smell. In addition, the company is developing a unique internet platform called Snortal, where users can create scented emails and customize their own fragrances. The current phase involves beta testing, with final products set to be released in the autumn of 2002.

VII. APPLICATIONS

Digital scent technology has a wide variety of applications such as:

To send scented email

To watch scented DVD's

To play scented video games

To sample a perfume from a beauty product's website

To smell the assortment of freshly brewed coffees for sale in their online store.

This technology plays its important role in the following fields.

A. Medical: Aromatherapy is a kind of curing certain disease by using different types of smell. It helps in discriminating brain disorders.

B. Education: Scent is an effective teaching tool for subjects such as Geography, History and Science.

C. E-Commerce: This technology provides live shopping experiences. This enables to buy perfumes, flowers and food beverages from exotic places

VIII. ADVANTAGES

1. Since one can send any type of smell, the iSmell is designed in a way that it will provide protection to the user against the smell.
2. The chemicals in cartridge mostly contain natural materials commonly found in the cosmetics, foods and beverages.
3. The iSmell device provides locking facility so that the user can lock a particular smell which he/she is allergic.



IX. LIMITATIONS AND DISADVANTAGES

The considerable limitation of this technology is the price. This technology costs about \$250 and above, so the people using pc's at home cannot afford for this luxury of scratch – and-sniff websites. As the technology is still not fully grown, the exact duplicates cannot be produced. Till now, the difference in smell is not been fully differentiated as there are only slight variations in the smell and the chemicals which are stored in the cartridges are not enough for it. This technology requires committed partners and dealer financiers to invest their money so that this could be revolutionary.

The digital scent technology is even now under grown, and will need a dedicated partners and moderate venture, to transform the results so that smell branding companies can assurance and faith them.

Difficult to create olfactory process because of a set of primary odors has not been originated really.

The sense of smell is not well understood compare to the other senses.

Smells are not orthogonal.

X. THE FUTURE OF DIGITAL SCENT TECHNOLOGY

In the future, it is possible to implement scent technology through three-dimensional projections, allowing individuals to experience highly authentic environments. This advancement would enable people to hold meetings in different locations simultaneously. Additionally, educational institutions could utilize online platforms to conduct classes, especially during periods of inclement weather. An example of such innovation is Google Nose, a technology claimed to be employed by Google, which offers smartphone and handheld device users the remarkable capability to search for and physically perceive a diverse range of scents.

XI. CONCLUSION

The sense of smell holds significant sway over individuals. Our olfactory senses are deeply intertwined with memory and emotions, providing a potent means to enhance ideas. This method captures the audience's attention and influences their learning, mood, and recollection. It possesses the potential to revolutionize advertising and serves as an invaluable marketing tool. By evoking emotions like fear or love, this digital scent has wide-ranging applications across television, theater, and the internet. By engaging multiple senses, it captivates audiences, and the olfactory stimulation perfectly complements the enhancement of learning, mood, and memory. As a result, this technology has the potential to assist users in maintaining a serene and exceptional mood during educational endeavors. Furthermore, this technology has also made strides in the medical field, aiding in the diagnosis of numerous diseases. It is evident that this technology will become an essential aspect of our future needs.

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