RESEARCH ON MOBILE GAMES

Mobile games are games designed for mobile devices, such as smartphones, feature phones, pocket PCs, personal digital assistants (PDA), tablet PCs, and portable media players. Mobile games range from basic (like Snake on older Nokia phones) to sophisticated (3D and augmented reality games).

Today's mobile phones - particularly smartphones - have a wide range of connectivity features, including infrared, Bluetooth, Wi-Fi, and 3G. These technologies facilitate wireless multiplayer games with two or more players.
Because most mobile devices have limited system resources, mobile game features are not as rich as games designed for PCs or gaming consoles. For example, only one mobile device (as of late 2011) - the Sony Ericsson Xperia PLAY - is equipped with a dedicated gaming controller. In most mobile devices, the keypad doubles as a gaming controller. Smartphones have touch screen displays for user input.

Augmented reality games are the latest mobile gaming trend. These programs combine a real-world environment with advanced computer graphics to provide the effect of augmented reality. An example is Sky Siege, where a player shoots virtual helicopters that appear to fly around the room. In actuality, a live image of the player's room is captured by the device camera and fed to the display screen, resulting in augmented reality to the player.

Advanced mobile games usually require fast central processing units (CPU), dedicated graphics processing units (GPU), large random access memory (RAM), and high-resolution display screens. Most developers use a royalty-free, cross-platform application programming device known as OpenGL ES to write games with 2D or 3D graphics.

JAVA

Java is a programming language that produces software for multiple platforms. When a programmer writes a Java application, the compiled code (known as bytecode) runs on most operating systems (OS), including Windows, Linux, and Mac OS. Java derives much of its syntax from the C and C++ programming languages.

Java was developed in the mid-1990s by James A. Gosling, a former computer scientist with Sun Microsystems.

Java produces applets (browser-run programs), which facilitate graphical user interface (GUI) and object interaction by Internet users. Prior to Java applets, Web pages were typically static and non-interactive. Java applets have diminished in popularity with the release of competing products, such as Adobe Flash and Microsoft Silverlight.

Java applets run in a Web browser with Java Virtual Machine (JVM), which translates Java bytecode into native processor instructions and allows indirect OS or platform program execution. JVM provides the majority of components needed to run bytecode, which is usually smaller than executable programs written through other programming languages. Bytecode cannot run if a system lacks required JVM.

Java program development requires a Java software development kit (SDK) that typically includes a compiler, interpreter, documentation generator, and other tools used to produce a complete application.

Development time may be accelerated through the use of integrated development environments (IDE) - such as JBuilder, Netbeans, Eclipse, or JCreator. IDEs facilitate the development of GUIs, which include buttons, text boxes, panels, frames, scrollbars, and other objects via drag-and-drop and point-and-click actions.

Java programs are found in desktops, servers, mobile devices, smart cards, and Blu-ray Discs (BD).

Calculator games

Calculator gaming is a form of gaming in which games are played on programmable calculators, especially graphing calculators.

An early example is the type-in program Darth Vader's Force Battle for the TI-59, published in BYTE in October 1980.[12] The magazine also published a version of Hunt the Wumpus for the HP-41C.[13] Few other games exist for the earliest of programmable calculators (including the Hewlett-Packard 9100A, one of the first scientific calculators), such as the long-popular Lunar Lander game often used as an early programming exercise. However, limited program address space and lack of easy program storage made calculator gaming a rarity even as programmables became cheap and relatively easy to obtain. It was not until the early 1990s when graphing calculators became more powerful and cheap enough to be common among high school students for use in mathematics. The new graphing calculators, with their ability to transfer files to one another and from a computer for backup, could double as game consoles.

Games continue to be programmed on graphing calculators with increasing complexity. A wave of games appeared after the release of the TI-83 Plus/TI-84 Plus series, among TI's first graphing calculators to natively support assembly. TI-BASIC programming also rose in popularity after the release of third-party libraries.
Assembly remained the language of choice for these calculators, which run on a Zilog Z80 processor, although some assembly implements have been created to ease the difficulty of learning assembly language. For those running on a Motorola 68000 processor (like the TI-89), C programming (possible using TIGCC) has begun to displace assembly.

Because they are easy to program without outside tools, calculator games have survived despite the proliferation of mobile devices such as mobile phones and PDAs.

Industry structure

Total global revenue from mobile games was estimated at $2.6 billion in 2005 by Informa Telecoms and Media. The total revenue in 2008 was $5.8 billion. The largest mobile gaming markets were in the Asia-Pacific nations Japan and China, followed by the United States.[17] In 2012, the market had already reached $7.8 billion[18] A new report was released in November 2015 showing that 1887 app developers would make more than one million dollars on the Google and iOS app stores in 2015.[19]

Mobile gaming revenue reached $50.4 billion in 2017, occupying 43% of the entire global gaming market and poised for further growth.[20] It is expected to surpass the combined revenues from both PC gaming and console gaming in 2018.[21]

Different platforms

Mobile games have been developed to run on a wide variety of platforms and technologies. These include the (today largely defunct) Palm OS, Symbian, Adobe Flash Lite, NTT DoCoMo's DoJa, Sun's Java, Qualcomm's BREW, WIPI, BlackBerry, Nook and early incarnations of Windows Mobile. Today, the most widely supported platforms are Apple's iOS and Google's Android. The mobile version of Microsoft's Windows 10 (formerly Windows Phone) is also actively supported, although in terms of market share remains marginal compared to iOS and Android.
Java was at one time the most common platform for mobile games, however, its performance limits led to the adoption of various native binary formats for more sophisticated games.
Due to its ease of porting between mobile operating systems and extensive developer community, Unity is one of the most widely used engines used by modern mobile games. Apple provides a number of proprietary technologies (such as Metal) intended to allow developers to make more effective use of their hardware in iOS- native games.
Common limits of mobile games

Mobile games tend to be small in scope (in relation to mainstream PC and console games) and many prioritize innovative design and ease of play over visual spectacle. Storage and memory limitations (sometimes dictated at the platform level) place constraints on file size that presently rule out the direct migration of many modern PC and console games to mobile. One major problem for developers and publishers of mobile games is describing a game in such detail that it gives the customer enough information to make a purchasing decision.

Location-based mobile games

Games played on a mobile device using localization technology like GPS are called location-based games or location-based mobile games.[23] These are not only played on mobile hardware but also integrate the player's position into the game concept. In other words, while it does not matter for a normal mobile game where exactly the player is (play them anywhere at any time), the player's coordinate and movement are the main elements in a location-based mobile game.
A well-known example is the treasure hunt game Geocaching, which can be played on any mobile device with an integrated or external GPS receiver.[23] External GPS receivers are usually connected via Bluetooth.[clarification needed] More and more mobile phones with integrated GPS are expected to come.[citation needed]
Several other Location-based mobile games, such as BotFighters, are in the stage of research prototypes rather than being commercial successes.

Augmented reality games

Augmented reality games, while not limited to mobile devices, are also common on newer mobile platforms where the device includes a reverse-facing camera. While playing the game, the player aims the device's camera at a location and through the device's screen, sees the area captured by the camera plus computer-generated graphics atop it, augmenting the display and then allowing the player to interact that way. The graphics are generally drawn as to make the generated image appear to be part of the captured background, and will be rendered appropriate as the player moves the device around. The starting location may be a special marker that is picked up by the camera and recognized by the software to determine what to present or may be based on the location through GPS. While other augmented reality examples exist, one of the most successful is Pokémon Go where the player, using the game app, travels to locations marked on their GPS map and then uses the augmented reality mode to find Pokémon to capture.[24]

Multipurpose games

Since mobile devices have become present in the majority of households at least in developed countries, there are more and more games created with educational or lifestyle- and health-improvement purposes. For example, mobile games can be used in speech-language pathology, children's rehabilitation in hospitals (Finnish startup Rehaboo!), acquiring new useful or healthy habits (Habitica app), memorizing things, and learning languages (Memrise).

There are also apps with similar purposes which are not games per se, in this case, they are called gamified apps. Sometimes it is difficult to draw a line between multipurpose games and gamified apps.

Multiplayer mobile games

Many mobile games support multiple players, either remotely over a network or locally via Wi-Fi, Bluetooth or similar technology.

There are several options for playing multiplayer games on mobile phones: live synchronous tournaments and turn-based asynchronous tournaments. In live tournaments, random players from around the world are matched together to compete. This is done using different networks such as Game Center, Google+, and Facebook.

In asynchronous tournaments, there are two methods used by game developers centered around the idea that players matches are recorded and then broadcast at a later time to other players in the same tournament.
Asynchronous gameplay resolves the issue of needing players to have a continuous live connection. This gameplay is different since players take individual turns in the game, therefore allowing players to continue playing against human opponents.

This is done using different networks including OpenFeint (now defunct) and Facebook. Some companies use a regular turn-based system where the end results are posted so all the players can see who won the tournament. Other companies take screen recordings of live players and broadcast them to other players at a later point in time to allow players to feel that they are always interacting with another human opponent.

BIBLIOGRAPHY:

http://www.academia.edu/Documents/in/Mobile_games
https://ieeexplore.ieee.org/document/7054236
https://www.techopedia.com/search?q=types+of+mobile+games&section=all
https://en.wikipedia.org/wiki/Mobile_game