

AR-Based Point System for Game-like Shopping Experience

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ABSTRACT

Point system is structured marketing strategy offered by merchants to encourage consumers to continue to buy goods or pay for the services. According to the spending, merchants give consumers a certain amount of points as reward. These points can be exchanged into a good or service but not back into cash. However, as a result of the low rate of reduction, the attraction of point system to consumers is not enough, especially in the case of micropayment. This paper calls for the design of innovative technologies to provide consumers with value guidance and improve user intention, e.g., by applying gamification and AR technique. In this paper, we use mission to provide consumers with meaningful task like living a healthy life, protecting environment and promoting local economy. Point will be given if mission is completed. If completed mission reaches a certain number, the level will be upgraded. Consumer can use level information to compete with friends. If a consumer keeps completing a specific mission, he or she can get a badge. Merchant will confirm mission for consumers. In addition, we tried to use point system to solve the inconvenience caused by the small changes during the payment.

CCS Concepts

• Human-centered computing → Human computer interaction (HCI) → Interaction paradigms → Mixed / augmented reality

Keywords

Human-Computer Interaction, E-commerce, Augmented reality, Gamification.

1. INTRODUCTION

Consumers are given points which are stored in point card according to their purchase of goods or service in the shop. Premiums are items that consumer can receive by redeeming proofs of purchase from store or a specific product. This was thought to be one of the first loyalty marketing programs.

American Airlines launched the first full-scale loyalty marketing program of the modern era on May 1, 1981 [1]. This

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revolutionary program was the first to reward "frequent fliers" with reward miles that could be accumulated and later redeemed for free travel. Within several years, many travel airline companies launched similar programs.

From the latter half of the 1990's, electronic money appears. The use of electronic money solves the problems caused by the use of bank notes and coins and promotes convenience. In 1997, Coca-Cola offered buying from vending machines using mobile payments [2]. After that PayPal emerged in 1998 [3]. After that, using point as loyalty rewards which can be credited directly to user account begins to gain popularity. Current point system is one of systems that use point as loyalty rewards.

Loyalty programs have changed the way consumers interact with the merchant from which they purchase product or services from and capture the eyes of consumers by saving money for shopping. However, there are still some problems to be solved. In this paper, we focus on the point system which is one type of loyalty programs.

2. PROBLEM

Since the point program in recent years has a lower reduction rate compared with the peak period, making points harder to accumulate than before. As a result, it seems that consumers are paying less attention to the point program and companies complain that these point programs discount goods to people that are buying their goods anyway, and that the expense of doing these programs rarely shows a good return on the investment. Therefore, the first problem is how to engage the attention of the consumers other than only giving more points as reward.

On the other hand, a 2015 study claimed that most supermarket loyalty cards do not offer any real value to consumers [4]. Currently, the point is the only standard for measuring consumption. However, points only measure how much is spent in consumption. There should be a more comprehensive way to measure other shopping behavior to help consumers establish a better consumption behavior.

In this paper, our research tries to solve these two problems. We will try to provide a new game-like shopping experience to attract people to participate in the consumption. What's more, we also try to motivate users to establish a better consumption behavior.

3. RESEARCH APPROACH

3.1 Related Approach

For the two problems we mentioned above, there are some related marketing strategies.

Shoppers prefer the allure of a new idea than what they are used to. For example Starbucks' program calls their currency stars. Although the currency is a type of point indeed, consumers prefer this new idea.

Referral programs [5] are an excellent way to attract new consumers. For example, offer patrons a discount if they refer somebody. Interpersonal relationships are considered to be important in marketing strategy.

Social media contests [6] are also one of efficient way of attracting new clients such as hosting a Facebook contest or a Facebook giveaway. Some free points, a tier upgrade, or another redeemable reward are adopted to make the offer more appealing.

Nowadays, many people will spend money on a brand only if they know some of their money is going to a worthy cause. They are particularly passionate about doing business only with brands that want to make a difference by donating to a cause. One solution is to create or adjust program to ensure that a part of the profits is donated to a cause, or run a marketing campaign for certain products or services which advertise that business will donate some of the money to charity [7].

In conclusion, new idea, interpersonal relationships, contests and a worthy cause are important factors in solving similar problems in other situation.

3.2 Our Approach

Our research tries to combine these marketing strategies into the interface design of proposed point system.

We apply gamification in our research. Mission and achievement are adopted to provide value guidance to consumers. Some missions for promoting consumers' motivation such as living a healthy life, protecting environment and promoting local economy are proposed. Achievement refers long-term accomplishments in a specific mission.

Reward is given to players who accomplish mission to engage them. Types of rewards include points [8], achievement badges or levels [9] and the filling of a progress bar. In our research, points are used as reward of accomplishing mission. Badges are used to indicate the status of achievement - keeps completing a specific mission. If completed mission reaches a certain number, the level will be upgraded. The filling of progress bar indicates the completion degree of mission. Making the rewards for accomplishing mission visible to players or providing leader boards are ways of encouraging players to compete [10]. Thus we use AR technology to visualize the point system to encourage players to participate in competition.

In the research, we try to improve interface of current point system to solve the two problems and deal with the inconvenience problem in micropayment. AR is used as a tool to realize visualization.

4. SYSTEM OVERVIEW

4.1 Overview

The system consists of two parts. One part is the consumer part and the other is the merchant part. At the consumer side, they can use the camera on the smartphones or smart glasses to recognize the AR marker and start system. By using system, they can pay point, check account, level, achievement and daily

mission completion. At the merchant side, merchant can confirm the mission and deposit the spare coins for consumers.

4.2 Consumer Module

4.2.1 Main Interface

As it is the main entrance of system, point, mission, achievement, level and pay button are distributed. We create some models to represent these elements in interface layout.

The main interface designed is shown as Figure 1. There are piggy model, coin model, star pattern, badge and pay button on main interface. Piggy model represents consumer's account. Piggy bank is usually used for storing small changes, which is similar to storing points in consumer's account. Coin model represents point. Because of protecting the privacy of consumer's account, using coin model can prevent accessing point directly. Each star pattern corresponds to one mission and the color of pattern indicates the progress degree of mission. Badges are located in the upper right corner of main interface. The brightness of the badge indicates whether the achievement has been achieved or not. When consumers want to deal with payment, they can click pay button.

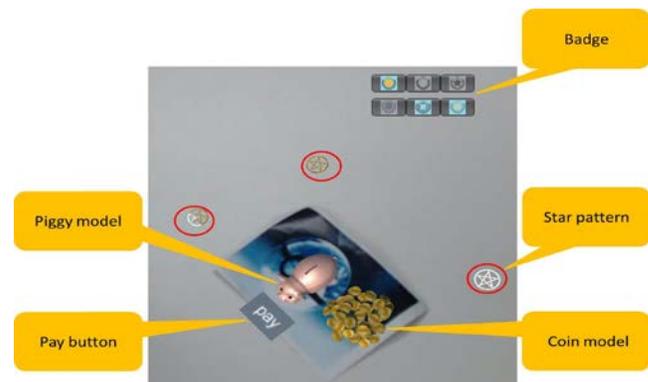


Figure 1. Main interface.

4.2.2 Mission Interface

The mission interface is shown as Figure 2. In this interface, we design the mission status and mission content. For the purpose of indicating status, we use different color to indicate different progress of mission. Mission content is customized to fit consumers.

Consumers can see the state of mission by looking at its color. If the mission button is entirely white, it means that the mission has not yet begun. If consumer clicks the mission button circled in Figure 2, consumer can see the mission content at the top left corner of the interface.

If the mission button is partially yellow, it means that the mission is in progress. If consumer clicks the mission button which is partially yellow, consumer can see the mission content and progress of mission at the top left corner of the interface.

If the mission button is entirely yellow, it means that the mission has been completed. If consumer clicks the mission button which is entirely yellow, consumer can see congratulations message at the top left corner of the interface.



Figure 2. Mission interface.

Mission

Table 1. Mission design

Number	Mission content	Points
1	Deposit point	1 point
2	Buy eco-friendly goods	1 point
3	Buy local goods	1 point
4	Buy low calorie foods	1 point
5	Take public transport or walk	1 point
6	Not use disposable goods	1 point
7	Buy 1 item	1 point
8	Buy 5 items	5 points
9	Buy 10 items	10 points

In our research, mission is daily task for consumers to get points with their own effort. For consumers, if they want to get more points, they need to promote self-motivation to do something useful for themselves or society. The content of mission can be well designed to guide consumers' value orientation. The correspondence between number and mission is shown as Table 1.

Correspondence between Interface and Mission

The color of star pattern reflects the degree of completion, which is thought as progress bar in gamification strategy. By clicking the different star pattern, consumers can see different information corresponds to different mission information.

4.2.3 Point Confirm Interface

When consumer touches the coin model, account points will be displayed at the upper left corner of the interface. In this interface, we design way of displaying account point.

Point & Reward

Point is used as a way of reward. If consumers complete daily mission, they can get points. This game mechanism is used to inspire the motivation of consumers to perform daily tasks. In the Table 1, we design the mission content and assign each mission with one point. That means if consumer completes one

daily mission, they can get one point in reward. The more daily mission they accomplish, the more points they will get. These points can be used to purchase. It makes consumers feel they get reward by their effort.

Correspondence between Interface and Point & Reward

We can view the point in account by clicking the coin model. The design of coin model can prevent the information leakage to some extent. Points are used as reward of effort.

4.2.4 Micropayment Interface

The micropayment interface is shown as Figure 3. When consumer clicks the pay button, they can choose how many point they want to use by clicking button with coin image at the upper left corner of the interface. They can click different buttons for any times and sum will be calculated. If they press the wrong button, they can reset the points by clicking clean button. If they decide to pay, they can click ok button to confirm payment. This interface is for micropayment. Consumers can choose to pay for the change part. We believe this helps to increase transaction convenience.



Figure 3. Micropayment interface.

4.2.5 Achievement Interface

If consumer clicks the dim achievement badge, the content of achievement will be displayed at upper left corner of interface. If consumer clicks the light badge, congratulation information will be displayed. In this interface, we design the achievement goals contents for consumers to achieve.

Badge is displayed to indicate achievement. Each achievement corresponds to one badge. Consumers can click badge to see the content of corresponding achievement. According to the achieving degree, the brightness of badge will be modified. If consumers achieve success in one field, the badge will be lightened. We try to make the feedback visible to improve the consumer's sense of self satisfaction. The correspondence between badges and achievements is shown as Table 2.

Badge & Achievement

Table 2. Correspondence between badges and achievements

Number	Badge	Achievement
1		Deposit point consecutively for 5 days
2		Buy eco-friendly goods consecutively for 30 days
3		Buy local goods consecutively for 30 days
4		Buy low calorie foods consecutively for 30 days
5		Take public transport or walk consecutively for 30 days
6		Not use disposable goods consecutively for 30 days

Correspondence between Interface and Badge & Achievement

There are two stages of achievement. The color of badge reflects the degree of completion. Consumers can click the badge to see detailed information about achievement.

4.2.6 Level Interface

If consumer clicks the piggy model, the level information will be displayed at upper left corner of interface. In this interface, we give level information to consumers for the purpose of competition.

Level & Competition

Level is used to compete with others. If consumers fulfill mission or achievement, they can gain EXP. If EXP is enough, account level will be upgraded. It helps to stimulate willingness to accomplish mission and achievement.

Correspondence between Interface and Level & Competition

In this interface, consumer can click piggy model and use the level information to compete with others. Consumer with higher level can achieve a sense of achievement while consumer with lower level will try to improve rating.

4.3 Merchant Module

4.3.1 Main Interface

The interface before deposit is shown as Figure 4. The merchant interface is slightly different from the consumers'. Merchant can confirm mission and deposit changes while they cannot see the account information.

In this interface, we assign different operation authority to merchant and we want merchant to act as the regulators of consumers.

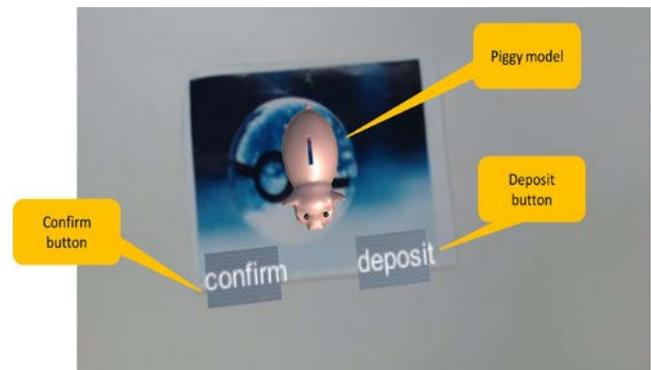


Figure 4. Main interface.

4.3.2 Deposit Interface

The interface before deposit is shown as Figure 5. Merchant is given the right of distributing points to consumers. When merchant clicks the pay button, merchant can choose how many points consumer want to deposit by clicking button with coin image at the upper left corner of the interface. If they press the wrong button, they can reset the points by clicking clean button. If consumer decides to deposit, merchant can click ok button to confirm deposit.



Figure 5. Deposit interface.

4.3.3 Mission Confirm Interface

The interface before deposit is shown as Figure 6. Merchant is thought to be the regulators of mission confirm. If merchant clicks the confirm button, he or she can confirm the daily mission for consumers. Once merchant clicks the confirm button, there will be 9 buttons that represent different tasks at the top left corner of the interface. If consumer finishes mission, merchant can click the mission number and give points to consumer.



Figure 6. Mission confirm interface.

Correspondence between Interface and Mission & Point

Merchant is supposed to interact with consumers by mission element. By clicking confirm button, merchant can confirm daily mission and give consumers points as reward. Therefore, through the mission we want to establish the relationship between merchant and consumer.

5. SYSTEM IMPLEMENTATION

5.1 Development Environment

We develop this system using Unity 5.6.0. We use Android SDK and use Redmi HM 1S as terminal. The Android version of Redmi terminal is 4.4.4 KTU84P and MIUI version is MIUI 7.5.1.0 (KHCCNDE). As for Unity AR implementation, we use Vuforia SDK and computer with Windows 10 installed.

The point card we use in research is shown as Figure 7. Recognizable patterns are printed on the surface of the card and the consumer can choose patterns according to his or her preference. This picture can still be identified even if some parts are blocked or worn.



Figure 7. Point card.

5.2 Implementation Procedure

To achieve interface, Vuforia is used as SDK and augmented reality is used to implement this system. The image on the point

card is predefined as an image target with many feature points. The more feature points, the easier the picture is to be identified. The collection of image target is target database. The piggy model, coin model, pay button and star pattern are predesigned model that are fixed in advance while the badges appear under the control of C sharp scripts. Collider components are added on component or button to monitor collision events and C sharp script is used to handle the collision events.

6. CONCLUSION

In this research, we analyze the present problem in point system. One is lack of attraction and the other is that consumers cannot get real value. In order to solve these problems, we find marketing strategies and try to apply them into the interface design of current point system. AR and gamification are applied to design and implement the system.

In proposed interfaces, game mechanisms like reward and competition are adopted. To realize that, badge and point are used to indicate reward. Level is used to show competition. In addition, we try to promote user motivation to live eco-friendly and healthy life.

In the future, we will enrich the content of animation and try to introduce SNS as an approach for competing. According to different mission and achievement, the system will show different animation effects, which will improve their sense of satisfaction. In addition, increasing the interaction between users is also considered very meaningful.

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