Development of an Immersive Cultural Game using Mixed Reality

Hesham Zaky, Yahia Boray, Omar Osman, Noora Fetais

hz1703584@qu.edu.qa, yb1507992@qu.edu.qa, oo1704345@qu.edu.qa, n.almarri@qu.edu.qa

Qatar National Research Fund — Member of Qatar Foundation

جامعة قطر QATAR UNIVERSITY

Abstract

This game aims to preserve and spread cultural practices. It introduces new gaming mechanics which allows user interaction with virtual game objects using hand gestures. The user's objective is to hunt prey in their natural habitat which means that the player will physically change his location to hunt a specific prey using his falcon to mimic how the falcon hunts for its' prey in the real world. This interaction with the real world, along with incorporation of realistic graphics and mixed reality features, enhances the user's experience and helps in preserving cultural practices. Previous work tried to achieve the same goal by different approaches that led to different user segments and different usability cases. One major limitation in that work was the accessibility due to the used of specialized hardware. The hardware is accessible to a small segment of users; however, given the new limitations forced by the COVID19 situation reusing the hardware is prohibited and as a result, not many will have access to the developed solution. The current implementation was designed to work on both Android and IOS to have a social interaction between the largest possible numbers of players. Other features that could also contribute to the goal of the project include building a virtual museum and displaying real falcons using the capabilities mixed reality has to offer.

A dead Deer with Blood VFX
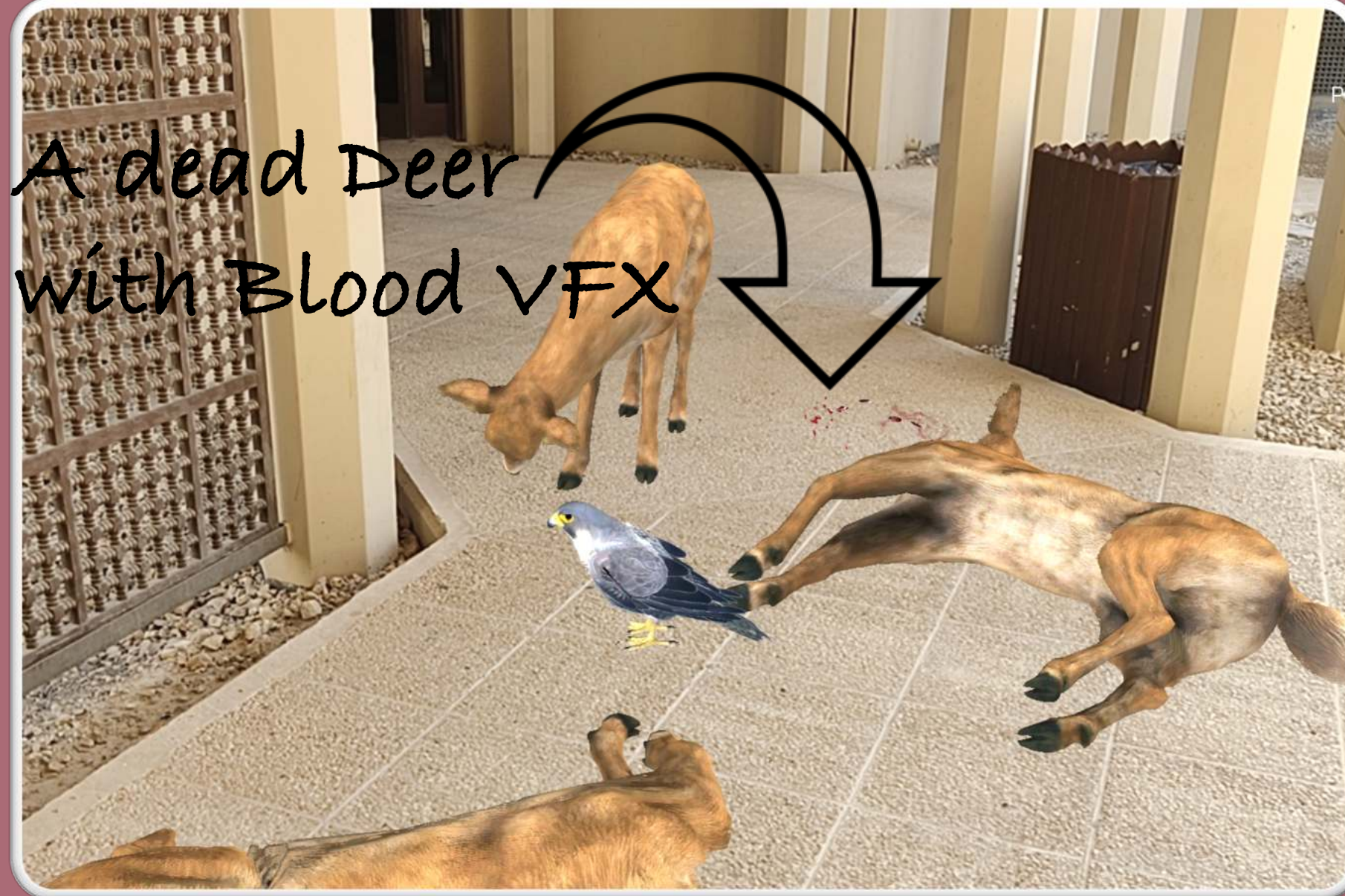
Introduction

The traditional sport of Falconry which is also known as hawking employs falcons and some- times eagles in a hunting game. Falconry is a well-known ancient sport that has been practiced by kings and princes in the west; in which the falconer uses a bird of prey to hunt animals. Culture is a national priority to preserve as mentioned in the Qatari 2030 vision "Qatar National Vision seeks to achieve development progress, yet at the same time it aims to preserve national culture". With the current advancements in the mobile era which allows access to such technology, and serves as an outlet for creative content, a mixed reality app is pivotal. It serves as means of preserving the culture and heritage of sports and for providing access to users that have never had access to the sport. This project technically tests the prospect of producing an immersive cultural game using state-of-the-art technologies. In this presentation , we focus on discussing the importance of the project and the result of the current technical approach, since it opens up new possibilities and tests new gaming mechanics.

Radar View • A real falcon integrated into the Scene • Animated Camera View

Results & Methodology

To achieve our goal of preserving cultural practices and raising awareness about this sport, the developed prototype had to target both Android and IOS platforms. The developed app used Flutter for most of the user interface as well as the content management, and Unity's AR foundation for building the AR experience. In addition, other plugins were used such as Manomotion to introduce MR features to mobile devices. With this approach we have two separate projects, and both can target the required platforms with a single codebase and no implicit configurations. Our was to utilize technologies that allows for better results that were not possible before due to financial and technological constraints. Testing the limits of this approach to build a Falconry game was the main target of this prototype. Thus, more efforts were spent on building a single code base for both IOS and Android platforms as well as solving integration issues and generalizing hardware constraints to both platforms. The app was tested with 10 male users. The participants used an IOS device iPad Pro 11-inch (2nd Generation) and an Android device OPPO Reno5 Pro 5G to test the application.

Android users had a basic Augmented reality experience with some camera tricks implemented to avoid breaking the immersion.

IOS users had a stable 60fps, as well as all the mixed reality features such as human seg-mentation, and environment depth. Other techniques were used to classify other surfaces other than the floor as an obstacle so that the prey can avoid it when fleeing or walking.

Generally, the feedback obtained from the users conclude that the current approach to solving the research problem is better than the previous at- tempts of building a falconry game. User's comments about the immersion, the gameplay, use of hand gestures to control the falcon as well as the animated camera view , and the radar tracking system were all positive.

Significance

This project is a simulation of a cultural game that is not practiced as often in real life due to several constraints. This work would bring the whole falconry sport experience closer to the player and teaching the younger generations about their antecedents' heritage, which would contribute to building a strong relationship between their past and present. Additionally, many people could try this game especially during the national events. Tourists would have the opportunity to explore heritage, females would explore it and live its fantasy as until now it is a male dominated sport, and people with special needs would also be able to try it. This game is not only used for exploring and entertaining purposes, but also for training. As children physically cannot master this sport before turning 18 years old, this game can serve as training platform before moving to the real venue. More significant goals are:

Awareness In many countries, falconry is a national obsession. Thus, raising awareness about this sport and types of different falcons are critically needed. Fortunately, with cutting edge technologies, such need can be satisfied. This will help us to educate and inform the whole world about this sport. This app can be used by related heritage embassies across the world especially during the National Day celebrations or during conferences.
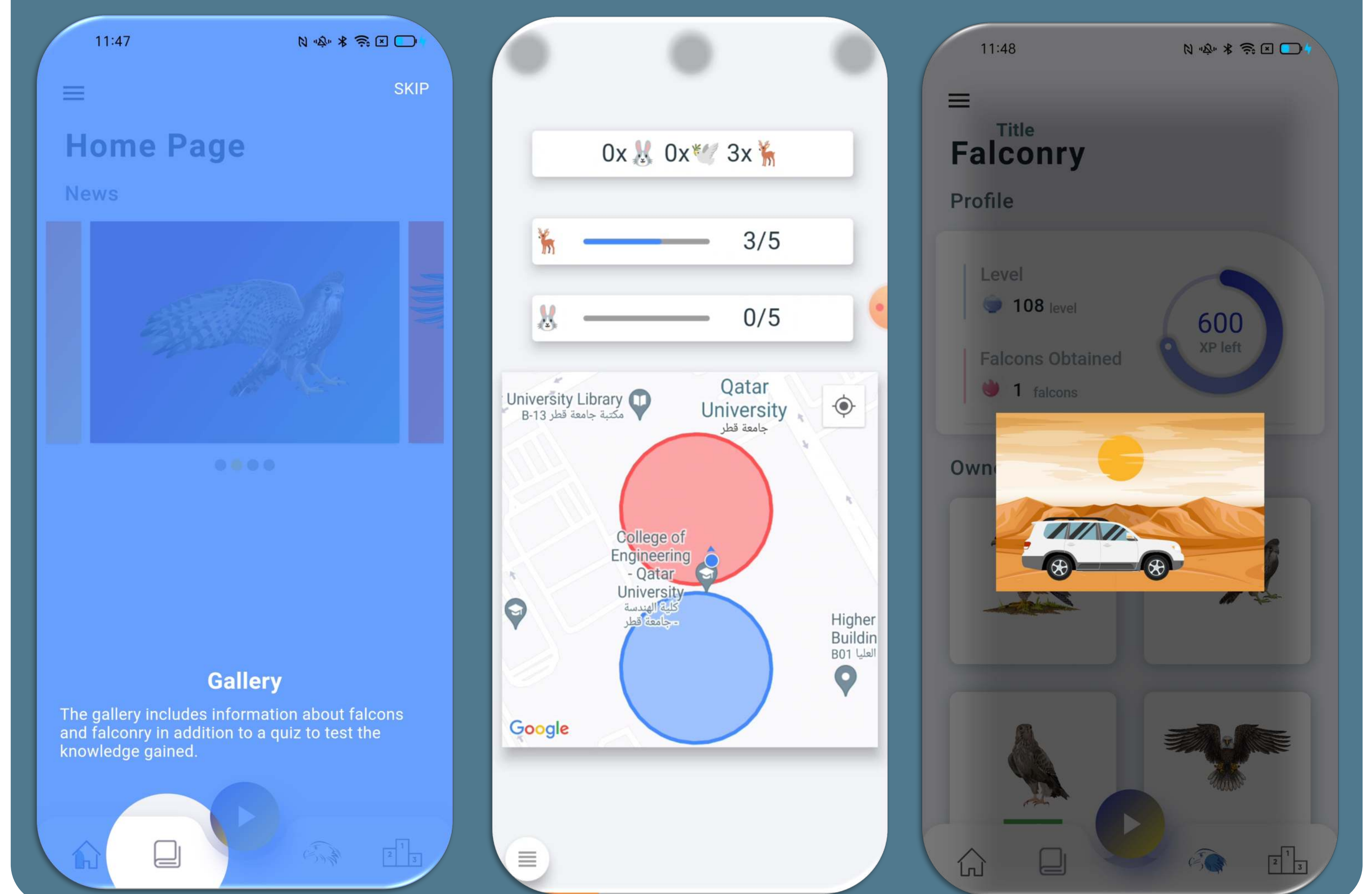
Preservation of cultural practices Preserving culture is one of the main aspects of the app because preserving culture and heritage is what makes societies exist and dispensing culture will create a society without an identity. Since, Falconry raises awareness about the sport, by delivering it to almost everyone makes it easier to practice. "virtual museums and digital reconstructions of cultural artefacts help to protect and preserve information which would otherwise be lost". This sport is crucial to preserving the practice of the sport and helps with integrating the detached generation to its roots, as well as educating the whole world about the beauty of the falconry sport and how it is deeply embedded to the cultural identity, so that it is preserved for all the coming generations.

A pigeon flying towards the player

Involvement of women in male dominated activities In almost every culture, there are some activities and practices that a woman cannot experience or practice. Falconry is one of those activities, due to the sport's difficult conditions and the male domination. Since this project aims to both educate and raise awareness about the sport; more people can join it and this cannot be achieved without the inclusion of women. On the other hand, the developed app does not only promote and enable the involvement of women in such practices it also encourages the involvement almost every segment of the society including people with special needs to be included in this sport.

Conclusion

To sum up the developed project's aim was to solve a well-known problem in the society, The problem was solved with harnessing current cutting-edge technologies to the benefit of the society as a whole and the culture. The initial objectives were satisfied, with utilizing flutter to build a user-friendly UI with multiple animations. Moreover, utilizing mixed reality features ensured an immersive user experience which was integrated with the information present in the quizzes. Raising awareness and educating people about the sport and the hunting process was achieved with the simulation done in the AR scene. Furthermore, a competitive environment was produced thanks to the use of the leader board and the leveling system