# AN IMMERSIVE GAME WITH ART AND HISTORICAL BACKGROUND FRAMEWORK

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*Abstract*—**Nowadays children are born in an era where digital technology is basically everywhere. Art and history, as many other subjects in school, are usually told and taught in traditional way, verbally. For a generation who everyday spends his/her time interacting with digital technology, learning them traditional way can somehow be tedious and less interesting. Visiting museums can be both interesting and also dull, depends on how museums tell their stories to the audience. Some researches have tried to put digital game into learning activity. This paper propose a framework designing a game which enable a player to get engaged in the game immersively and also learn the art and historical background of the game story.**

*keywords*— immersive game, digital game, mobile game, art and historic game, AR framework.

## INTRODUCTION

In earlier stage, people actually start learning by activity we refer to as playing. At a later stage, people begin to associate playing with fun, unnecessary childish activity and studying or working as a serious activity.

According to a research report, Generation Z refers as to peple who are born beetwen mid 1990s and 2010. They are also called as Digital Natives Generation. This generation is familiar and dependant to technology products (Grail Research, 2011) The given condition also affect the way they interact and respond to their environment

At school, art and history are still mostly told verbally, children have to memorize people, events, dates and numbers yet they are distant from the subject discussed. Going to the museum and historic sites tend to become nothing but someplace to take some photographs. To connect these necessary aspects, we can use game as a medium to attach the broken link.

PREVIOUS STUDY

Benford *et al.* (2004) have conducted an experiment of using mobile technologies (PDA) in direct interaction with other players outdoor in open space. The game is called Savannah. They created lions in the savannah gameplay in order to introduce and develop the conceptual understanding of animal behavior. Ten children aged 11 to 12 years old participated in the experiment. The children took lions role, exploring the virtual savannah. Their main missions of the game were to mark their teritory in the virtual savannah using the device they brought and to hunt to survive. Players had to make decisions about their teritory, shelter, food and water. While doing the mission, the lions had to maintain the energy level by hunting and eating preys. Unsuccessful attempt resulted in energy reduction. It is also learned from the research that mobile gaming might be employed as a tool for supporting learning. The game interface for the lions role was simple, children who acted as lions received smell and sight mode on their devices. As illustrated in Figure 1, the players can see their energy game during the process also can switch from sight to smell mode. In order to understand how the game was going to be played, the participants were briefed before the game began. (Benford *et al*, 2004)



*Figure 1.* Savannah Interface. Player can see their energy level, and switch between sight and smell mode. (Benford *et al.,* 2004)

The implementation of Savannah consisted of three main components: PDA game interface, the game server and the Den interface. PDA game interface sent and received the current state of the lion to the player and acted as lion's sensory input for the player. The PDA also sent its location via GPS tracker. The game server received generated events from players through PDA, sent feed back to the player also keep game events from all players to disk. To cover the network communication, Savannah used a WiFi LAN. The Den interface acted

mainly like a game master or command center, it showed the location and status of each player, real time view of the game field.

Understanding that people usually visit museum in group, whether it is a family, friends, colleagues, Wakkary *et al.* (2009) designed Kurio. Kurio is a museum guide in a game form. In Kurio, players are given a scenario that the group/family were time travelers, who were lost and trying to get back to their time. To accomplish the goal, the group has to face a series of challenges. Wakkary et al also proposed three design strategies to improve the quality of social interaction and learning with museum guides, embodied interaction, game learning, hybird system. The hybird system consists of a set of tangible (listener, pointer, reader), PDA and a tabletop display (Wakkary et al., 2009)

Almost the same subject, yet different implementation, ThIATRO (The Immersive Art Training Online) was proposed by Froschauer, J. *et al.* in 2011. Considering the same situation like Kurio, that people usually visit museum in group, museum visitors in ThIATRO are given a scenario to play with. In ThIATRO, visitors played as art thief in fictious scenery. ThIATRO is played by two teams who compete to capture museum's artwork and bring it to their base. Each team is given a clue about what artwork they should steal. While Kurio choose hybird system, ThIATRO uses HUD (Head-up Display).

• These games shows that games have successfully become supporting part of learning, most prefer mobile device and story to induce immersibility.

GAME AND PROPOSED FRAMEWORK

Adventure games is a game genre where the players explore the environment and discover things. In this type of game, a player usually wander looking for pattern on the way learning about the game and its environment. In some games, this type of game often offer rewards to those who explore more than others. The form of the rewards could vary from in game items, badge, mini games, etc.

An explanation of exploratory learning is as described as follows:

> Learning through exploring environments, 'realia', lived and virtual experiences with tutorial and peer-based support. This notion of learning is based upon the notion that learning patterns can be helpfully transferred to dissimilar situations through meta-reflection. Unlike Kolb's experimental learning this process is not always circular (although it may be), and does not rely upon lived experience. Rather the approach acknowledges the cognitive process that help individuals to use their imagination and creativity to draw out lessons from interactions as well as extracting meaning from data. This process can be complicated and happen on different levels of understanding. That is, learning can be supported through different media, and through multimedia, interactions and textual engagement. (De Freitas, S., 2006).

By this definition, we believe that adventure games actually belong to exploratory learning. Thus why this genre is suitable for adventure like activity. In the sample game framework, we call Explorer, we choose the combination of adventure and Role Playing Game (RPG). De Freitas also explained immersive world as described below:

> Immersive worlds are taken here to mean 'microworlds' that is the space of the game, the game-world The concept of 'microworlds' was introduced by Minsky and Papert (1971). Microworlds are given domains or environments which may be explored in a non-linear way by users or learners, the environment includes artefacts and objects, and learners may learn through exploring the environment and its objects in a relatively open-ended way.

*A. Technical Part*

Learning from the previous works mentioned in the earlier part, what we propose here is a framework example using mobile device. Taking advantage from mobile technology, by using its compact size and mobility, people can still interact with both world, physical and digital world at the same time. Mobile device such as smartphone and tablet is considered as the most suitable device for this scenario due to its popularity, price and familiarity. Recent technology also enable people to do visual/image recognition, thus can be used as a marker.

Two elements can be used as check point or marker in the game are: visual marker and geotag. While Augmented Reality (AR), a technique projecting virtual object to reality. (Buerger, 2003) , can be used to augment the immersibility of the game.

Visual marker can be both the usual QR code or certain image. To use some certain image as a marker, we need to establish an image recognition module.

Geotag will come in handy for a game using a wide historic area/landmark, more over if it has way too complex visual features . Such as temple complex (candi) or a palace. Geotag based game works using information from google map and GPS location provided by the device. Important places in the map is pinned in the map. (See Figure 2)
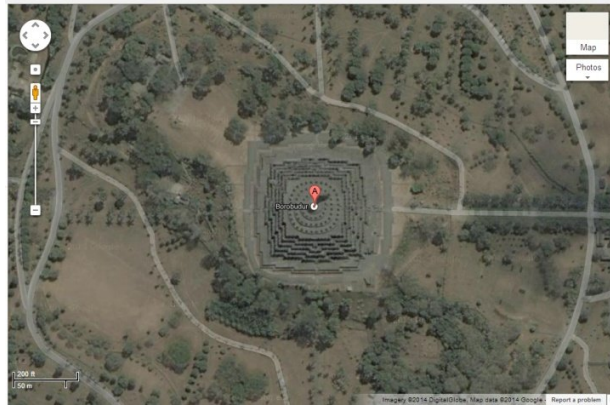
*Figure 2.* Geotagging Example. (Googlemap, 2014)

*B. Gameplay*

In a game, a player needs some motivation to accept the mission. There where the story like in RPG (Role Playing Game) genre decorate the mission. One of the example of the scenario is the players has been in contact with a mysterious person in the future. This future person asks for help so that we go to some certain place or capture a picture of an artwork, if the first task successfully completed, the next phase will reveal the next mission to do or clue to find and solve.

In Figure 3, through a mobile device, a player can either create a new profile or choose available profile. For a player who starts to play, the initial scenario will be told and the player accept the initial mission. For returning player, the main module provide an interface which enable the player to switch between modes: AR game, Hunting Mode (visual recognition module) and player collection (encyclopedia).
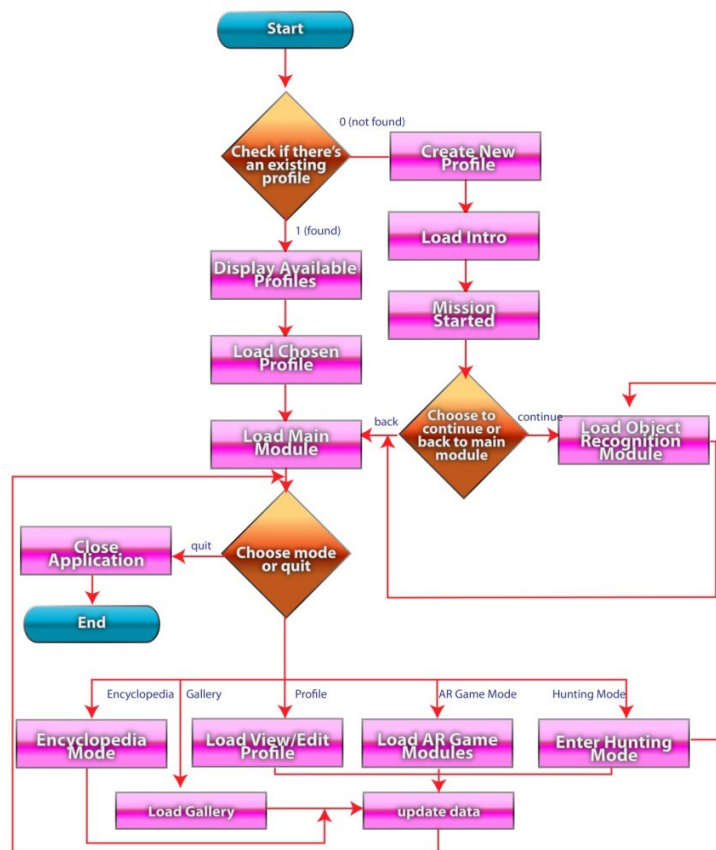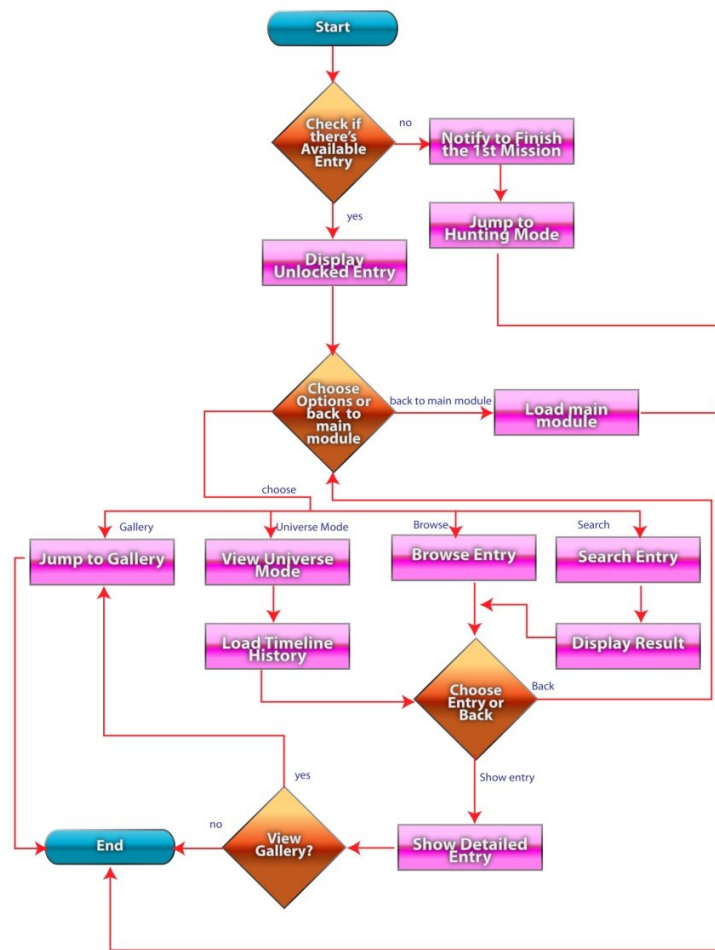
*Figure 3*.  Main Module. Player can create a new profile.

*Figure 4.* Players Collection. This section looks like
an encyclopedia for the player.

Figure 4 displays players collection. This section can only be accessed by the player if the player has finished the initial mission. This player collection interface is shown like an encyclopedia, player can directly browse, choose and display through the owned catalogues, or view the object in the timeline history view. Player can also search the collection through this module.

Figure 5 illustrated the hunting mode of the game. This mode consists of visual marker using visual recognition module to retrieve the correct marker. If the captured image is correct, the new object will be added to players collection, and the player receive points and badge. As the previous challenge solved, player will receive the next clue/mission. If the captured item already owned, player can try earn additional point by answering related question.
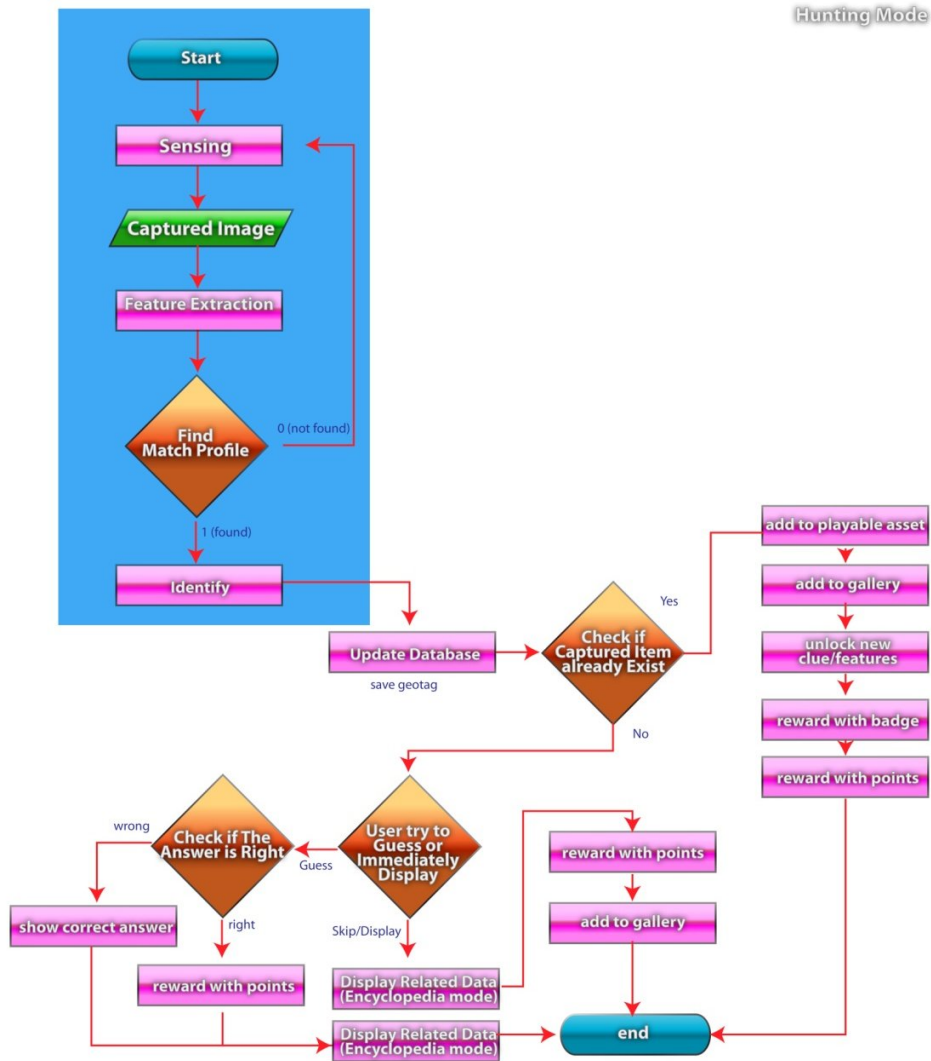
*Figure 5.* Players Collection. This section looks like an encyclopedia for the player.

## DISCUSSION

Beside mobile device, the proposed framework will require a game server if done in network, which is better since it can add competition to the game. Yet a game server will add both complexity and also ease of control of the game.

## CONCLUSION

Mobile device is still measured as a best choice to make player engaged in the activity, while still paying attention to the real objects in his/her surroundings. The challenge for visual marker type game using image recognition is the recognition process itself. Since it has to be done real time in mobile device, a light and relatively accurate recognition method will be required for this part.

BIBLIOGRAPHY

Benford, Steve and Rowland, Duncan and Hull, R. and Reid, J. and Morrison, J. and Facer, K. and Clayton, Ben (2004) *"Savannah": designing a location-based game simulating lion behaviour.* MobileBristol, Bristol.

Buerger, M. E. dan Cowper, T. J., (2003), *Improving Our View of the World: Police and Augmented Reality Technology*, *NCJRS*, Washington, DC.

De Freitas, S., (2006). *Learning in Immersive Worlds: a review of game based learnings*, Joint Information Systems Committee. London.

Froschauer, J., Arends, M., Goldfarb, D., Merkl, D., (2011). 'Towards an Online Multiplayer Serious Game Providing a Joyful Experience in Learning Art History.' Games and Virtual Worlds for Serious Applications (VS-GAMES), 2011 *IEEE Third International Conference on* , vol., no., pp.160,163, 4-6 May 2011 doi: 10.1109/VS-GAMES.2011.47

Grail Research (November 2011). *Consumers of Tomorrow, Insights and Observations About Generation Z.* Retrieved from http://www.grailresearch.com/pdf/ContenPodsPdf/Consumers_of_Tomorrow_Insights_and_Observations_About_Generation_Z.pdf

Wakkary, R., Hatala, M., Muise, K., Tanenbaum, K., Corness, G., Mohabbati, B., Budd, J. (2009). 'Kurio: A Museum Guide for Families'. *Proceedings of the Third International Conference on Tangible and Embedded Interaction (TEI'09)*, Feb 16-18 2009, Cambridge, UK.

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