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Master Dissertation

Master of Business Administration (MBA)

Holographic Marketing

“How does the implementation of holographic marketing methods in advertising affect brand recognition and brand perception?”

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Ilshat Aliev from Google Germany

“HYPER-REALITY” short clip by Keiichi Matsuda

Gene Roddenberry, the creator of “Star Trek” universe and his idea of a holodeck, which was coined way ahead of its time.

Mohammed Faraz Hafeez, fellow MBA student at Hochschule Anhalt who inspired me for great steps in my educational life.

## Abstract

The planned paper will be diving deep into the possibilities of opening a completely new area of theoretical studies and practical applications – holographic marketing.

The concept is relatively unknown to the public now, no significant academic papers on the matter are published as of yet, so the author will concentrate on the comparative analysis of the arising holographic marketing with the traditional fundamental marketing system. The term “traditional marketing” is very broad, so in order to produce a reliable and relevant analysis, the author will look at one of the most important aspects of marketing: advertising.

Advertising will be explained from a traditional point of view and after applying the newly discussed holographic principles. In order to make the comparison more trustworthy, a case study scenario was chosen for analysis and description.

A portion of the paper will be devoted to analyzing case study of the current market leader in providing the augmented technology – Microsoft with its project Hololens. The author is also closely collaborating with a newly created holographic media agency based in the USA - The Holo Herald that incorporate various aspects of the holographic technology into modern life setting via the usage of the innovative perks of Microsoft Hololens.

The author also proposed a genuine research to be conducted together with The Holo Herald, which will be vital to the key findings in the paper.

In the concluding part, the author will support the theoretical research conducted and practical case studies analyzed with future concept prognosis based on the key findings.

# Holographic Marketing

## Introduction

*“Tell me and I’ll forget. Show me, and I may remember. Involve me and I’ll understand.”* - a traditional Chinese saying.

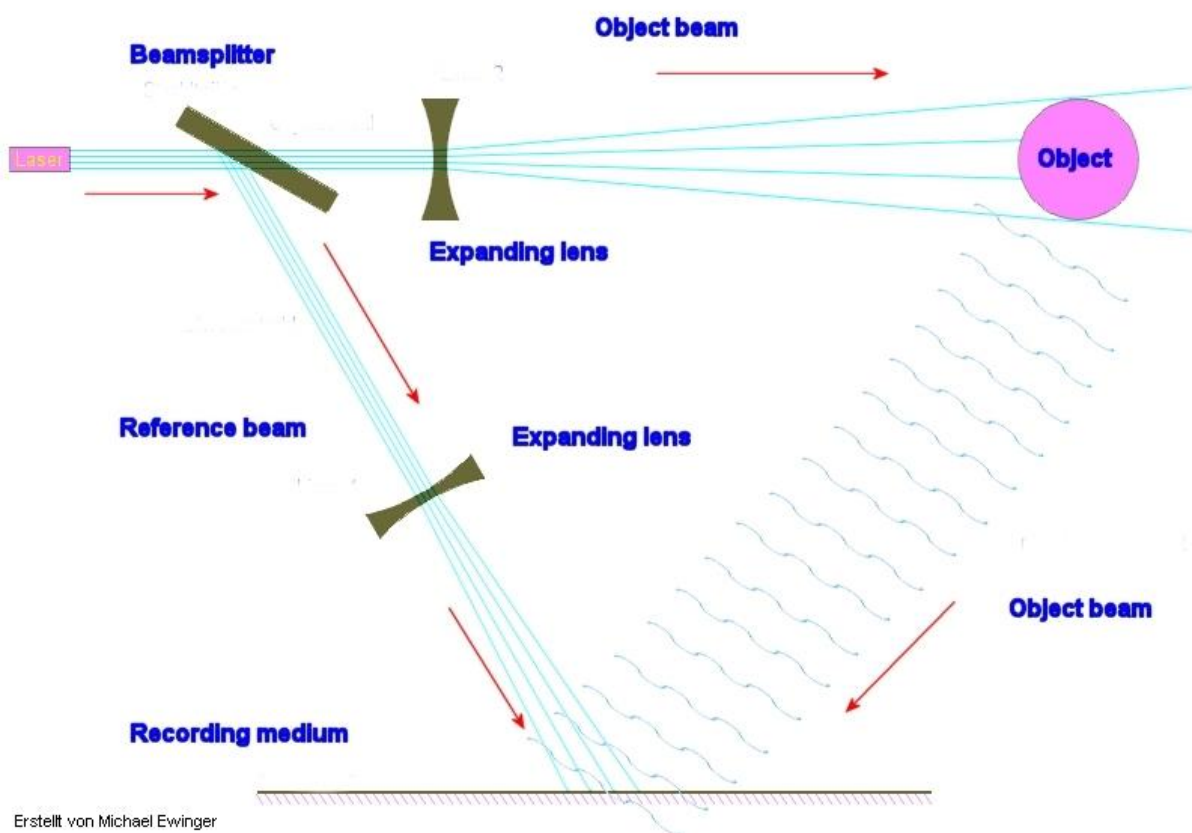
There are many things in this world that have fully working functionality and generate revenue, yet seem so unrealistic at first glance. Installing specific modelling software and projecting a draft of the project in three-dimensional space for free editing and full preview. Opening a communicating device and calling a person to have a conversation with his holographic projection instead of just 2D pixels on a laptop/phone screen. Slightly moving a curtain to see weather forecast projected on your own window frame - as well as the traffic jam situation, stock indices and maybe even your email inbox folder? Starting a car engine and getting a lot of information about road structure, possible dangers and other important details immediately on your windshield.



All these things were deemed impossible even ten years ago and were regarded as “science fiction” even by the most revolutionary producers in the world. They are becoming real day by day as we speak now, transforming from “science fiction” into “coming soon”.

The human eye detects and sees objects as they reflect the photons of light. The creation of a holographic image is based solely on this principle - a beam of reflected light is being created, identical to that would be reflected by a physical object. A person, whilst looking at this particularly projected beam, sees the exact same object (even if looking at it from a different angle).

Holograms of higher quality are static “pictures”, the “canvas” of which is a photographic polymer element and the “brush” is a laser beam that interchanges the structure of such elements. As a result, a polymer that is being manipulated in such way creates a holographic picture - light falls on the surface of the hologram and the polymer creates its thin interferential image.



Interference occurs in the case when in a particular space several electromagnetic waves are combined with each other with the same frequencies. In the process of recording a hologram in a concrete area two waves are being combined - the first (main one) is emitted directly from the source and the second (object one) is emitted from the object. A specific photo plate

with sensitive material is placed in the same area and a picture of darkening stripes appears on it which characterizes the distribution of electromagnetic energy (interferential picture). Then the plate is being lighted by a wave, which by its characteristics is close to the main one and the plate transforms this wave close to object wave.

As a result, the observer sees practically the same light that would be reflected from the initial item.

### Brief history of holograms

It all started in 1947. The World War II has ended, Europe is still torn to pieces, the economy is in a very bad state. India becomes independent from Great Britain, Argentina allowed women to vote, Kalashnikov created his first rifle, and John Bardeen and Walter Houser Brattain conduct an experiment that will allow creating the very first working bipolar transistor. Polaroid starts the production of their photo cameras.

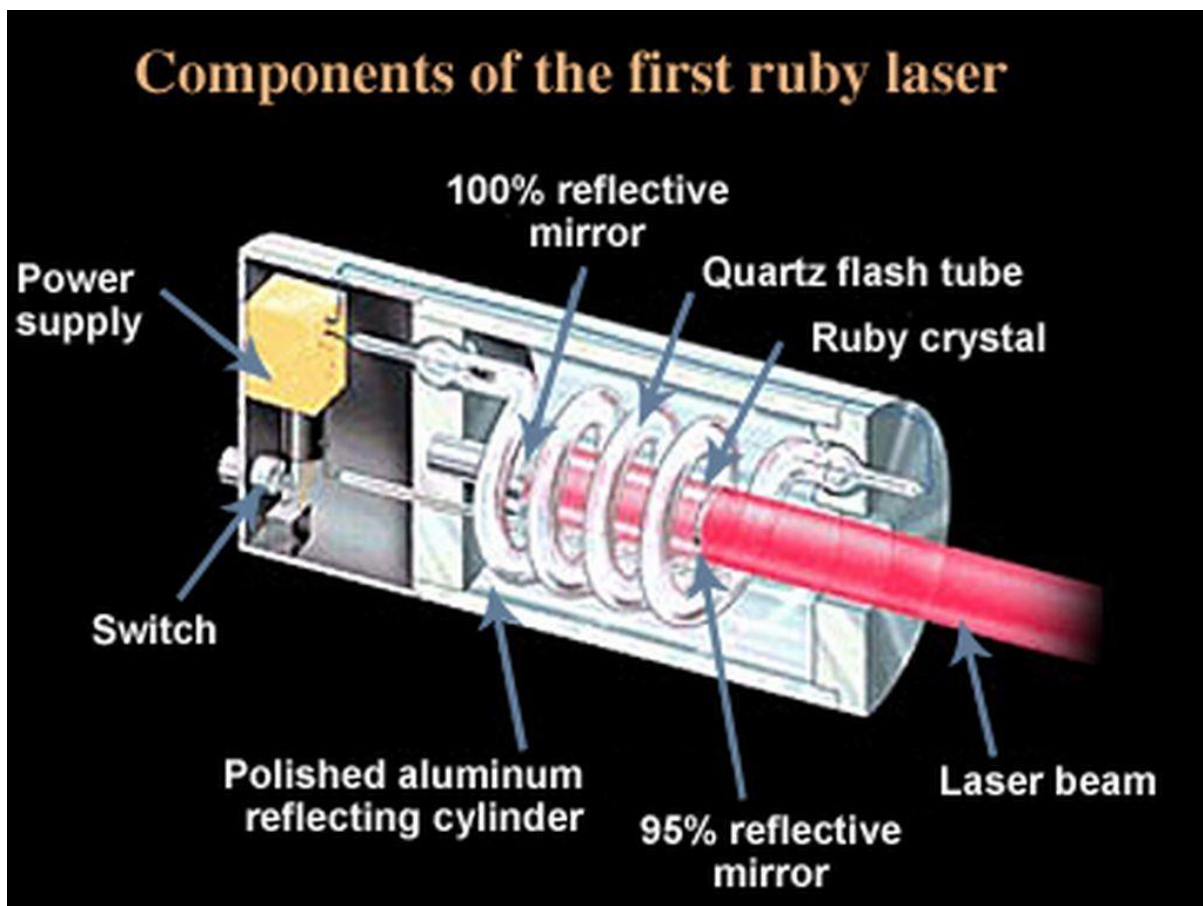
In the same year, Gábor Dénes invented and created holograms.



Dénes tried to increase the defining power of electronic microscopes of that era, but ended up with the creation of the world's first hologram instead.

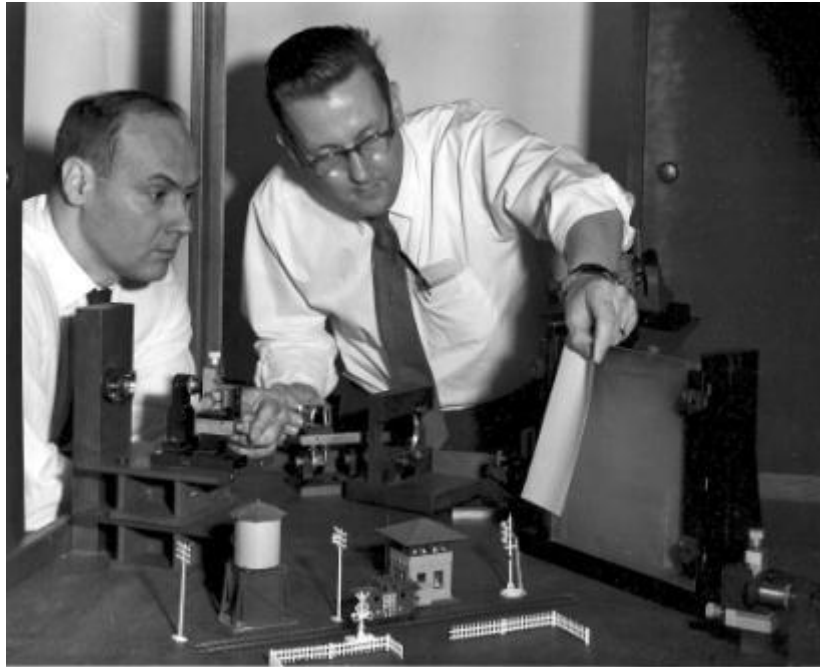
However, he was way ahead of his time (as many people are) and he didn't have sufficient technologies to create holograms of good quality - it is impossible to do without a coherent light source and the first artificial ruby crystal laser was demonstrated by Theodore Harold Maiman only 13 years since Gábor Dénes's invention.

After the 1960s, when red ruby 694 nanometer (impulse) and helium-neon 633 nanometer (continuous) lasers were introduced creating holograms became much easier.



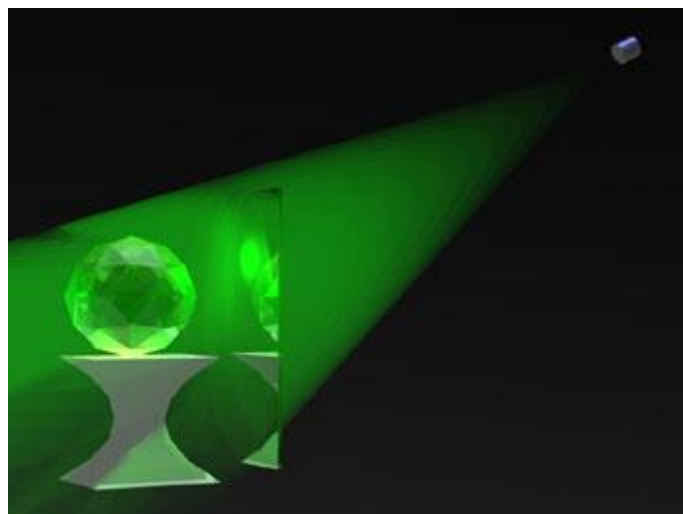
In 1962, Emmett Norman Leith and Juris Upatnieks from Michigan Institute of Technology invent a classic scheme of hologram making. In the hologram recreation process, light is being put through a photo plate but some particles are reflected from the plate and create an image, which is visible from the opposite side of the plate as well. Up to our day, military specialists in creating visor crosshair and many more army-specific holograms are still using this method.





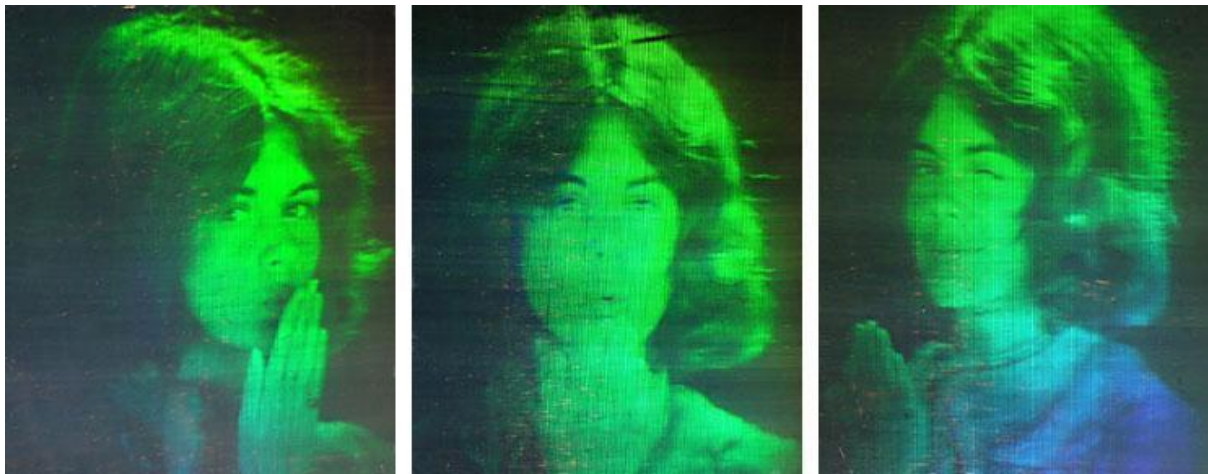
In 1967, the first holographic portrait is recorded using a ruby laser.

Scientists modified and enhanced photographic materials in 1968, because of it Yuri Denisyuk, one of the bright minds behind Soviet optical holographic imaging invented his own method of creating holograms and gets holograms of high quality (with the usage of reflection of the white light particles). This method receives the name of Denisyuk.



Lloyd Cross in 1977 created a multiplex hologram which consisted of projections of images from dozens of angles, every each one of which was available for view only from one angle.

The size of the recorded object didn't have to be limited to the length of the wave of the laser or the dimensions of the photo plate. Thus, a possibility of creating a hologram of a non-existing object was implemented - you could simply draw a selected non-existing object as it is seen from several angles and then create a hologram of it. However, vertical parallax was not there, such hologram could only be viewed from a horizontal point of view, but not from above or from below. Multiplex holography has much higher quality than several other methods (for example, lense raster) but it was still far from perfection and not very realistic.

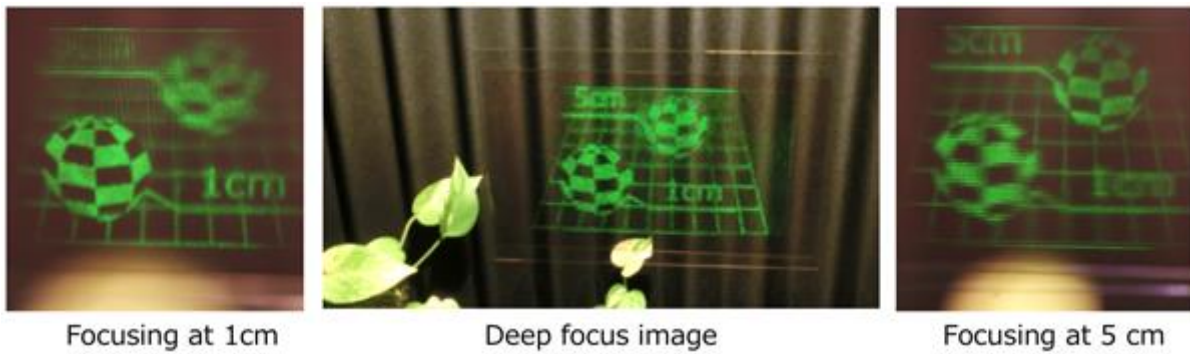


In 1986, Abraham Szoke suggested to create a source of coherent emission in the surface area with the help of the X-Ray light radiation. Since dimensional resolution in holography depends on the size of the coherent emission source and its distance from the object, it was possible to reconstruct the atoms surrounding the emitter.

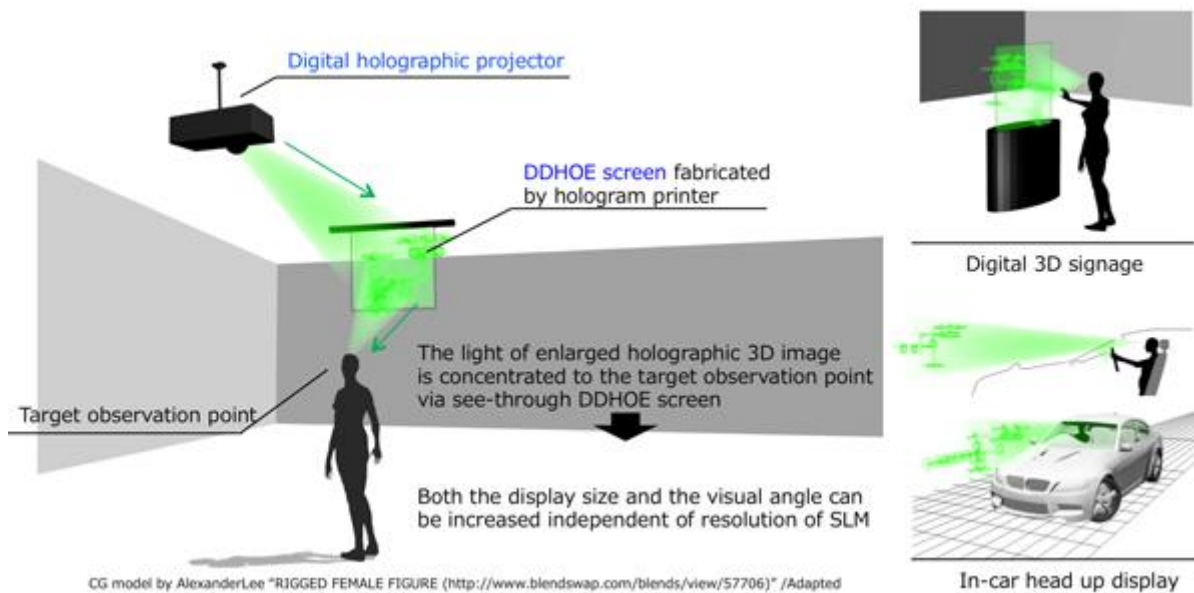
### [The Phys Article](#)

The following text is taken entirely (with minor corrections) from an article published on Phys technology blog.

Beginning of the article. The potential applications of 3D digital holograms are multiple. In addition to arts and entertainment, several fields of appliance including biomedical imaging, scientific visualization, engineering design, and displays could benefit from this technology. For example, creating full-sized organs for 3D analysis by doctors could be helpful, but it remained a challenge owing to the limitation of hologram-generation techniques.



A research team led by Professor YongKeun Park of the Physics Department at the Korea Advanced Institute of Science and Technology (KAIST) has come up with a solution and developed a 3D holographic display that performs more than 2,600 times better than existing 3D holographic displays. This study is expected to improve the limited size and viewing angle of 3D images, which were a major problem of the current holographic displays. The study was published online in Nature Photonics on January 23, 2017.

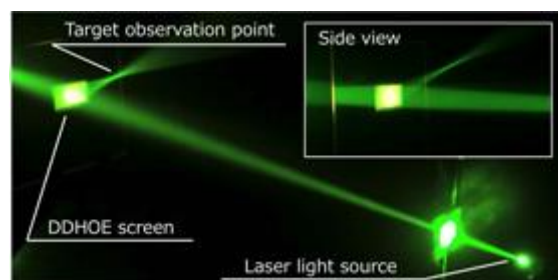


3D holograms, which often appear in science fiction films, are a familiar technology to the public, but holograms in movies are created with computer graphic effects. Methods for creating true 3D holograms are still being studied in the laboratory. For example, due to the difficulty of generating real 3D images, recent virtual reality (VR) and augmented reality (AR) devices project two different two-dimensional (2D) images onto a viewer to induce optical illusions.

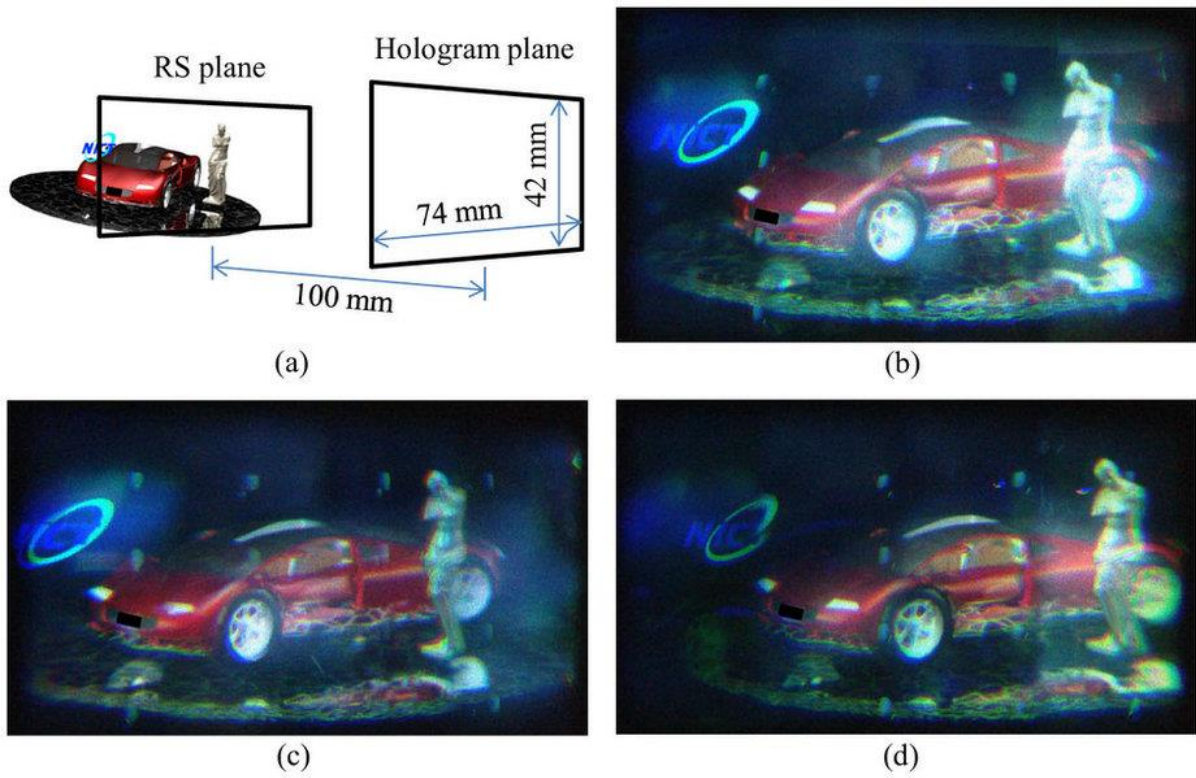


To create a 3D hologram that can be viewed without special equipment such as 3D glasses, the wavefront of light must be controlled using wavefront modulators such as spatial light modulators (SLMs) and deformable mirrors (DMs). A wavefront modulator is an optical manipulation device that can control the direction of light propagation.

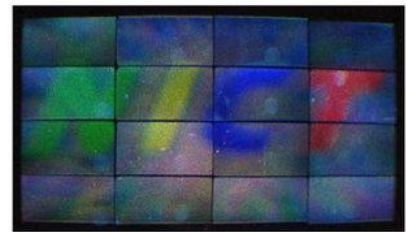
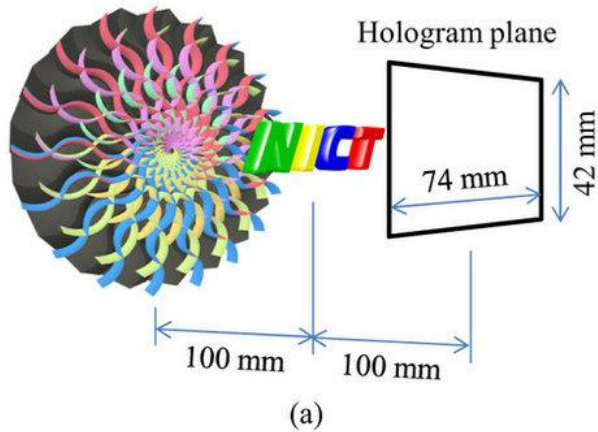
However, the biggest limitation to using these modulators as 3D displays is the number of pixels. The large number of pixels that are packed into high-resolution displays developed in recent years are suitable for a 2D image, and the amount of information contained in those pixels cannot produce a 3D image. For this reason, a 3D image that can be made with existing wavefront modulator technology is 1 cm in size with a narrow viewing angle of 3 degrees, which is far from practicable.



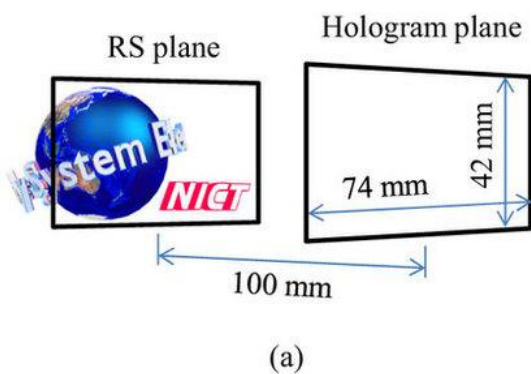
As an alternative, KAIST researchers used a DM and added two successive holographic diffusers to scatter light. By scattering light in many directions, this allows for a wider viewing angle and larger image, but results in volume speckle fields, which are caused by the interference of multiple scattered light. Random volume speckle fields cannot be used to display 3D images.



To fix the problem, the researchers employed a wavefront-shaping technique to control the fields. As a result, they succeeded in producing an enhanced 3D holographic image with a viewing angle of 35 degrees in a volume of 2 cm in length, width, and height. This yielded a performance that was about 2,600 times stronger than the original image definition generated when they used a DM without a diffuser.



Professor Park said, "Scattering light has previously been believed to interfere with the recognition of objects, but we have demonstrated that current 3D displays can be improved significantly with an increased viewing angle and image size by properly controlling the scattered light."



Hyeonseung Yu, who is the lead author of this research article and a doctoral candidate in the Department of Physics, KAIST, noted that this technology signals a good start to develop a practical model for dynamic 3D hologram displays that can be enjoyed without the need for special eyeglasses. "This approach can also be applied to AR and VR technology to enhance the image resolution and viewing angles," added Yu. End of article.

[Griffith University and Swinburne University in Australia create a holographic display based on graphene.](#)

The scientists used Gabor's method and created a 3D holographic display with high resolution based on an digital holographic screen that consists of many small dots, reflecting light particles.

The display has a viewing angle of 52 degrees and an observer does not have to wear specific gear (like goggles or a helmet) in order to comprehend the picture fully. The viewing angle depends on the quantity of pixels used. Graphene oxide is being worked with photoreduction method which creates pixels that can curve the color for the holographic picture. This can be used to completely reinvent the mobile screen and make it holo-like.

[University of Bristol in UK develops ultrasonic holographic projection.](#)

The object is created in the air with the help of many ultrasonic emitters, focused on a cloud of steam (vaporized water) which is also maintained by the same system. The practical implementation is worse than usual screens, but the effect works.

The steam is created by drops of specific liquid, not only water

This matter is lighted by a special lamp that then creates the holo-like reflection.

As an end result, the projection can be touched as well as seen.



The interferential vibration frequency is between 0.4 and 500 Herz.

One of the main fields of application of such holographic displays should be medicine. On the basis of the medical card of the patient and also through modelling (projecting) a specific organ from inside the human body, a doctor can distinguish what is wrong with it. Another implied usage is to completely interchange the current sensor displays in banks, shops and grocery stores with this new technology.

Moreover, of course one of the most important applications of such technology - to create advertisements with “feel” effects. This will be discussed in detail later in the paper.

[H+ Technology from Vancouver, Canada is developing an interactive tabletop holographic display.](#)

This company started out a crowdfunding campaign on Kickstarter in 2015 and successfully gathered the money needed for the initial product development and launch. There hasn't been



many news on the topic of their creation since 2016, so it is possible to assume that with the very successful Kickstarter campaign, the world will see another great holographic device very soon.

H+ technologies have two versions of their device called Holus (for home use) and Holomax (for business use).



Holus Home:

- Tabletop platform transforming any sort of data sent from a PC, table or a smartphone into a holographic picture that is accessible from different angles and may be interacted with.
- Applicable for simple family board games, video conferences with holographic presence (a floating avatar), professional 3D modelling, sophisticated augmented reality games and many more.

Directly quoting the website of the company: *“The purpose and objective of Holus is to provide a social campfire experience where people can overcome isolation and stagnation with respect to information. Holus is the first step in the holographic revolution, aiming to*

*Humanize Technology by bridging the gap between the digital and physical world, and between humans and technology.”*

Holomax is the advanced Holus package for business use with holographic projection, immersive environment, interactive touch possibilities, motion tracking, middleware support and installed gesture control.



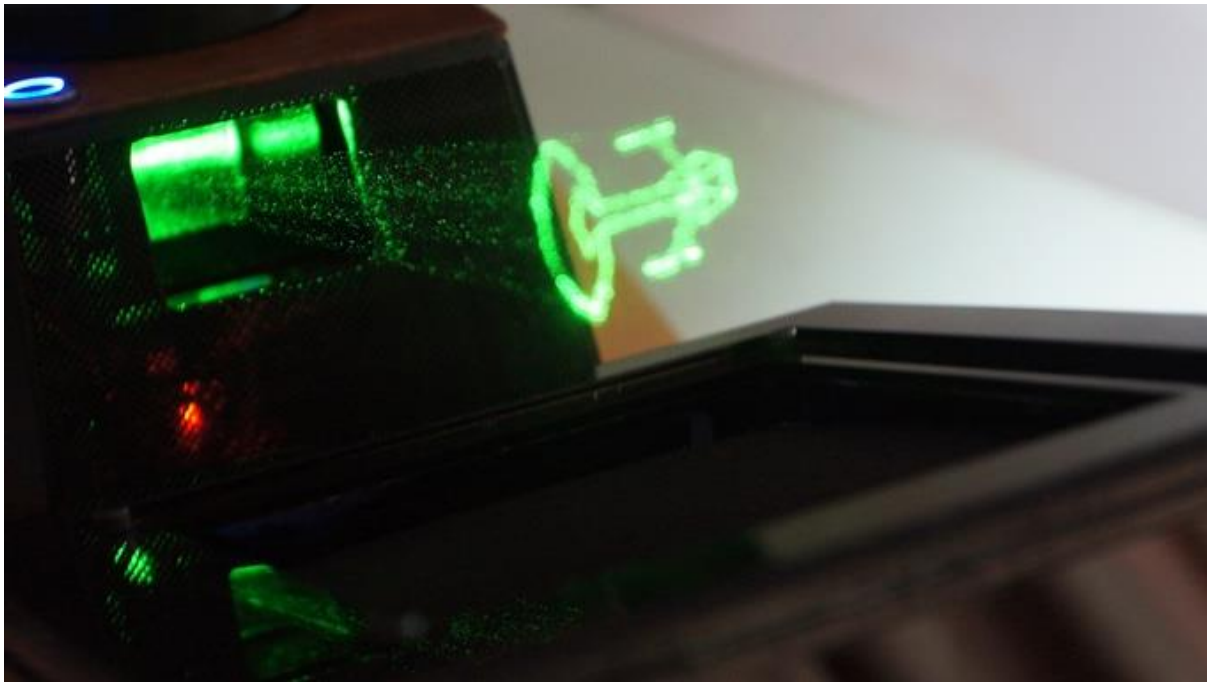
The Holus / Holomax have a specific Software Development Kit which eager developer can utilize to create various software solutions for the platform, including games, educational applications and many more.

Additionally, Holus is open for collaboration with third-party devices that might allow bonus features to be used - such devices as Leap Motion's gear, for example.

### [The Holovect Mk II](#)

The Holovect Mk II is a self-contained laser-based volumetric display system that fits on your lab bench or desktop. It is the perfect companion to a 3D printer and a stand-alone educational or promotional device.

The Holovect Mk II is the first commercially available, laser-based desktop "holographic" display, capable of drawing 3D objects in air with light.



Holovect images are NOT holograms but instead volumetric vector images projected onto modified air (i.e. projections in space). This distinction is due to the fact that a hologram is a recording of interference patterns on film or glass plates that contains three-dimensional information about an object (Greek root "holo" means whole or complete, and "gram" means record). However, since Holovect images contain three-dimensional information and are free-floating objects in air, they are most certainly holographic. They are real 3-D projections.

These are the main technologies that exist in the world at the current moment that by some means directly project holograms or holo-like pictures into the air not requiring the end user to wear any devices to help create the images. However, all of these projects are still in development / construction / alpha and beta testing periods. For the sake of the current research, after a long way of explaining, what holograms are and what they mean for the contemporary technological society, the thesis will focus on three existing and adopted technological solutions that project holographic images with the use of specific wearable devices.

These solutions are:

- Microsoft HoloLens, an augmented reality headset produced by Microsoft Inc, currently in Developer Testing stage.
- Leap Motion, an augmented reality/holographic device currently in Closed Beta stage.
- Google Tango, a specific computing platform allowing smartphones and tablets to use augmented reality perks, currently live and used by at least two smartphone vendors.

Microsoft HoloLens and Google Tango and their application to the theory of Holographic Marketing will be discussed in the main section of this thesis.

## Transitions in advertising

This part of the thesis will analyze the transitions that took place during the various periods in time of progress of advertising as a whole concept. The author took the liberty of classifying advertisement eras according to personal opinion and work experience.

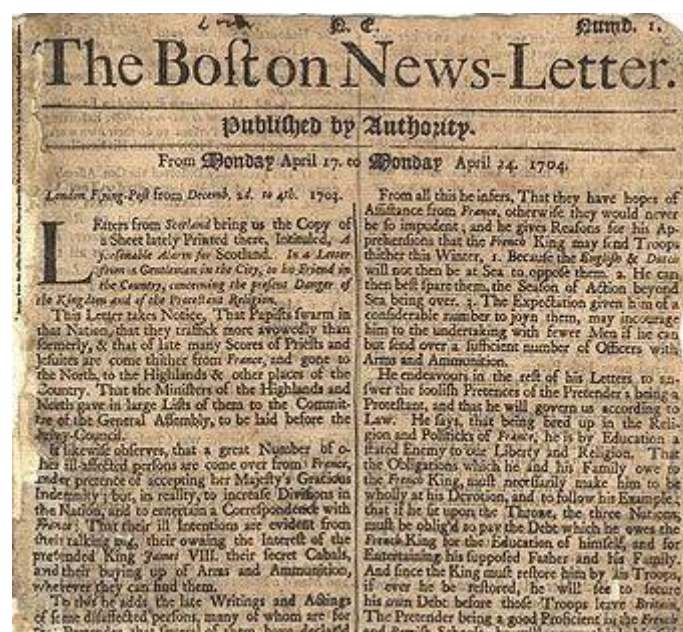
Each period of development of advertising as a phenomenon (or era as the author wishes to call it) will be explained with particular examples, yet in short version as this thesis is fortunately not one of Philip Kotler's books on old school marketing.

In addition, all of the analyzed advertising materials and methods are visual and/or pre-recorded (released) - i.e. newspaper ads, television clips and so on. Radio shows, direct mail services or personal selling will not be taken into consideration here.

## Classic advertising

20th century, mostly done through generic posters and small ads in newspapers.

This period is characterized by first shaky steps in advertising. Of course, the first newspaper ad was printed back in 1704; however, there was no such paradigm as "advertising" yet and that particular ad was just the very first drop in the ocean yet to come.



Then, the first printed posters saw the light of the day in 1835 - and logically, these were the posters specifically made for a circus entrepreneur show “Ringling Bros and Barnum & Bailey” by Jared Bell.



Overall, the market was just developing with several bright ad agencies booming in the beginning-middle of the century, such as Young & Rubicam, Leo Burnett and Ogilvy and the first steps in newspaper promotion and targeted campaigns.

Middle of the 20<sup>th</sup> century. FMCG goods. B2C market.

Transition into middle of 20th century with the development of fast moving consumer goods market, the rise of mass sales through the usage of personalized posters and 0-100% advertising campaigns. The rise of the B2C market.

The first TV ad appeared on US screens in 1941 featuring a Bulova watch that “ticks” - it was played before baseball matches and people absolutely loved. The company paid \$9 for twenty seconds of airtime.

In that era, the very first “heroes” were created - specifically designed characters that became the faces and the first brand ambassadors even before that term was coined. Like, for example, the infamous Marlboro Man.



Such “brand ambassadors” were brought on to help sell all kinds of products, from beer and cigarettes to home appliances. Such strategy was utilized by producing companies and ad agencies in order to strengthen the connection between the brand and the end user - for example, people that imagined themselves as cowboys whilst smoking a Marlboro cigarette.

It was centered on the masculine feeling: “Want to be a man?” This is a very important point in the history of advertising that will be discussed later as the author expects such brand ambassadors to be revived and heavily used again under a completely new marketing concept.

Another example could be the Volkswagen “Think Small” campaign, created in 1960, sporting one of the never dying, yet half-forgotten by modern advertisers principle - “don’t be something you are not”. The campaign advertised Volkswagen cars as small and utility-based on the contrast with large bulky American cars designed and sold for showing-off.



Back in those days, the main and most important concept behind any advertising campaign was to sell as much product as it was physically possible, thus centering around mass sales through supermarkets and retailers to the B2C market.

## Electronic era

Electronic 2D era with the rise of B2B and B2C sectors including mass sales utilizing television advertising, any type of on-screen 2D advertising, neon signs and screens.



Continuing the idea of fully pre-scripted advertising campaigns, the electronic 2D era featured one of the best television ad masterpieces of the 20th century.

Apple's 1984' styled ad for the introduction of Macintosh personal computer stands out because of the perfect idea, metaphorical comparison with the famous novel and targeting the basic consumer as a small part of the B2C world.



Another great example of a catchy advertising campaign that stayed in the minds of the people for at least a decade is Budweiser's "Wazzup" clip. Not only a single phrase simply repeated in a humorous way inspired many people to buy and try Budweiser beer, it also completely connected the most loyal consumers and created what is now called a "meme".



In addition, the ad campaign highlighted the website of Budweiser, where amused consumers could learn how to say the famous phrase in thirty different languages for more laugh and for more brand recognition. This was very important for brand perception as it showed Budweiser as not only great beer but also something to “have fun” with.

One more TV advertising campaign that the author wants to highlight is the Red Bull Stratos phenomenon. Everyone of course remembers the 2012’ freefall jump performed by the Austrian skydiver Felix Baumgartner, but it was a purely genius move to associate such adrenaline-filled encounter with an energy drink such as Red Bull.



The officials back at Red Bull that were behind the supportive campaign have stated for numerous times that it wasn't an advertising campaign in itself - up until present time they try to convince the public that Red Bull Stratos was a scientific mission filled with new exploratory data and Felix's insane endurance and diving skills' test. However, the public immediately associated the whole project with the energy drink and praised the marketing brains behind the scenario for enormous character and Felix's devotion.

### Internet era

Internet era with advertisements on the personal computers (via Youtube or any other embedded video source) and smartphones. Predictive advertising based on Google/Youtube/Amazon search.

This era introduced the word "spam" to the general public - meaningless useless banners that would pop-up everywhere on the websites. The very first banner was introduced in 1994 on Wired's website.

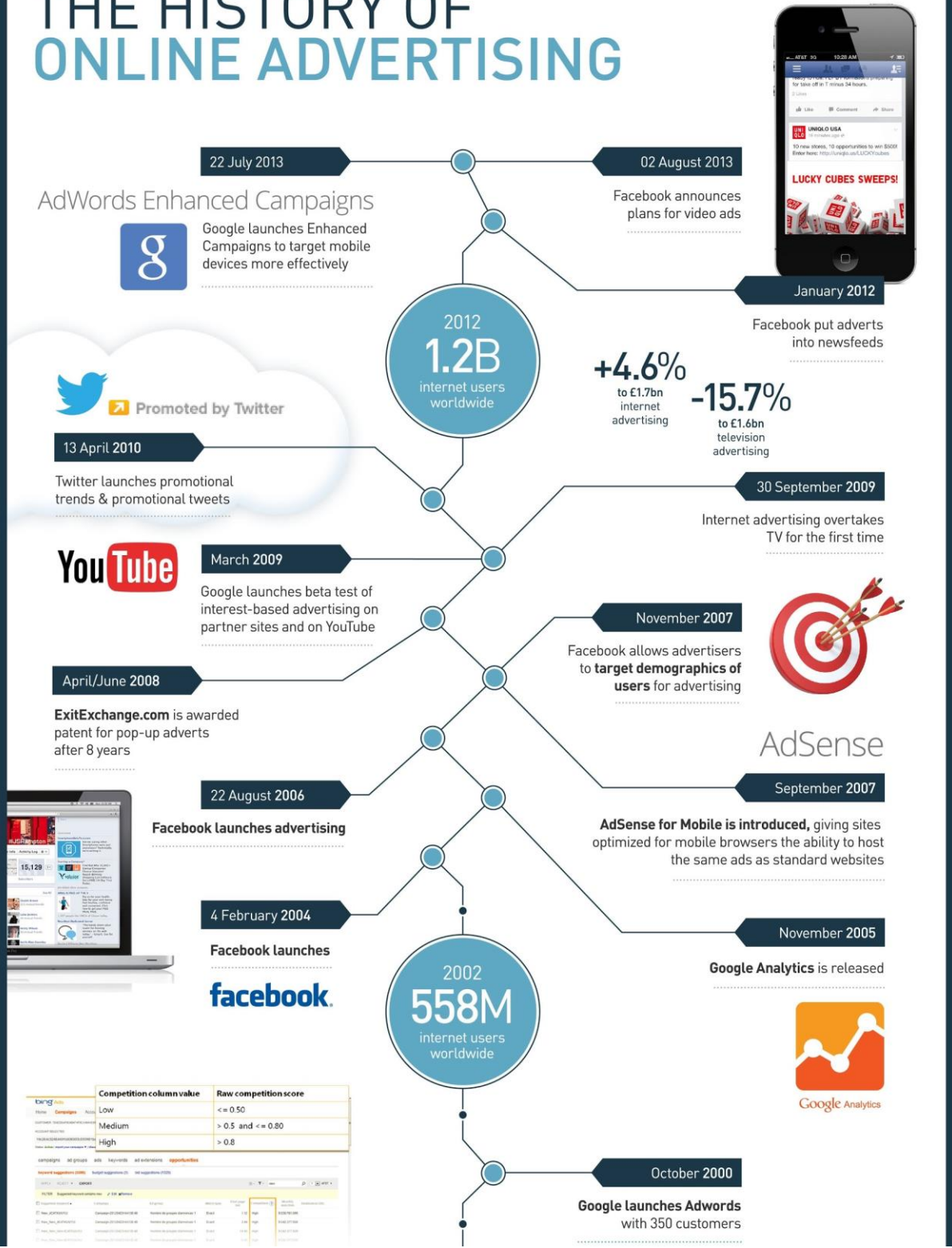


However, as time went by, the industry finally took a turn towards the progressive future and smart banners and predictive advertising were introduced. Since 1999, advertisers started to look into paid search and pay-per-click campaigns, until finally Google introduced the AdWords in 2000, which utilized the Quality Score model. As of 2013, almost 96% of Google's revenue comes from advertising.

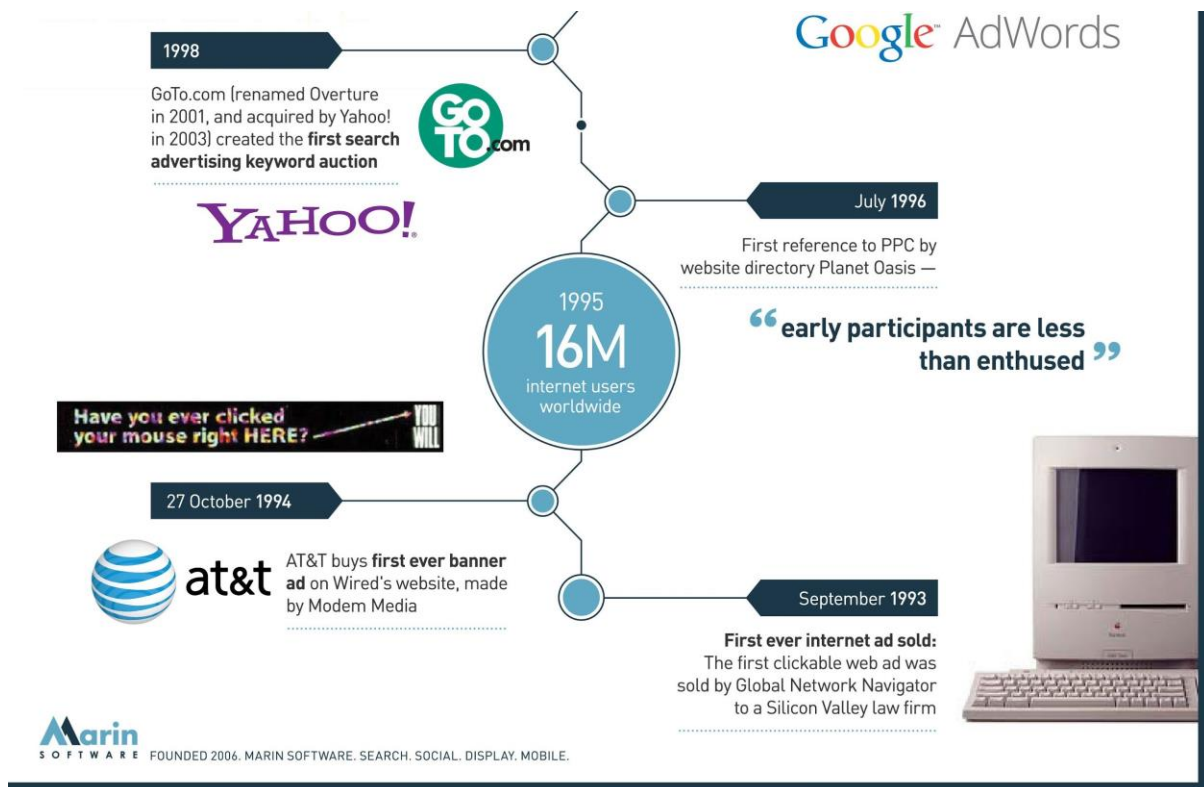
This era also marked the implementation of social media advertising - Facebook, Twitter and Youtube gained immense popularity and became the main advertising platforms of modern time. Moreover, Google's search engines now allow predictive advertising - when a user searches for specific pages on Google, Amazon, Youtube and many other pages, the banners show recommended adverts according to the user's tastes, preferences and previous selections. This is an important aspect of brand perception.

The following infographics will briefly describe the history of online advertising with figures.

# THE HISTORY OF ONLINE ADVERTISING



Competition column value	Raw competition score
Low	<= 0.50
Medium	> 0.5 and <= 0.80
High	> 0.8



Notice how the author focuses on brand recognition and brand perception and highlights the importance of these concepts in all examples and theories provided in this advertising history transition part.

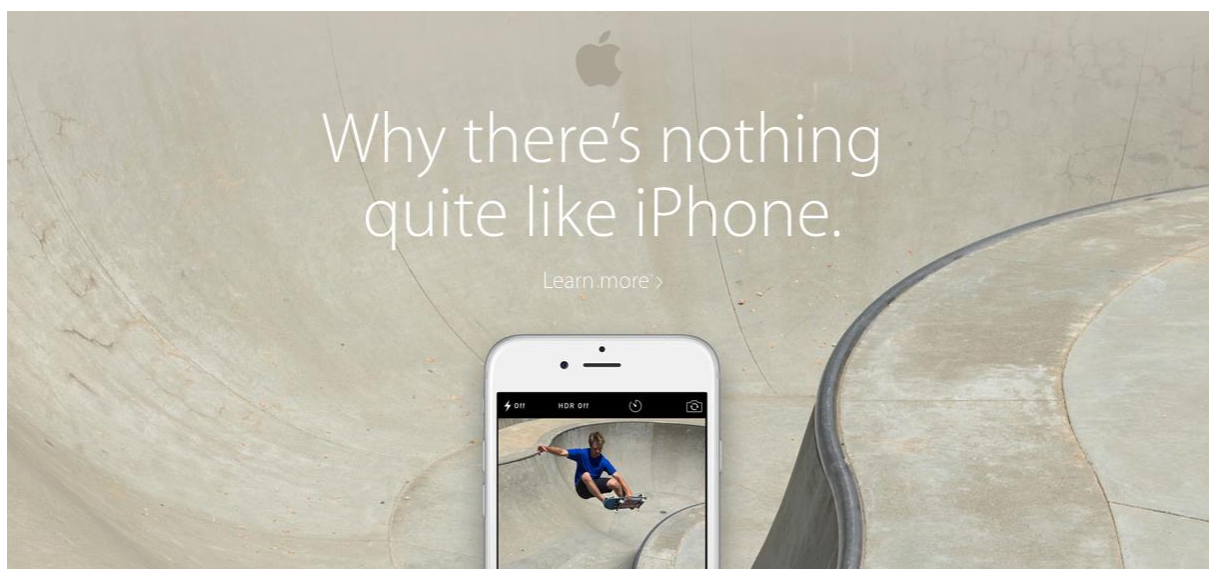
This move enables the reader to come prepared to the next part of the thesis - the literature review on above mentioned vital parts of advertising and the connection to the next generation of holographic marketing which is the sole purpose of creation of this paper.

The main part of the thesis will focus on brand recognition and brand perception by the consumers applied to the newly discussed holographic marketing principles, the traditional approach to branding should first be discussed in detail.

This is traditionally done in a form of a literature review. The following review tries to accumulate citations from several diverse academic sources from different authors written in different periods in order to vary the different approaches to the same topic of discussion.

## Literature review

In the beginning of the 21<sup>st</sup> century, branding was viewed as some kind of magical process that allowed companies to generate sky-high sales and revolutionize the market, becoming leaders in their specific niche. However, there even were several brands back in the days that operated quite nicely in their segment even without an official logotype, like gear.com for example (Kotler 2003). As Philip Kotler stated in his “Marketing Management, 11<sup>th</sup> edition” (2003): *“a brand is essentially a marketer’s promise to deliver a specific set of features, benefits and services consistently to the buyers”*.



*Apple is one of the best examples of successful branding laws application*

Back in those years marketers did not even discuss the medium through which the brand value and brand equity should be delivered to the customer, as no significant technical progress were expected to appear at that moment. Kotler discussed brand equity as the degree to which customers are loyal to the brand, starting from a simple awareness, coming to acceptability, preference and finally loyalty.

According to Aaker, brand equity is highly related to the degree of brand-name recognition, perceived brand quality, mental and emotional associations and channel relationships. (David Aaker, 1995)

Customer attitude towards a brand, from lowest to highest:

- Customers will easily change brands especially for price and popularity reasons. No brand loyalty or the degree of dependence cannot be proven theoretically.
- Customers are generally satisfied with the brand. There is no specific reason for them to switch to another brand.
- Customers are mostly satisfied and it will cost them extra to change a brand.
- Customers are becoming friends with the brand and their perception towards it changes to almost fully dependent.
- Customers are devoted to specific brand and will not switch to another brand even if they incur emotional or price losses by staying with the current personal favorite.



**Customer Loyalty Leaders**  
based on assessments from 42,792 consumers aged 18-65 across 635 brands in 72 categories  
leaders based on cross-category loyalty strength against the ideal  
**in 2016**

Brand	Category	2016 Rank	2015 Rank
Google	Search Engines	1	6
Amazon	Online Retail	2	8
Apple	Tablets	3	4
Netflix	Video Streaming	4	1
Facebook	Social Networking	5	5
Apple	Smartphones	6	3
Amazon	Tablets	7	2
YouTube	Social Networking	8	7
Amazon	Video Streaming	9	10
WhatsApp	Instant Messaging	10	9
iTunes	Video Streaming	11	13
PayPal	Online Payments	12	18
Dunkin' Donuts	Coffee	13	17
Samsung	Smartphones	14	11
Nike	Athletic Footwear	15	31

MarketingCharts.com | Data Source: Brand Keys

*Google leads the race in the global brand loyalty according to last year data.*

These basic interpretations of brand awareness (degree of recognition) dating back to the beginning of the 21<sup>st</sup> century (as far as 10-15 years ago!) were based on the same platform of printed ads and TV ad campaigns as other frameworks years before them with the Marlboro Man commercials (for example).



However, in the same academic source, Kotler discusses the “elusive” goals of branding on the World Wide Web: “*the one-to-one nature of the Internet does not build massive and stable brand awareness*”.

It is discussed that “the format of Internet advertising has been ineffective”: in the beginning of the 21<sup>st</sup> century, Internet advertising was annoying and toxic to the end customer, conclude Kotler and Aaker. On top of that, the authors assumed that in the digital era (2003-2005!) the consumer was in total control of the online advertising picture and could, therefore, terminate the annoying ad in any time.



*The annoying pop-ups from the dawn of internet advertising.*

Internet advertising and brand recognition / brand perception had weak correlation between them.

Kotler mentions several brand-building tools. Whilst the list is mostly obsolete, let us quote it for future use (after adjustments and updates of course):

- Public Relations and press releases
- Sponsorships

- Clubs and consumer communities
- Factory visits
- Trade shows
- Event marketing
- Public facilities
- Social cause marketing
- High value for the money
- Founder or a celebrity personality
- Mobile phone marketing

Bradley (1995) elaborates on the advertising strategies created and used 15-20 years ago whilst implying that proper selection of an advertising message and the medium of delivery can be crucial in effecting the brand loyalty, i.e. increasing the brand recognition of a certain product by a group of target customers. The main goal, according to Bradley is rightfully reaching the right audience with a clear and convincing message.

Usually, a solo advertisement has weak effect because of the decaying recall amongst several audiences. That is of course because 20 years ago advertisers used static platforms like printed campaigns and TV clips to convey a certain static (fixed) message about the product to a certain group of people within a certain pre-projected timeframe.

  
**WIN £20,000 TOWARDS  
 YOUR DREAM WEDDING\***

\*T&Cs Apply



*Go Compare series of ads featuring opera singer Gio Compario was voted most annoying and repetitive UK advertisement by Telegraph.*

This is important to notice now, as the main part of the thesis will talk about an interactive, flexible, and versatile advertising platform of the new age of holographic marketing.

In addition, Bradley (1995) cited Langhof (1967) with the musings on the relationship between awareness of the advertising campaigns and the loyalty levels towards the brand by the customers.

A direct correlation between mentioned variables was drawn out fifty years ago and was still cited in the '95 book. Why? Because the medium of advertising has not change – printed ads and TV slots were the foundation of proper marketing and Internet only started rising from its knees.

Bradley (sourcing John Fanning, 1985) also highlighted the main functions of an advertising agency in the 90s':

- Creative department
- Account executive
- Media department
- Accounts/data processing
- Production

IEBM International Encyclopedia of Marketing under the patronage of Michael Baker (1999) and in particular, one of the authors by the name Mark Sherrington discuss a list of qualities that a brand should have in order to sustain high brand awareness / loyalty amongst its consumers:

- Value performance. Indicates a brand's true performance and not hyped marginal benefits created by the advertising campaigns.
- Highest common factors. Successful brands try to provide a mix of benefits for their consumers, thus increasing the overall utility.
- Spiritual reward. Customers will want only the best for themselves, so-called inner and outer directed values that brands can deliver.

- Distinctive added value. A unique benefit that can be properly distinguished even by a non-experienced end user. Sherrington gives an example of logos and how loyal and even not-so-loyal customers can recognize a particular successful brand only by looking at a small part of its logo.
- Coherent brand mix. The most important aspect of the coherent brand mix concerning the current research is promotion.



*“The best or nothing” - Mercedes ads imply a great spiritual reward for its viewers.*

Bagozzi (1998) defines personal and nonpersonal media within an advertising paradigm. He is stating that with personal media, the “distance” between the source and the receiver is small and both verbal and nonverbal contacts are direct. The feedback is delivered shortly and interactions go through an easily identifiable process from beginning until the end. The source and the receiver are aware of each other in the context of the current campaign – the source knows whom the message is delivered to and the receiver knows the origins of the message.

A non-personal media has a lot of distance between the source and the receiver, the contact is indirect through several channels (usually), the feedback is scarce and delayed and in the communication itself, the main role always goes to the source. Both the receiver and the source usually do not know each other or both parties think of each other as a conglomerate or simply a crowd.



*Old Spice commercial series, one of the first to combine implied personal and official nonpersonal approaches.*

The situation totally changes with the introduction of the holographic marketing, which will be spoken of in the main part of the thesis.

Bagozzi also states that there is a two-step flow model of communications where the mass media transfer the message to the opinion leaders and they, in turn, connect with the public.

Remember Marlboro Man and Felix Baumgartner from the introduction (history of advertising) part? These are the custom examples of opinion leaders or, as the author called them in the introduction part, brand ambassadors. The conception of holographic marketing transforms such ambassadors into fully functional brand heralds.

Herny Assael (2006) talk about the important effect by deceptive advertising campaigns on brand image and brand awareness levels / loyalty. The author argues that deception is present when viewers get incorrect beliefs because of too much advertising exposure.

He gives an example of an old Volvo advertisement in which the manufacturer's car was hit by a heavy Monster Truck, along with other competitor cars and, unlike the latter, did not

break in half. The deception occurred because the Volvo car was prepared for the collision before the advertisement was actually shot, while the other cars were weakened, thus not surviving the crash test.

Such type of deception in ads is dealing huge amounts of damage to the image of a particularly advertised brand and affects the company perception in the eyes of a regular viewer. However, a large reason for the possibility of such deceptive campaigns to go through is because of the low transparency of the media channel (in this case – TV) and also because a company (or an agency) could prepare its product for any kind of clip – be it an on-screen crash test or highlighting only the positive sides of the product.

The advertisement features a vibrant green background with a grassy field at the bottom. In the foreground, three product packages are displayed: a large box on the left, a smaller box in the center, and a tub on the right. Each package prominently displays the Danone logo and the product name 'ACTIVIA' in large white letters, with 'B.L. REGULARIS' in smaller text above it. Below the product name, it says 'FAT FREE' and 'SANS GRAS'. The top left corner of the advertisement highlights key nutritional facts: '0g added sugar', '0% fat', and '40 calories per 100g'. The bottom of the advertisement contains the following text: 'The only fat free yogurt, now with no added sugar to contain Danone's famous probiotic culture BL Regularis™ DN-173 010 1 billion *Bifidobacterium lactis* per 100 g'.

*FTC complaint about Activia misleading claims led Danon to pay \$45 million in damages for claiming basically “Activia promotes bathroom regular bathroom trips.”*

Marketers must analyze these parts of the equation in order to check the effectiveness of an advertising campaign or a single ad:

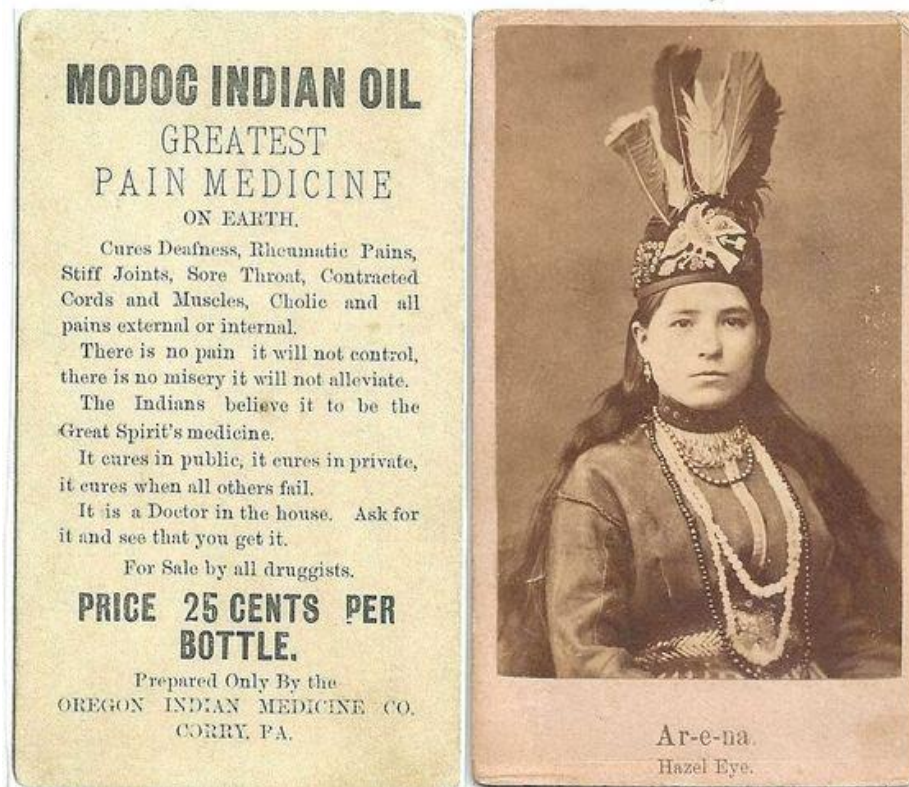
- Have communications objectives been formulated to reflect consumer needs?
- Have marketers adequately encoded product benefits?
- Has the message been transmitted to the target segment utilizing the right media?
- Did consumers decode the message in the manner the advertiser intended?
- Does exposure to and acceptance of the message lead to a purchase / repetitive purchase?

Things in marketing are a lot more sophisticated than they were 10-15 years ago, debates Nick Johnson in his 2015’ book “Future of marketing”. He is quoting an old friend of his, Cammie Dunaway, an experienced marketing officer (30+ years) that has worked for such big names as Nintendo and Yahoo!

*“Back in the golden days, the formula for success was not so hard to fulfill – you understood your traditional 4P approach and if you’ve applied the current brand challenges to the known framework in addition to having good products and at least normal advertising, success was more or less predictable” - Cammie Dunaway.*

However, the rules of the game have changed, states Dunaway, highlighting that the goals remained the same, yet the playground itself is transforming every year.

Nick Johnson gives an example of a very old advertisement from the 19<sup>th</sup> century that spoke about the perfect benefits of a medicine called Modoc Oil – and the success was immense.



*“The greatest” medicine on Earth.*

This approach has stopped working long before our days – because consumers are well educated and the term “marketing” is not associated with magic anymore. People generally understand how companies create dull and boring campaigns without any specific appeal and thus decide to ignore the advertised product.

Alternatively, what is even worse for the producer company, consumers give the product a very bad review in the social media and all further marketing efforts aimed on reviving the product’s image are in vain.

The author stretches importance on the four pillars of power that shifted the awareness and perception game towards the consumer:

- The move online – enormous, prevailing usage of online media in marketing communications.
- Transparency explosion – consumers see through any sly or many-leveled advertisement campaign, making it almost impossible to deceive them even with the brightest scenarios.



- The media landscape is fragmenting rapidly – it is hard for the creators of content to contact consumers and talk to them, **and many new channels and platforms are appearing very fast.**

Consumer data is more open than before – everyone (you, your competitors, the competitors of your competitors) have access to the databases with consumer details in order to deliver more targeted and relevant content. Moreover, consumers expect more openness and relevancy from the producers on the same market.

### Research gap

Summing up the review of the important literature, it can be very safe to assume with assurance that professional marketers have dwelled really well in the fundamental concepts standing behind consumer brand recognition and brand perception. Specialists perfectly know how behavior of people towards a certain product change with the application of different marketing methods in accordance to the branding requirements, producer needs and current market trends.

Marketing, as a social phenomenon studied for many years has always walked hand-in-hand with scientific and technological development of the human society. Marketing has always been the biggest link between vague psychology of Homo sapiens and strict rules of business and sales.

However, the rules of the marketing game are changing as we speak. The introduction part of this thesis talked in detail about the development of a technological breakthrough - holographic imaging and various methods of its creation. Such new paradigm does not only play with the minds of people but can also be used to create a completely revamped and innovative holographic marketing.

In conclusion, reviewing the facts gained from academic sources in the literature review in addition to the practical examples from the history of advertising from the point of view of brand recognition and brand perception, determining the research gap for the current thesis goes as follows:

- There is little to none research gap applicable to expressing previously unknown thoughts on brand recognition and brand perception in the current meta-marketing fundamental theory using the traditional methods of advertising, medium of message and psychological reaction of consumers.
- There is, however, an endless research gap - call it a research ocean regarding the new meta-marketing theory, emerging from the application of holographic imaging and augmented reality solutions.
- There were no previous academic researchers or papers on the topic of holographic marketing - the term itself has not been even “coined yet”. According to the various internet sources (thoroughly mentioned in the Bibliography section), there have been many non-academic interpretations of innovations in advertising and practical marketing connected to all kinds of holograms, however, no significant academic reports, reviews or thesis papers in the field of holographic marketing have been posted yet.
- The author assumes that it is acceptable, relevant and vital to create a new meta-marketing theory of applications of holograms / augmented reality and their effects on the brand recognition and brand perception of consumers.

The author of this thesis, therefore, embraces the courage to be the first academic researcher in the world to actually “coin” (officially reserve for future use) the term “Holographic Marketing” and takes this leap of fate to develop a beginning of new meta-marketing fundamental theory.

### New meta principles

It was mentioned that the research gap is large; however, the new meta-marketing holographic theory should follow several rules in order to be relevant, viable and trustworthy:

1. The new meta-marketing holographic theory that speaks about the influence of application of holographic imaging / augmented reality on the brand recognition / brand perception of consumers should not be in conflict with classic theories of advertising and consumer behavior. Even more, it should serve as a successor of such theories in appliance to the new holographic platforms.

2. The new meta-marketing holographic theory should utilize the additional psychological feelings and effects that holographic advertising medium give consumers.
3. The new meta-marketing holographic theory should follow the same ethical rules as the classic theories that were tested by years of experience.
4. The new meta-marketing holographic theory should be viable, i.e. should generate revenue for companies that decide to utilize it.

## Methodology

Research aims and objectives

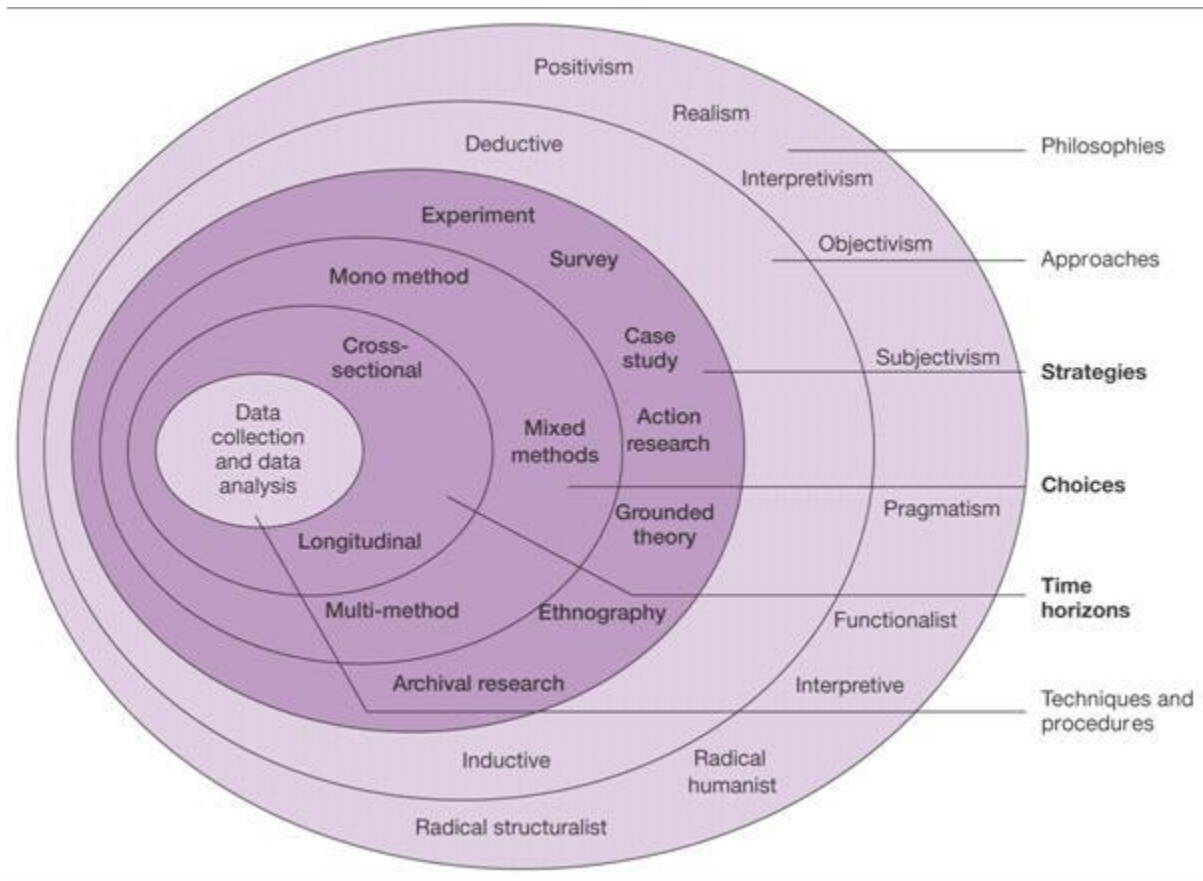
Research question:

“How does the implementation of holographic marketing methods in advertising affect brand recognition and brand perception?”

Research objectives:

1. Define the term “holographic marketing” and explain what it consists of, using currently available solutions as well as allegories and predictions.
2. Describe the changes to brand recognition and brand perception under the new meta-marketing holographic theory.
3. Analyze the case study of Microsoft Hololens and its importance in the pioneering of holographic marketing using a proposed research conducted together with The Holo Herald.
4. Draw key findings and develop prognosis based on conducted research and analyzed case.

## Research design (the onion)



Research philosophy used: Critical Realism.

Critical realism implies that humans experience the ambiances and imageries of the real world. According to critical realism, ambiances and imageries of the reality may be illusory and they usually do not render the actual state of things.

Critical realists distinguish that our senses and other factors may get in the way between researched reality and us as researchers and appreciate the significance of multi-level research and the influence and interrelationship between the individual, the group and the organization.

Research approach used: Inductive

The paper will be focusing on exploration of new opportunities and drawing (if possible) new ideas, theories and systems. For this reason, an inductive approach is the most appropriate one.

Research strategies: Grounded Theory + Case Study + Active Research

The paper will transition from a descriptive analysis of the traditional (current) marketing systems to the introduction of the holographic marketing based on the case study to the educated future prognosis.

Research choices: Mixed Method

Time horizons: Longitudinal

The longitudinal time horizon approach is chosen because the author will be analyzing the past, present and future of marketing in its various states (traditional, holographic) throughout the whole paper.

## Holographic marketing

Holographic marketing is a newly created approach to classic methods of advertising by using specific holographic imaging and the help of augmented reality solutions in order to create a completely new medium of message delivery to consumers.

Switching from traditional methods of advertising such as the TV screen or 2D posters to three-dimensional observation through holographic images, vectors or specific ads designed to be broadcasted through augmented reality helmets/glasses will bring enhanced vision of the product to an average consumer.

For example, a person using one of Google Tango' powered smartphones - Lenovo Phab 2 or ASUS ZenFone AR will be able to receive all the perks of traditional advertising of a product - that is the message informing him about the added value, the unique identity of the brand and consumer utility that the product brings - but in a three-dimensional mode on a screen of a what appears to be a regular mobile phone. Google Tango platform will allow a consumer to watch specifically designed holographic ads. Another advantage will be the added "augmented" information possibility - i.e. a consumer will be able to simply point the camera of a smartphone at a product and get instant data about it on the screen - contents, positive/negative reviews, price fluctuations and many other details.

Both Microsoft Hololens and Google Tango' powered smartphone will be able to allow the consumer to connect real world and the augmented details, by smart scanning the environment around the phone / Hololens user - for example a room which he is in - and unlocking the possibility to add non-existent elements directly in real-time. A classic example with Google Tango will be the possibility of scanning and creating a digital copy of your living room and then, coming to the furniture store (or even online in the comfort of your own house), freely place the available furniture models onto that digital room for a 100% informed purchasing decision.

Another example can be mentioned with the Hololens and virtually everything that you can scan / make digital copy of and then use in any circumstance with the help of augmented reality. That is of course supported by the visual advertising materials that can "float" around

the user, representing the branded products, appealing from a three-dimensional point of view, compared to traditional two-dimensional as has been seen by any consumer for numerous times on a TV screen or a printed poster.

Holographic marketing will intensify the way consumers interact with the branded products by adding one more degree of freedom - the volume. For example, a client will be able to visit an augmented website of Mercedes AMG and not only pick a dream car for himself - but also view that car from many angles and, using specific databases, look inside the engine or explore the inner cabin - all from the comfort of a house chair.

This new approach to marketing will also greatly increase the possibilities by which producers can enrich the message they want to deliver in the advertising materials. For example, filming unrealistic looking ads with futuristic special effects.

One more great possibility of holographic marketing will be the holopresence. Imagine that you as a producer can create a holographic image of a famous person (with permission and royalties being paid to the mentioned person, of course) and use such projection in your advertising! All you have to do is to completely digitalize the way real person moves, interacts with people, speaks and gestures. Think of a very famous football player advertising.. well, for example pure mineral water - you as a producer / sponsor of the advertising campaign don't have to spend a lot of money on the famous person to film several takes every day until you get the perfect cut. Just digitalize the football player, pay the royalty and use his holopresence for your advantage.

Brand ambassadors - real people spent their time and effort to promote a particular brand will be in the past. Holographic brand heralds will take over, totally revamping the old concept of a spokesperson.



Let us talk about brand recognition in the light of holographic meta-marketing theory. As it was previously mentioned in the literature review part, there are five main stages on any consumer's path of becoming a brand loyal buyer. The author will now discuss each of those steps in relevance to holographic marketing. The example taken here will be Nike vs Reebok footwear.

First phase. Customers will easily change brands especially for price and popularity reasons. No brand loyalty or the degree of dependence cannot be proven theoretically.

In the era of holographic advertising, customers will still be able to stay in this phase, however the enrichment of advertising gained through the usage of holoimages will allow companies to persuade people on reconsidering which brand is better for them faster than it were with traditional advertising. Imagine a situation where you can use a holographic projector to try on many pairs of shoes from Nike web store without even leaving your own house. You will also be able to create your own holopresence model and switch between several outfits to find the shoes that match you best from the comfort of your couch. This will definitely decrease the time during which consumers will be in phase one, thus benefiting the producers that will invest in holographic advertising earlier than others. Innovation and continuous improvement is the key.

Second phase. Customers are generally satisfied with the brand. There is no specific reason for them to switch to another brand.

This is a very hard phase for producers as it is a really complex situation when consumers that you want to take over are satisfied with your competitors' brand. However, if your brand will have the fresh innovative holoimaging advertising campaign or even a famous holopresence brand herald like a famous Olympic medal winner, consumers can start thinking of switching to your brand.

Third phase. Customers are mostly satisfied and it will cost them extra to change a brand.

Even if it may cost customers extra to switch from their favorite brand to Nike (for example, because have established a discount program for themselves at Reebok), the concept of a

holographic web store described higher is very attractive and third phase can be much easier with holographic marketing.

Fourth phase. Customers are becoming friends with the brand and their perception towards it changes to almost fully dependent.

This is a great phase for a producer, because consumers will want to associate themselves with your brand. The holopresence that anyone will be able to create for themselves will help in establishing the dependence of consumers.

Fifth phase. Customers are devoted to specific brand and will not switch to another brand even if they incur emotional or price losses by staying with the current personal favorite.

The risk of causing emotional losses to your consumers will be minimized with the addition of holographic advertising because the campaigns will become so sophisticated and well-developed that moral damage will not a significant issue.

Several years ago, in many of editions of “Marketing Management”, Philip Kotler described Internet advertising as “hard to handle” and “ineffective”. Of course, in those times, 10 to 15 years ago the Internet was only starting to grow. However in our day, consumer brand perception through Internet advertising depends on many factors, most important is how attractive a product is shown visually and also how detailed are the core benefits that the end user will receive.



*Germany's social media and internet usage, Hootsuite.*

Let us take Germany as an example here. The Internet penetration is enormous, ranking up to 89%. Be it on smartphones or laptops/PCs, Germany is a very profitable country for Internet advertising. Consumer brand perception and recognition for most known products is already high in Germany, however, with the possible introduction of holographic advertising, the companies that will adopt the new meta first will gain a significant boost in consumer awareness and therefore in sales volume.

When talking about holopresence of brand heralds, Germany again will be in top ranks. Consumers love advertising campaign with famous people in Germany. Imagine a holopresence of Manuel Neuer appearing right in front of you in your room, talking about Nike shoes - would you go online and buy them? What if the brand herald Neuer also helped you choose the best sportswear that you (and he!) like really much? This statement proves that with the inclusion of holographic presence into the new-meta marketing theory sales of first adopter companies will rise significantly after the first wave of disillusionment will pass.

Let us now briefly discuss several brand-building tools that many authors highlighted to be very important in the eyes of consumers. Emphasizing on these variables was proven to be advantageous for your product.

- Public Relations and press releases

One of French politicians during the presidential election pre-debate stage sent over a holopresence of himself to one city, whilst simultaneously giving a speech physically being in another city. Your brand heralds will be able to do the same and what is more - they will be able to deliver moving speeches about your brand's benefits and added value directly to consumers through the help of holographic imaging.

- Clubs and consumer communities

Imagine a Nike jogging holographic club (community) where your consumers exchange opinions on different sportswear in real life, yet as holograms from their houses. This will certainly boost your brand's perception and popularity and even attract new consumers that were only curious about the brand before seeing the holographic club.

- Factory visits

It is a bit hard and costly to organize factory visits of large quantities of consumers. But what if you would be able to turn your holographic projector on and take a three-dimensional tour through one of Mercedes' factories with a holopresence guide alongside you?

Another important aspect of brand perception is the problem of repetitive advertisements that immensely decrease the popularity of a brand. This was discussed in the literature review and the cause of such problem is the fixed medium through which the message is conveyed and non-interactivity of the advertisement. Imagine watching the same TV ad even if it is an ad of your favorite Samsung phone over and over again. Eventually, you will start hating this ad and your brand perception and loyalty will drop.

However, if the same concept of the ad will be streamed over holographic imaging or holopresence the result will be different. As the hologram can be made into an interactive tool or even a holopresence with small AI perks installed, the campaign can change itself, replacing one kind of small details with other kinds, thus completely enriching the viewer experience and, as a result, stimulating the consumer to stay loyal. A holographic Samsung

phone advertisement can change people that talk about the phone, mentioning its features all by itself, without the need for control from the producer's side.

Remember the discussion about personal and nonpersonal media through which the advertisement message is conveyed from the literature review part? Holographic marketing will allow companies to combine both of these approaches into one. The advertisement will be developed by hologram specialists for an entire market, however, the holographic projector that will stream it will be able to adjust each advertisement to the personal traits of a person who will watch it.

For example, that Old Spice ad with the black muscular guy that has been appealing to other male consumers, some out of envy, some out of so-called "bro" feelings, can be modified for certain audiences - and a skinny teenager can appear instead of the black muscular guy because the viewer is an average college student who will prefer to watch his peer advertise something like Old Spice to him.

The three important aspects that shift perception towards the consumer can now be analyzed from the perspective of holographic marketing.

- The move online – enormous, prevailing usage of online media in marketing communications.

The next shift will be towards holographic reality, where consumers will be able to experience marketing communications from all sides and angles from anywhere in the world.

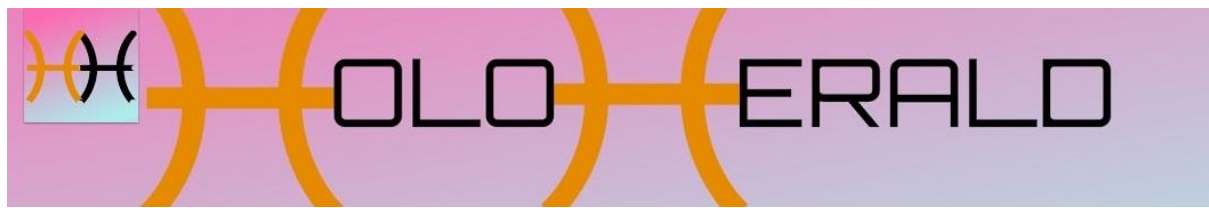
- Transparency explosion – consumers see through any sly or many-leveled advertisement campaign, making it almost impossible to deceive them even with the brightest scenarios.

Holographic brand heralds will help consumers in having even more transparency as with holographic marketing every detail of the product will be visible and people at any given point in time could ask for product characteristics, price levels and many more.

- The media landscape is fragmenting rapidly – it is hard for the creators of content to contact consumers and talk to them, **and many new channels and platforms are appearing very fast.**

The vast variability of holopresence avatars, details of holographic advertisements and possible interchangeable scenarios of campaigns will allow companies that adopt the new meta earlier than their competitors to shine in this upcoming era of change.

## The Holo Herald case study



The Holo Herald team:

Erik McFarland

Paul Szorik

Austin Swainston

Alex Reed

## Description of the company

The Holo Herald is a media company/community from the United States. It is a website and Youtube channel dedicated to covering all of the recent developments in the augmented/mixed reality field. The members of the team explore the world of augmented/mixed reality with the help of Microsoft Hololens - an augmented reality helmet with full support from the producer, own application store and a software development kit.

Members of the team initiate podcasts and film short exploratory clips filled with augmented/mixed reality experiences. They are using a specific camera to record the Hololens experience from the point of view of the user. The Holo Herald gives insight on many topics connected to Microsoft Hololens. For example, they review applications that are available now, such as Puzzle AR, Holo Real Estate, My Study Lab, Hologate, Holomaps (with 3D cities!) and many others.

The author of this thesis contacted The Holo Herald team and conducted several discussions on the future of augmented reality and the usage of holograms in future life. The author also proposed a marketing research in the light of the newly defined holographic marketing concept that could be conducted by the company.

## The proposed research:

Sample size: four people - members of the Holo Herald team.

Type of research: non-moderated focus group discussion.

Subject: holographic games for Hololens available in the application store, such as Puzzle AR, Cyber Snake, Holo Tower, The Floor is Lava, Young Conker, Robo Raid and Fragments.

Proposed (unavailable yet) addition to all games: small holographic advertisements in the corners of the field of view of the user.

The Holo Herald did video reviews on all the mentioned games so it will be relatively easy for them to propose how holographic advertisements could look like as parts of such games. The ads can vary, be it ads of popular contemporary brands (Apple, Samsung, cars, food and



so on) or Holo Herald team members can imagine absolutely fantastic advertisements of their own taste and preference.

#### Proposed research questions for the focus group discussion:

1. Do you feel that holographic advertising is significantly different from traditional two-dimensional? If yes, how is it different? Please elaborate your opinion.
2. Were you annoyed in any way by the holographic advertisements appearing in your field of view?
3. If you were creating such pieces by yourself, what would you do differently?
4. Can you say that your perception of the promoted brands changed after noticing holographic ads for the first time? If yes, then how did it change?
5. Can you say that switching to holographic advertising makes you recognize brand identities better? If yes, elaborate - how and why.

After the end of the proposed research, The Holo Herald might discuss it all together in one of their Youtube podcasts devoted to all Hololens related happenings and news. The Holo Herald team also invited the author of this thesis for a possible collaboration on one of the podcasts where further developments of holographic marketing could be discussed.

## Conclusion

This thesis paper turned out to be a bit chaotic at first glance. This is the fate of all groundbreaking theories and breakthrough research discussions.

The effects of holographic marketing on brand recognition and brand perception were well discussed from a theoretical point of view and on the basis of proposed research with The Holo Herald team.

### Key findings of the research:

1. The rise of holographic marketing is inevitable - in the following years, many companies will switch their campaigns to the holoimaging and the first ones to do that will receive more benefit, both market share-wise and profit-wise.
2. The holoimaging technology will evolve rapidly with each year and soon, marketers will be able to create such paradigms and concepts/platforms that the author of this thesis couldn't even dream of.
3. Holopresence will be booming in the following years because having a holographic brand herald for your product will definitely benefit the brand recognition and brand perception by the consumers.
4. In the completely new holoimaging environment all companies will have equal chances to shine through implementing the new meta into their business representation.
5. Consumers will receive much more information about the brand and brand loyalty will be possible to establish a lot easier than now.

### Key limitations of holographic / augmented reality marketing:

1. In the case of augmented reality marketing like ads on Hololens or a similar cheaper lower resolution device, companies have to make people actually wear it.

2. Companies that create the holographic ads must make sure that they are not invasive - otherwise the dark era of the Internet browser pop-ups will start all over again and this will put a shadow over the new fundamental theory really badly.
3. Very cheap device + paid ads OR expensive device + no ads. Companies that produce augmented reality devices must choose between these options because that will determine how much money they will actually get from advertisement creators.
4. Companies have to make sure to have well-established brand identity for their products before going holographic because otherwise they would just be a “cool company that has cool holograms” to their consumers and will lose market share to companies with stronger branding.
5. Contemporary augmented reality / hologram equipment must be upgraded as soon as possible to ensure good picture quality and low advertisement streaming costs.
6. Companies will have to change their estimated budgets in order to streamline more funds on the development and application of holographic concepts.

The marketing experience shifts together with technological innovation and changes in the minds of people, both psychological and social.

It was only a matter of time and patience until we would finally see hologram-like pictures closely resembling those that Star Trek and Star Wars franchises showed to the general public back in the days. And now that we finally see such innovations - it is a great honor and never ending joy to be living in the times of such wonderful creations, not only being able to observe them, but also to partially influence.

Welcome to the world of futuristic holographic marketing!

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## Declaration of authenticity

I hereby declare that I prepared the dissertation submitted independently and no other means and sources apart from specified were applied. Furthermore, I have NOT made payments to third parties for any part of the submitted dissertation. The paper has not submitted in a different degree programme at the same time or in a similar form and has not been published yet as a whole.

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