

# Tech Hunt using Augmented Reality

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**Abstract :-** This project introduces an approach of connecting user with surrounding environment with the help of a scavenger hunt game. This game also ensures to enhance technical knowledge of user with involvement of technical quiz while the game is in process. It involves implementation of an android application which has augmented reality capability as well as an administrative website for game organizers to generate the game and manage the game content. Using mobile application user will first have to select single or multiplayer mode and needs to mention the technical field of his interest. User gets a clue for a location, on finding the object user scans the QR code next to it. On verification of QR code a question will pop up. To get the next clue user has to answer that question correctly. These clues to find the objects are given using AR technology.

This application does not only make user familiar with the surrounding university environment but also acts as a tool for educational betterment.

**Keywords-** Android, Augmented Reality, Scavenger Hunt, Game, Vuforia, Unity 3Dng..

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## I. INTRODUCTION

The treasure and scavenger hunt game categories are relatively well-known. The main idea is to reach different checkpoints and eventually execute specific tasks at these locations, like acquiring information or finding a specific object etc. The players can choose the Single Player Mode to play individually or Multiplayer Mode to play in a group where they can form a team and different technical fields like IT, CS etc. They will be given a hint to reach the location followed by a technical question based on the location and the selected field. There will be a set time limit also. They can also pass the hint while playing in a team. The application will display hints with the help of AR content. While scavenger hunts are fun to play, game organizers often design games to encourage players to explore specific geographic area or to familiarize them with certain topics of interest.

The development of the application was motivated by the fact that the popularity of treasure hunt games is rapidly growing, but currently there are only a few games using augmented reality. During the creation of a regular treasure hunt game, the placement of real physical objects is time consuming and expensive. By using virtual objects these costs can be significantly reduced. Furthermore, augmented reality can serve with

many other interesting solutions, allowing the transformation of scenes.

In this project, a mobile platform Android was chosen for the game due to its popularity and portability. The Tech hunt mobile app is accompanied by administration web, which includes an administration panel that can be used by the game organizer to design games, create a list of available games, and upload games to Tech hunt mobile app dynamically. Game organizers can use the Tech hunt admin web to define locations or objects for the game and also load and associate AR content with each location. As each object is located by a player, the Tech hunt mobile app will track the success rate and allow the player to move on to the next object in the game.

## II. RELATED WORK

The term “Augmented Reality” was first used in 1990 by Caudell and Mizell (1992), who were developing an AR system to help workers assemble wiring harnesses. According to a survey of augmented reality conducted by Azuma and others (Azuma, 1997; Azuma et al., 2001), an AR system has the following properties: combines real and virtual objects in a real environment; runs interactively, and in real time; and registers (aligns) real and virtual objects with each other. There are mainly two types of augmented reality

currently seen in mobile technology: markerless and marked AR. Markerless AR uses the location determined by a mobile cell phone to serve as a basis for adding local information to the camera view. Marked AR uses a two-dimensional barcode such as QR (Quick Respond) code to connect a cell phone or personal computer to information, usually on a web site. Augmented reality applications can complement a standard curriculum. Text, graphics, video and audio can be superimposed into a student’s real time environment. On higher education, there are some applications that can be used. For instance, Construct3D, a Studierstube system, allows students to learn mechanical engineering concepts, math or geometry. In the gaming industry this technology is mostly used on smartphone games. A mobile AR game, ARQuake, was created by Hender-son and Feiner (Thomas et al., 2000). ARQuake is an extension of the desktop game Quake that includes a physical environment in which the player sees monsters, weapons, and objects of interest augmented on the real world.

The purpose of taking android as a platform is the fact that Android’s market share accounts to over 80% with over 1 billion devices were being shipped in 2014 alone, means a lot to those investing their pennies in the Android development game. This means that building an android app will mean a lot of potential downloads, which is actually a good sign for the developer community.

### III. DESIGN

In this project, a mobile game prototype is to be generated to explore learning opportunities in university environment. The design involves general architecture and implementation of game scenario. The design is made to give user an experience of mixed reality that augment physical and virtual world. Consisting of both the web admin interface and the mobile application, Tech hunt is intended to be used by game developers (administrators) and game players, and therefore provides a variety of features for each group. Admin website is used by admin to create a new game and edit the existing game. These games are

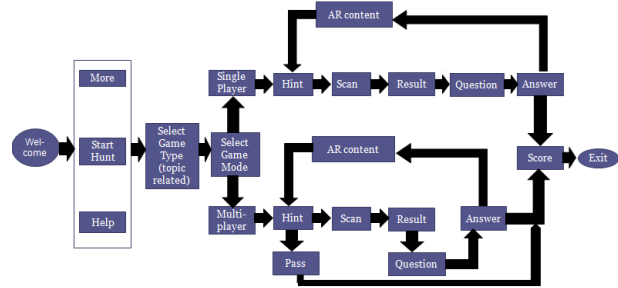


Fig. 1 Flow of the game for user dynamically uploaded to mobile application.

This scavenger hunt game can be played by an individual or in a team. As shown in fig.1, on starting the game user selects the player mode along with the technical field he wants to play for. Player is given an object to find. On finding that object player scans the QR code next to it with the help of built-in Smartphone camera. After verifying the object system will give a multiple choice technical question. (Technical question will be based on the field user has chosen before starting the game). Player has to answer that next object. Hint to find the objects are given using Augmented Reality platform in form of multimedia content. Also in multiplayer mode, if player is unable to find the object he/she can request team members to exchange the hint with the “pass the hint” feature.

### IV. METHODOLOGY

This project is to be developed using an agile development methodology based on eXtreme Programming. That means the development process will be both incremental and iterative with thorough testing. The project will be broken into five iterations. The first iteration is focused on basic player functionalities of electing a game from a list to play. The second iteration creates an administration website that allows an administrator to create a list of games for the player to select and play. The third iteration then adds the augmented reality functions for the player to verify a found object and reveal the next augmented multimedia contents; association of technical questions with QR codes is also done in this iteration. The fourth iteration adds more administrative functions to the website such as allowing modification and deletion of games as well as setting points and time limits for games. Finally, the

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fifth iteration implements the timer and game summary on the mobile app. At the end of each iteration, working software, both android app and the admin website, will be delivered to the client (a group of intended users from the college) for testing and feedback.

### V. TECHNOLOGY

For developing augmented reality content in this project we are using Vuforia as Augmented Reality Software Development Kit (SDK). It enables the creation of Augmented Reality for mobile devices. The Vuforia platform uses superior, stable and technically efficient computer vision-based image recognition and offers the widest set of features and capabilities, giving developers the freedom to extend their visions without technical limitations. With support for iOS, Android, and Unity 3D, the Vuforia platform allows to write a single native app that can reach the most users across the widest range of Smartphone's and tablets.

In this project, Hints with their answer needed to be generated randomly from the dataset. The database of hints and Technical Question will be generated on Vuforia, which might be the video, image or any 3D content for the next clue. Randomization will be on question set hint such that every player gets a unique question set. These databases are imported on Unity3D, where using the inbuilt camera we are going to set target 3D image on hint. We are using Unity3D as AR development Platform. Unity3D is a game engine used to develop video games for PC, consoles, mobile devices and websites. To develop this project on android platform, we are using Eclipse IDE (Java Developers version) with the Android plug-in. The AR project will be imported in Eclipse and using packages an android platform for the game will be develop.

For managing database of player and question set, MySQL will be use to perform operation and manipulating the data. Languages such as HTML, CSS, and JavaScript/jQuery will be use to adjust the administrative interface for presenting, styling, generating game on user request and validating web pages. PHP will be use to connect to the database and retrieve information, as well as to insert information, so that the admin will monitor new entries and update in database of player and question set. Since the design is

based on three-tier architecture, a PHP script running on the server will be used for storing and retrieving data to and from the web server while SQL will be used to communicate with the database.

### *Future Scope*

Although, the game consists of many interactive features, it can be expanded in future for further enhancement. The Tech hunt game can also be enhanced by adding a larger variety of AR content, such as text, videos, 3D objects, animation, etc. Other possible enhancements include the introduction a competitive setting in which competition can be there among teams or among players playing individually or both.

### *Applications*

Tech hunt addresses a relevant and persistent approach in an innovative and effective way. It deals with the lack of student engagement through the application of gamification combined with AR technology to provide a more interactive delivery mechanism for instructional content. This game can be used as a tool for teaching students how to use available resources and information. Hunts can be tailored to virtually any curriculum area, simultaneously providing students with technological and subject matter knowledge, and they can be as simple or involved as circumstances dictate. It can also be implemented as Business game used in business education and advanced training to employees. Orientation can also be a good application area of this game for incoming freshmen for the purpose of navigation and interaction.

### VI. CONCLUSION

The paper proposes development of a scavenger hunt game for Android platform with incorporation of augmented reality capability. The game can be used by individuals, departments, or organizations to provide an innovative approach to playing the scavenger hunt game with an educational purpose. The AR application helps to improve learning through interaction. Incorporating games in learning activities makes the learning fun and raises student's motivation and engagement in a given task. This game evaluates learning opportunities through an orientation activity in an environment. The game is designed to encourage players to explore specific

geographic areas or to familiarize them with certain topics of interest.

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