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Designing a Gamification on an IoT Integrated Mobile-Based Application using Marczewski's Gamification Framework: An Overview

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Abstract

Society nowadays is getting more individual. It is getting hard to get to know new people in the environment, especially in the rural areas. There is a concern that society in the future will get colder and apathetic. In this paper, the author wants to share an idea to warm the society by using gamification and integration with IoT. Both tools will be used to enhance a fun and better society with a lot of other advantages such as health, happiness, and others. Gamification is used to direct a change for people who use the application to have wider social reach in fun ways with the help of gamification. IoT is used to make a different and new user experience to make a better engagement for people to use the application.

Keywords: *gamification, IoT, society*

1. Introduction

Human is known as a social creature. A single human could not build everything that has made to exist today. They will need the help of others to make things realized and keep developing for a better innovation for the needs of all kinds.

However, individualism has risen globally, driven by the millennials and its practices have risen by about 12% compared to 1960. In Indonesia, this phenomenon is driven by generation Z (people who were born in the year between 1995 to 2012). It spread from a platform we called social media. This shift toward greater individualism has impacted different markets in unique ways such as collectivist culture, balancing identities and "express yourself".

To make the society communicate more with each other, we will need a trigger that will make them communicate happily. The gamification method is considered as a good way to solve make this trigger. But a gamification of things is not enough to make people feel engaged to get out of their home and communicate with others directly face to face. This engagement will be realized if a gamification combined with something that is new for common people. It is about IoT.

The gamification concepts that can be used for options to be implemented are situation – for reward-based gamification and meaningful gamification [1-4]. Situation – for reward-based gamification is for have better engaging for users to play the game, while meaningful gamification is for holding the users to keep playing the game for the long term.

The goal that we want to achieve is not about to make people neglect all the obligations or jobs they need to do and play the games, but it is about having a quality free time by playing this game to release stress of daily work and make social reach wider. Besides

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that, the use of this gamification may help people to have better social networks, releasing stress, exercise for better health and train people's awareness of surroundings.

The game ideas for this concept are so many and can reach people for almost all ages. The goal of this paper is to discuss how IoT and gamification can be integrated to engage people to socialize more and get other advantages.

2. Literature Review

A. Gamification

According to Kapp gamification is "using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems." [5]

Gamification is the use of game thinking, approaches and elements in a context different from the games. Using game mechanics improves motivation and learning in formal and informal conditions (GamifyingEducation.org). Various definitions overlap and can be summarized as follows: Gamification is an integration of game elements and game thinking in activities that are not games.

Games have some distinctive features which play a key role in gamification:

- users are all participants – employees or clients (for companies), students (for educational institutions);
- challenges/tasks that users perform and progress towards defined objectives;
- points that are accumulated as a result of executing tasks;
- levels which users pass depending on the points;
- badges which serve as rewards for completing actions;
- ranking of users according to their achievements.

B. Internet of Things

As identified by Atzori et. al. [6], the Internet of Things can be realized in three paradigms – internet-oriented (middleware), things oriented (sensors) and semantic-oriented (knowledge). Although this type of delineation is required due to the interdisciplinary nature of the subject, the usefulness of IoT can be unleashed only in an application domain where the three paradigms intersect.

The RFID group defines the Internet of Things as the worldwide network of interconnected objects uniquely addressable based on standard communication protocols.

According to Cluster of European research projects on the Internet of Things [7] - Things' are active participants in business, information and social processes where they are enabled to interact and communicate among themselves and with the environment by exchanging data and information sensed about the environment while reacting autonomously to the real/physical world events and influencing it by running processes that trigger actions and create services with or without direct human intervention.

According to Forrester [8], a smart environment – Uses information and communications technologies to make the critical infrastructure components and services of a city administration, education, healthcare, public safety, real estate, transportation and utilities more aware, interactive and efficient.

In our definition, we make the definition more user-centric and do not restrict it to any standard communication protocol. This will allow long-lasting applications to be developed and deployed using the available state-of-the-art protocols at any given point in time. Our definition of the Internet of Things for smart environments is – Interconnection of sensing and actuating devices providing the ability to share information across

platforms through a unified framework, developing a common operating picture for enabling innovative applications. This is achieved by seamless large-scale sensing, data analytics and information representation using cutting edge ubiquitous sensing and cloud computing.

3. Methodology

Marczewski's Gamification Framework will be used in this research due to its simplicity compared to other frameworks. The framework will be discussed as shown in the figure below.

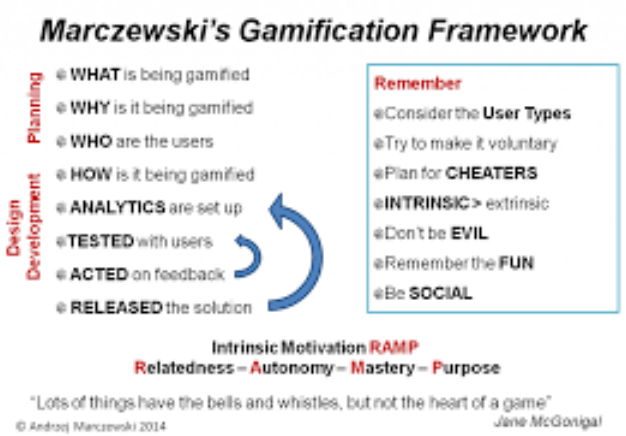

Figure 1. Marczewski's Gamification Framework

There are 4 things to be considered at the planning part of the gamification framework, consisting of 3 questions about what, why, and who [9]. These questions will determine the design scope of the application. After that, there is a design development part consisting of 6 questions about how, analytics, tested, acted, and released which will determine the feedback loops, game mechanics, motivation, and user journey.

There are several player types, such as socializer, free spirit, achiever, and philanthropist. For limiting the scope of the component, the author chose 2 of them. They are game mechanics and feedback loops, while for player types, the author chose 2 of them. They are Socializer and Achiever. Socializer was chosen due to the objective of this gamification, which is to engage more communications and connect more people who uses this game, while achiever was chosen due to the target that will be set in the game for users to achieve which is a good match for this type of players.

Fig. 2. Types of Bartle's Player Types

The game is about to socialize, doing things in groups, competing with other players, exercising and many more.

Here are the game mechanics for Socializer and Achiever players the author(s) suggested:

1. Levels / Progression is a means to show the progress of a player. Levels will show next to the profile personal status page in the mobile game, and the progress bar will be shown on the mission list and how much of it has been completed by the player. Levels can be shown in the form of a progress bar, icon, or metaphor (bronze, silver, gold, and platinum) [10].
2. Quests are used to provide short term and long-term targets to direct the players to do something in order to get experience to increase the level and other rewards such as shopping vouchers and many more. The challenges will be determined by the profile of the players' interests that will be asked when a player registers his/her account to the system and can be modified on the profile page of the mobile game app.
3. Achievements / Rewards are a gift, tangible or intangible, presented after the occurrence of an action (i.e. behavior) with the intention of causing the behavior to occur again [11]. The achievements can be experience bonus to raise the level faster, free shopping vouchers, free items from the companies that are cooperating with the game provider to promote their items on this game.
4. Leaderboards/ Scoreboards will be used to show which person is at the top of a kind of game.
5. Competition allows users to compete to play together. After a game has been completed, each player will get a reward. In Marczewski's framework, after the design is carried out a trial will be carried out for the success of the gamified system design, user testing, and gamified system evaluation in order to get feedback. In accordance with the research flow designed, the application of the gamification framework in web-based tenses learning will be carried out at the stage of the trial of the success of gamified systems only.

4. Discussion

A. Gamification Framework Analysis

The gamification framework used in this concept of designing a social game is Marczewski's Gamification Framework.

- What

  Mobile app game integrated to IoT such as mobile phones, smartwatches/ bracelets, and sensors

- Why

  Individualism is rising in this modern era, and this game design will make the opposite practices, such as group work, cooperating with others, and many more

- Who

  The targeted users are age 12 or above. 12 years old as considered as the minimum recommended age for a kid to own a mobile phone.

- How

  There are 2 components to be used such as game mechanics and feedback loops, and for user types, the author chose 2 types, they are socializer and achiever and for the game mechanics

B. Game Rules

Each player will get 100 virtual coins to play games. 1 game will use up 10 to 20 coins depends on each game option value. After the matchmaking button has been touched, the system will consume the coins of each player joined in the game. If they leave or neglect the mission of the game, their coin will be lost. If they play the game and finished, they will get 2 to 5 points and the return of the 10 to 20 coins used to join the game, and if they win the game, they may get 10 points. The players will be able to trade the coins to the cooperated merchants to get free items or discounts only if a player has at least 200 coins after the trade has been made. Further technical rules will depend on the game option chosen by the system. Each game has different rules.

C. Game Play

For example, if there are players that have interest for activities to reduce stress (based from the information every players inserted when they register the first time), they will get a mission to find a place nearby provided by the game provider or cooperated third party which is a place to learn to meditate which is known as an effective way to reduce a depression. The players will get a mission to enter and try to meditate inside the room together for 30 days and the smartwatch or bracelet will record the heartbeat and other measures if that player practice meditation in a right way or not, and a GPS sensor inside the mobile phone to check if a person is inside the targeted area or not. Inside the room, they will be asked to communicate with others by the trainer and make new bonds to cooperate for reducing stress levels together. The area will be covered by CCTV that is connected to the police system to monitor the safety of all the players. Players who can reduce the stress level to a certain measurement will get a reward from the game, the reward can be a shopping voucher, free item, or other things.

D. Testing and Analysis of Gamified System Results

After testing the concept and plan about the game, a test case will be made shortly after. There will be a certain set of data and situation which is a set of data or situations that will be used in testing. Black Box method will be used to measure if a software functions properly as expected or not. Testing will be done if a sequence of analyzing player data, choosing the suitable available game option, matchmaking, and finishing the game and reward distribution are completed.

5. Conclusion

Gamification in Indonesia is getting more attention especially from the education sector which now is using it to make the learning process more entertaining for students. Those gamification concepts are just a web app or mobile app. In this paper, the author is trying to make a different approach that is integrating the mobile app to IoT, for such new things will be seemed more interesting and is expected to reach more players to build a better society in mental health (having more social network), physical health (by racing or exercising), and many other advantages. This concept can be implemented to any other game ideas with the same vision about society.

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