Interactive Advertisements in an IoT Era

Vassilis Javed Khan[1(✉)], Dion Bonné[2], and Suleman Shahid[2,3]

[1] Eindhoven University of Technology, 5612 AZ Eindhoven, The Netherlands
v.j.khan@tue.nl
[2] Tilburg University, Warandelaan 2, 5037 AB Tilburg, The Netherlands
{d.a.e.bonne,s.shahid}@uvt.nl.com
[3] Lahore University of Management Sciences, Lahore 54792, Pakistan

Abstract. The Internet has profoundly changed the nature of ads by making them interactive. We are currently observing an evolution to the Internet of Things (IoT) and it is inevitable that interaction designers will utilize IoT for creating a new ilk of interactive ads. In this paper, we present evidence that the attitude towards a TV ad interacting with a robot is positive when compared to the absence of interaction. Furthermore, we sketch the interaction space of TV ads and generally TV content with smart objects.

Keywords: Interactive advertisement · Human robot interaction · IoT

1 Introduction

The extension of the viewer's experience of content on the TV has been researched and has proven to have market success in the near past. One of the first well-known examples of such an extension, which was brought to the market with quite some success, is that of Philips' AmbiLight TV. The device itself was extended with several LED lights in its edges. Moreover, the TV was also able to recognize certain color patterns in the played content and based on that content it turns on the LED lights to create an extension to the experience in the ambiance of the room. Microsoft researchers have recently extended that idea with the IllumiRoom project [6].

Enabling interconnectedness among devices – anytime and anywhere - is called the Internet-of-Things. Due to the Internet-of-Things (IoT) paradigm, several devices can be connected to a (smart) TV and this enables cross-media interaction [5]. This entails that a TV can also be extended, by connecting it to several devices. One of these inventions is the ability to remotely control a TV system through a smartphone. These forms of interactive television also offer the ability to create interactive advertisements. For example, Durex was the first to introduce a dual-screen advertisement, which provides an extra layer to the story through a mobile app [6].

Although advertisements have been used for centuries the advent of the Internet and mobile technology has driven ads to become more personalized and more interactive. The ultimate goal of ad designers has been to make them effective. With the new Internet-of-Things (IoT) paradigm, new forms of ad interactivity will arise. With all of the new forms of interactive ads, attracting the viewers' attention to the ad has become more important. The Interactive Advertising Model (IAM) [8] has examined the unique

R. Poppe et al. (Eds.): INTETAIN 2016, LNICST 178, pp. 106–111, 2017.
DOI: 10.1007/978-3-319-49616-0_10

attributes of the Internet and the way they impact the experience of ads. The primary aspects are "interactivity and virtual reality". The advertiser-controlled aspects in IAM state several "Ad-Formats" that extend Internet ads compared to print ads, such as: banner, pop-up, hyperlink, etc. As was the case with the Internet, in an IoT era we would expect the concept of ad interactivity to extend to other dimensions. For example, smart objects in the viewers' environment (e.g. robots or smart toys) could extend the ad's interaction space.

In the area of robotics, an increasing number of robots are designed for personal use. Robots are a unique opportunity to create new systems to cooperate in reaching better living conditions [4], even within a living room environment. The design of such personal robots extends the use of simple, mundane tasks -e.g. robotic vacuum cleaner and lawn mowing- to entertainment purposes -e.g. Sony's robotic singing Elvis [3]. Thus, robots can actively change the environment by performing actions and offer the possibility of richer interaction with humans. Recent research on social and personal robotics has shown that these robots are already accepted in a living room environment [2].

Thinking along this line of extending media content around the output device we envision a TV ad in which the characters involved can interact with physical robots in the proximity of the TV. Based on previous research that has shown that interactive ads are more engaging and that robots in the living room environment can be engaging social partners, we hypothesize that this form of interaction will lead to an enriching user experience when compared to its absence. For example, one might imagine a simple interaction in which the characters in the TV ad might wave to the side of the robot and the robot might wave back, to more complex interactions such as the physical robot actively being part of the content in the TV whether that is an ad, an animated movie or a computer game. Although similar ideas have been already proven successful in mass-entertainment venues, such as Disney world and 4D films [1], no one has yet explored them in a home setting and in relationship to ads.

2 Method

We conducted a between subjects experiment (N = 70). One group (N = 35 - control group) watched a short (8 min) TV documentary with an ad (40 s) and the robot next to the TV but without the robot actually moving at all. The other group (N = 35 - experimental) watched the same movie and ad only in this case the robot also moved in combination to the advertisement that was playing on the TV.

2.1 Material and Setting

The documentary was eight-minutes and it was about the KMA - the military academy in Breda, the Netherlands. Halfway through the video, we included an ad, about LEGO Mindstorms (Fig. 1). The ad features LEGO Mindstorms, a robotic platform for teenagers. The ad was specially produced for our research. Before the production, a brainstorm session with the production crew, comprising of five students (background

Fig. 1. Left: Position of the researcher (left arrow), two participants at a time (right arrow) and the robot (top arrow) are highlighted, as well as the movement of the robot. Right: A frame of the TV ad featuring the snake-figure of LEGO Mindstorms. The same toy-robot was placed next to our lab's TV. The experimental group saw the robot actually interacting with the TV ad.

in media design) was held. Five ideas/scenarios were elaborated on storyboards and we picked one scenario, named "Bedtime stories" (Fig. 1) which conveyed the best relationship between the ad and the robot. The story of the ad depicts a young boy who is sleeping on his bed and wakes up when his sister drives with a remote control the snake figure of the LEGO Mindstorms to scare him off. Since there were several robot-figures one could build with the kit of LEGO Mindstorms that we had, we chose the snake figure that fitted best the ad's storyline. Since this was a new concept for our participants, we were particularly careful about choosing an interaction that would not seem accidental or random. That is why our main criterion for choosing an idea to produce the ad was the one that better conveyed the interaction between the robot and the ad.

The interaction of the robot with the ad was pre-programmed with LEGO's Mindstorm software platform. The interaction was programmed to mimic part of what was presented in the ad itself. We used the snake figure, as it was in the ad (Fig. 3). The robot moved on the TV table when the snake moved in the ad (Fig. 2). Finally the snake-robot did an attack move and played a snake-rattle sound at the same time when this was shown in the ad. The installed program on the robot itself was triggered through the researcher's computer that was connected through Bluetooth to the robot.

A room at our university was transformed to resemble a typical living room. A TV, couch, chairs, plants and coffee table were strategically placed to make the setting as realistic as possible. The researcher sat behind the participants, primarily for launching the robot's movement and secondarily for observing.

2.2 Measurement Instrument

When the viewing session finished, participants were asked to fill out two questionnaires. The first one measures the general attitude towards the ad, found in the marketing scales handbook [4]. It is a six item, seven-point Likert-type scale that measures a person's reaction to an advertisement he or she has been exposed to. The second one

is about Human-Robot Interaction [7]. It is a fourteen item, seven-point Likert-type scale that measures the negative attitude toward communication robots in daily life. This scale is divided into three subscales: (1) the negative attitude toward situations of interaction with robots, (2) the negative attitude toward social influences of robots, and (3) the negative attitude toward emotions in interaction with robots. Since the robot was an integral part of the interaction we wanted to find out whether there is any negative perception of it being part of a living room leisure activity. Next to the questionnaire, eight structured interviews (four control group and four experimental) were conducted to get a more detailed insight into participants' views about the general concept. The interviews were audio recorded and transcribed.

3 Results

For the first questionnaire, the general attitude towards the ad was significantly higher $t(68) = -2{,}687$, $p < .01$, in the experimental group ($M = 4.30$) than in the control group ($M = 3.61$). For the second questionnaire, for subscale 1, the participants' attitude toward situations of interaction with the robot was not statistically significant for the two groups $t(68) = 1.668$, $p = 0.10$ (control group $M = 3.63$, experimental group $M = 3.23$). For subscale 2, the participants' attitude toward social influences of robots was not statistically significant as well, $t(68) = 1.740$, $p = 0.086$ (control group $M = 4.94$, experimental group $M = 4.11$) and the). For subscale 3, the participants' attitude toward emotions in interaction with robots was also not statistically significant, $t(68) = 1.756$, $p = 0.084$ (control group $M = 4.48$, experimental group $M = 3.94$).

When asked about the interaction between robot and advertisement our participants had a very positive opinion about it. Most interviewees agreed that it would also help to make TV advertisements more effective. Participant 2 (female, 25) described it as follows: "*normally, you look at advertisements, but you do not really see them. It is like you shut yourself down until the seven minutes are over and you can continue watching your movie or TV show. Something like this (the interaction with the robot) really grabs your attention."*

On the issue of attention, there was the concern expressed that one will only be able to focus on the robot once it starts moving around during advertisements. Participant 3 (male, 22) said the following about it: "*the main problem has to be how to divide the attention (between the advertisement and the robot). For example, if the robot would walk behind my couch, I would turn around and focus on the robot, because I tend to find a robot more interesting that an advertisement. This means that placement and timing are extremely important, because it could also be distracting.*"

Finally, participants saw an opportunity for this concept to be specifically addressed to children. This might be due to the use of LEGO Mindstorms as the robot itself. Participant 7 (male, 21) was one of those interviewees who mentioned: "*I believe that this robot interaction could have a greater effect on children, because I think that they would be more sensitive to something like this.*"

4 Discussion and Conclusion

This study extends the current line of research by showing that smart objects –toys- can be used for extending TV experience. Our study clearly shows that this is a promising direction for designing such interactions and investigating its effects. We found a statistically significant difference for the ad that includes interaction with a robot. Our second measurement was about negative attitude towards robots of which we found no evidence when comparing the two conditions –a result that is also positive when designing such types of interactions in a living room setting. Our results are in line with the previous studies where it has been shown such an extension adds to the user's experience [6] and shows a clear potential for further research.

In terms of further research, the possible movements of a robot can be thought of in relation to the: (1) TV content; (2) TV as a device (Table 1). In our study the movement was synchronous replicating the content but we can imagine other scenarios. An example of synchronous that extends the content is when the robot would interact with the virtual character in the TV – in a simple scenario waving back to the virtual character. An example of asynchronous would be a movement that does not necessarily directly relate to the TV content. We can imagine an abstract movement during a TV ad that has as purpose just the aesthetic enhancement of the ad.

Table 1. The possible robot's movements that we envision.

	Movement		
	Synchronous		Asynchronous
In relation to TV content	Replicating the content	Extending the content	
In relation to the TV (as device)	Attached		Detached

In relation to the TV as a device, the movement can take place either attached to the device or detached from the TV. In the case of our study, the movement was detached from the TV. We envision more rich movements such as the robot actually moving behind the TV –"disappearing" from the physical world while appearing on the virtual - or even moving on top of the TV in the case of drones. Further, we envision robots that could actually be physically extended parts of a TV and could move in the periphery or on top of the actual screen of the TV. In that case movement would be actually attached on the TV itself.

Since attitude is a precursor to behavior [1] we expect that this interaction will actually positively affect the overall ad experience of users. Nevertheless, more research is required to further investigate behavioral aspects such as purchasing or social recommendations. This study was particularly focused on ads only. We do envision other media types such as animated movies, documentaries, talk shows, and even educational programs to take advantage of this novel way of extending the TV content. For future research we will explore a robot and type of TV ad are applicable to an even broader audience.

References

1. Ajzen, I.: The theory of planned behavior. Org. Behav. Hum. Decis. Process. **50**(2), 179–211 (1991)
2. Angulo, C., Pfeiffer, S., Tellez, R., Alenya, G.: Evaluating the use of robots to enlarge AAL service. J. Ambient Intell. Smart Environ. **7**(3), 301–313 (2015)
3. Beer, J., Prakash, A., Mitzner, T., Rogers, W.: Understanding Robot Acceptance (2011). http://hdl.handle.net/1853/39672
4. Bruner II, G.C.: Scale #51: Attitude Toward the Ad (General). Marketing Scales Handbook. GCBII Productions, Carbondale (2009)
5. Jensen, J.: Interactive television: new genres, new format, new content. Paper presented at Proceedings of 2nd Australasian Conference on Interactive Entertainment, Sydney, Australia (2005)
6. Jones, B.R., Benko, H., Ofek, E., Wilson, A.D.: IllumiRoom: peripheral projected illusions for interactive experiences. In: Proceedings of SIGCHI Conference on Human Factors in Computing Systems, pp. 869–878. ACM (2013)
7. Nomura, T., Kanda, T., Suzuki, T.: Experimental investigation into influence of negative attitudes toward robots on human-robot interaction. AI Soc. (2005). doi:10.1007/s00146-005-0012-7
8. Rodgers, W., Thorson, E.: The interactive advertising model: how people perceive and process interactive ads. J. Interact. Adv. **1**(1), 42–61 (2000)