HISTORY OF ANDROID

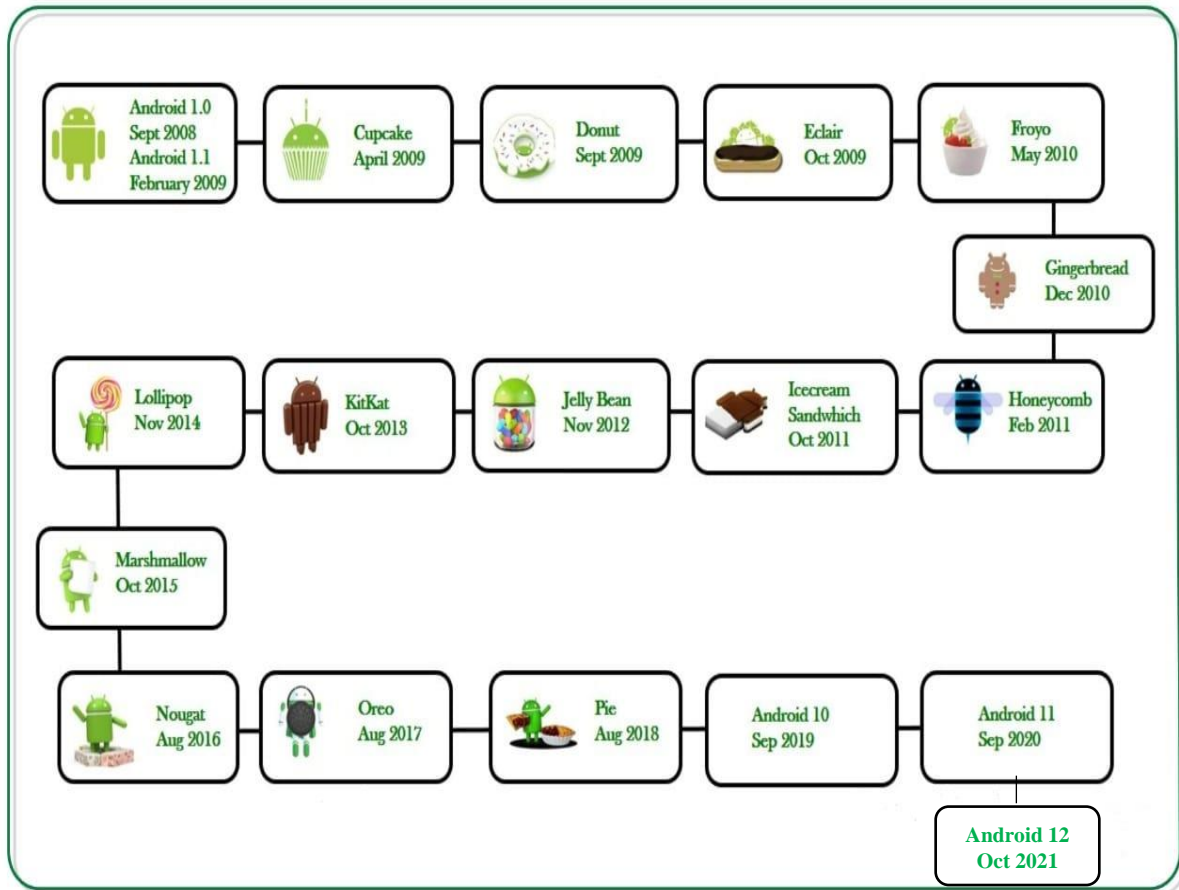## Overview of Android released versions history

Figure 1: Android versions and release dates till now [1]

2003

Android offers a unified approach to application development for mobile devices. History of android begins in 2003 with Andy Rubin, Rich Miner, Nick Sears, and Chris White where they started a company called **Android.Inc** in Palo Alto, California.

Figure 2: Developers and Founders of Android.Inc[2]

2005

Google found the true potential of Android and backed it up by bringing it for $50 Million later all co-founders worked in **Googleplex**.

Figure 3: Google backed up android [3]

2007

Android was officially given to open source. The first public Android Beta Version 1.0 was finally published on 5th November 2007.

2008

The first ever android device called HTC Dream smartphone was launched in Market (now play store) on 23rd September 2008. It's the first version of android- Android 1.0 with API 1.

Features included are <u>Google Maps, YouTube, HTML Browser, Gmail, Camera, Bluetooth, Wi-fi</u> etc.

Figure 4: HTC Dream smartphone [4]

2009

Android 1.5 Cupcake

On late April 2009, Android 1.5 Cupcake was introduced into Samsung Galaxy series. The major updates included <u>are</u> <u>widgets for home screen,</u> <u>autorotation, on-screen keyboard, third-party keyboard support, support for widgets,</u> <u>video recording</u><u>, enabling copy-paste for browser, facility to upload videos on YouTube, check phone usage history</u> and many more.

Figure 5: Widgets added to Home screen [5]   Figure 6: Screen Keyboard in qwerty pattern [6]

Android 1.6 Donut

In September 2009, Android 1.6 Donut was introduced. The most powerful update is using CDMA (Code Division Multiple Access) based network which helped to connect across the world. Other updates are different screen sizes, quick search boxes and bookmarks on web browsers, expansion of the Gesture framework, text-to-speech, etc.
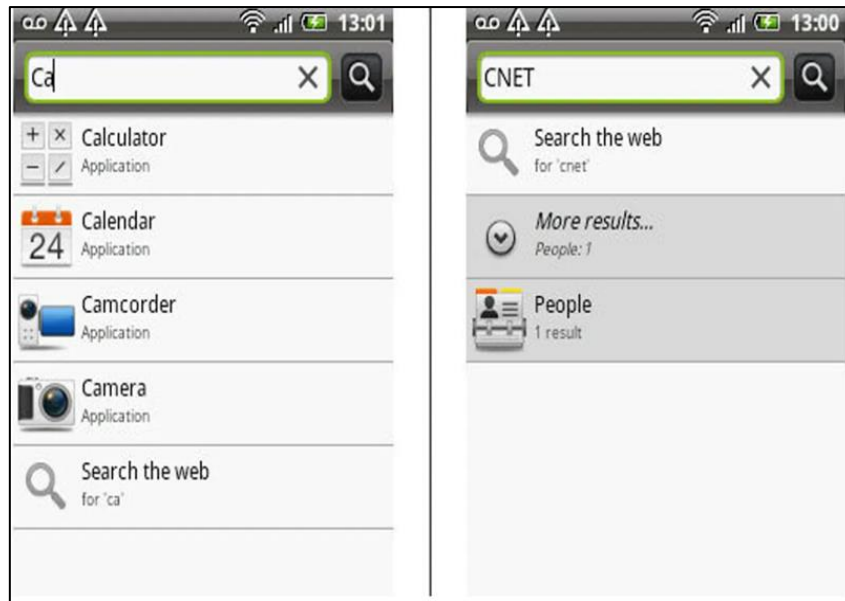
Figure 7: Quick search boxes in web browser [7]

Android 2.0,2.0.1 and 2.1 Éclair

On October 2009, Android 2.0,2.0.1 and 2.1 Eclair was introduced. The highlight of this version is they introduced Google Maps with voice Assistance and other features are support for adding multiple accounts in one device, inclusion of smarter dictionary for virtual keyboards, enhanced ability to track multi-touch events, camera flash and digital zoom etc.

Figure 8: Inclusion of Google maps and voice assistance in smart phone [8]

2010

Android 2.2 Froyo

On May 2010 Android 2.2 Froyo is launched. Froyo is a combined word of Frozen Yogurt. The highlighted features of this versions were Wi-Fi mobile hotspot support, push notifications, enhancement of device security through PIN/ Password protection, automatic update of apps features, support for Bluetooth enabled car, etc. The other versions 2.2.1, 2.2.2, and 2.2.3 was published in Nov 2011.
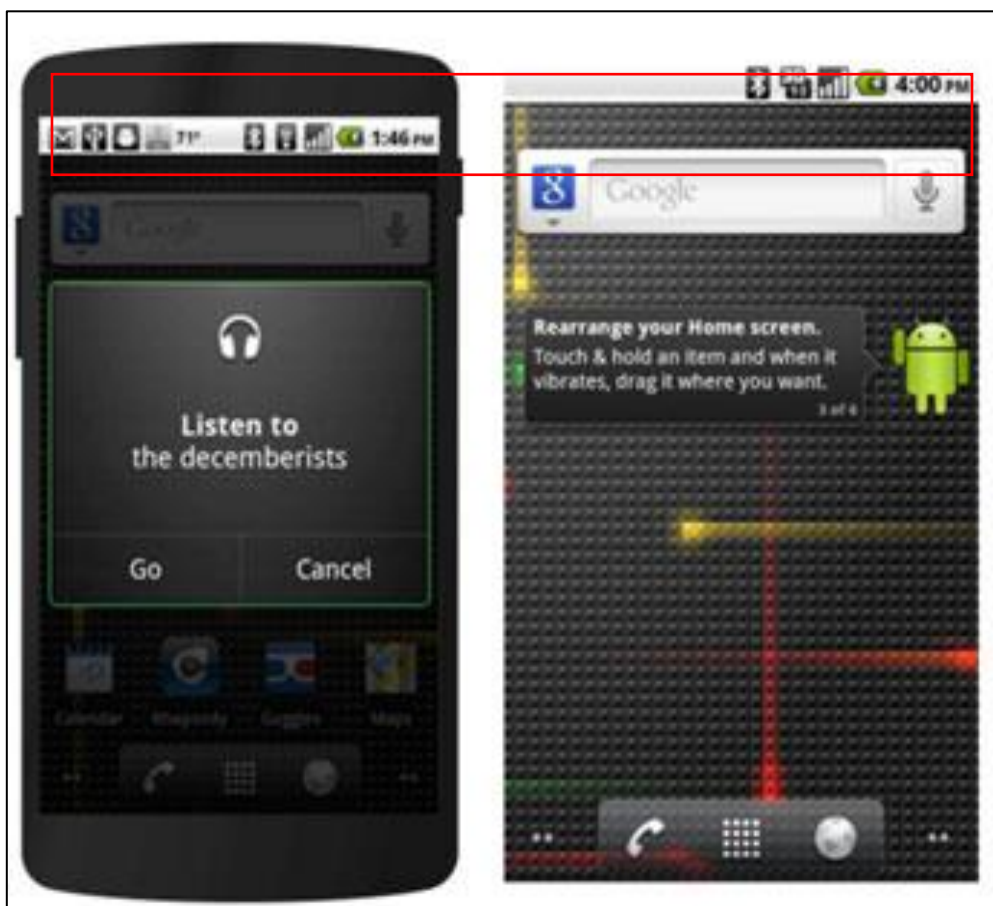

Figure 9: Wi-Fi, Bluetooth etc. enabled features in android. [9]

Android 2.3 Gingerbread

On 6 December 2010, Google released Nexus S with Android 2.3 Gingerbread, which Wasco-developed with Samsung. It was designed with the facility of graphics-intensive 3D games that took gaming to new heights. In this version, the new feature was NFC (Near Field Communication). NFC is used to transmit information between devices just by bringing them close together. It featured some more sensors like gyroscope, barometers, gravimeters, etc. This version improved the keyboard which offered new interface for keys and added battery management so that users could see the performance of their device.
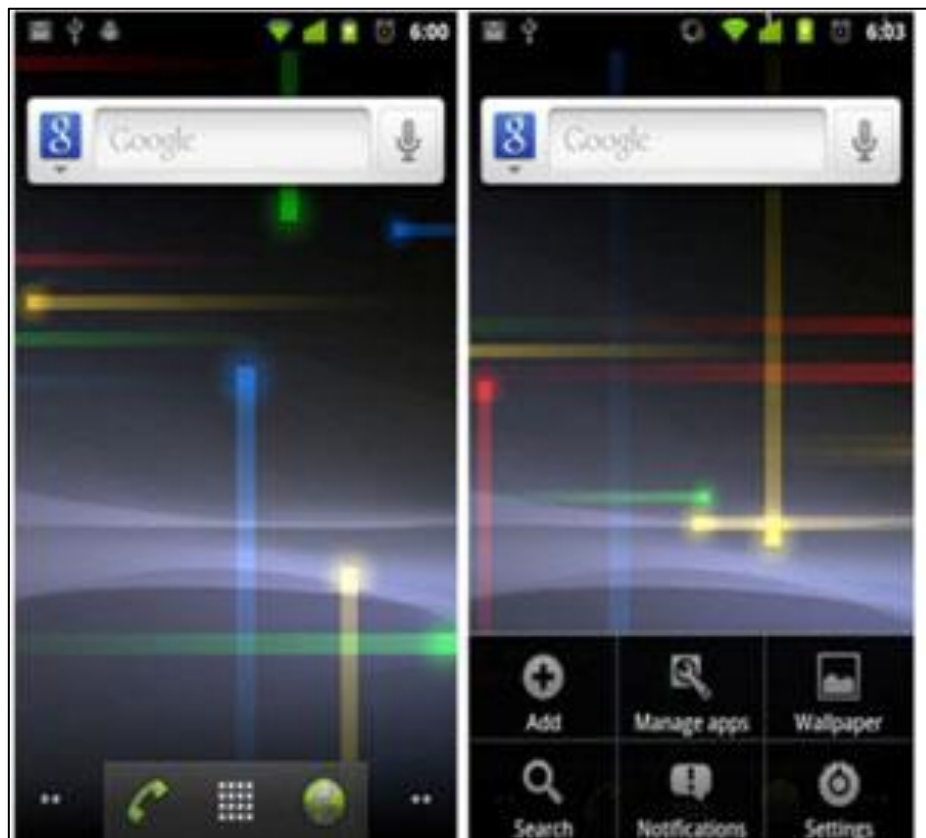

Figure 10: Keyboard with new interfaces [10]

2011

Android 3.0 Honeycomb

On Feb 2011, Android 3.0 Honeycomb was released and installed in Tablets phones with larger screen. The significant update in this version is that introduction of virtual buttons for performing the start, back, and menu functions. The later versions of honeycomb acquired feature to support for joysticks, gamepads, Google talk, external keyboards, and pointing devices, better USB connectivity, accessing file on SD Card and other hardware support.
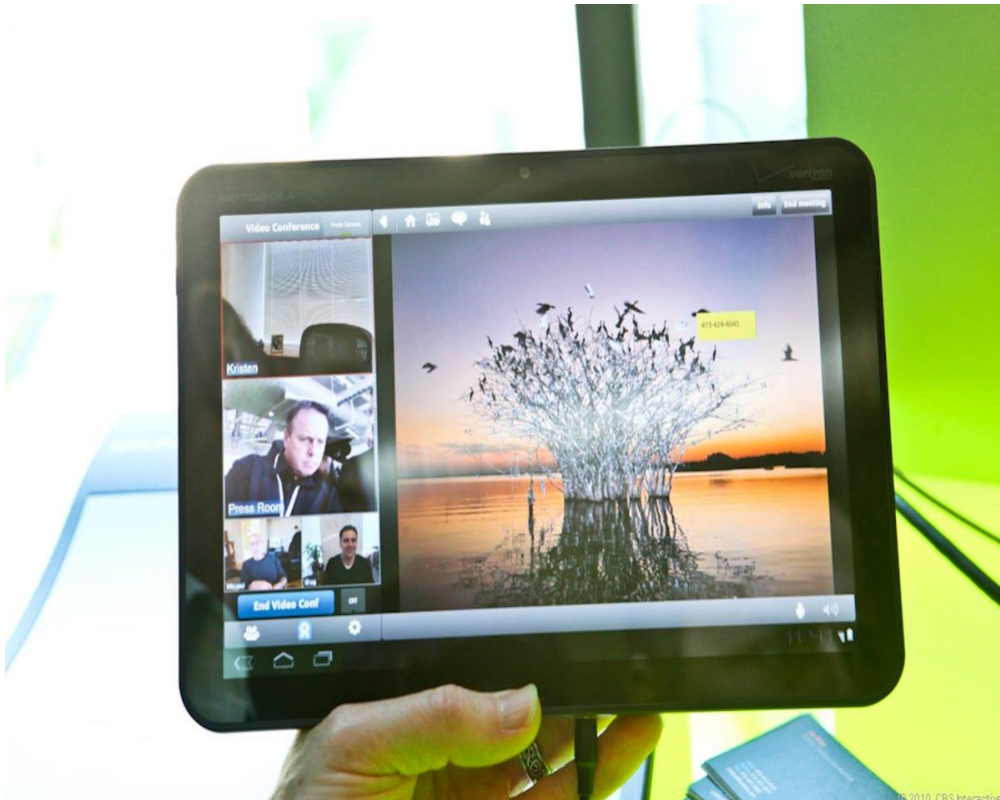

Figure 11: Support of Gamepads [11]

Figure 12: support to Google talk [12]

Android 4.0 Icecream Sandwich

On October 2011 Android 4.0 Icecream Sandwich released. The significant addon feature in this version is face recognition to unlock phones. Other prominent features included the possibility to monitor the use of mobile data and Wi-Fi, sliding gestures to reject notifications, tabs of a browser or even tasks, integration of screenshot capture using the Power and Volume button and many more.

Figure 13: Face unlock feature [13]

2012

Android 4.1 Jellybean

On June 2012 Android 4.1 Jellybean released. Jellybean had faster, smoother performance. It let user to interact more with expandable notifications, the Chrome browser became the default, widgets became resizable, and Google came preinstalled, and it also included international languages (utility for localization).

Figure 14: support to local language [14]   Figure 15: Smart phones with google pre-installed [15]

2013

Android 4.4 Kitkat

Android 4.4 KitKat was released on 25 June 2014 with Nexus 5 that featured the "Ok Google" feature so that people could access Google Now without touching the phone with their hands. This hands-free activation worked only when screen was on. People were able to send text, get directions or even play a song. It also added full-screen apps, new hangouts app and new phone dialer. These were primarily designed for smartwatches and other wearables and integrated with Google Assistant technology and mobile notifications features into a smartwatch form factor. This version was designed to support lower RAM like 512 RAM devices.

Figure 16: Smart phone with 'Ok Google' feature and Smart watches integrated with Google assistant [16]

2014

Android 5.0 Lollipop

In November 2014 Android 5.0 Lollipop were released with Nexus 6 device. Google overhauled its aesthetic completely with a flat interface known as Material Design. some of markable changes are Notifications came in banners across the lock screen or as pop-up alerts. The OS also had priority mode, multiuser support, screen pinning and recent apps were renamed overview, support for multiple SIM cards, the Device protection policy, kept the device locked in case of theft/misplacement until the owner signs into their Google account, and the introduction of High-definition voice calls etc.

Figure 17: Android lollipop features [17]

2015

Android 6.0 Marshmallow

In October 2015 Android 6.0 Marshmallow was introduced. Google Nexus 6P and Nexus 5X were the first devices to have android Marshmallow preinstalled. Marshmallow introduced **Doze Mode to save on battery life**. It also added built-in support for a **fingerprint reader**, USB Type-C and 4K mode for improvisions for target-specific sharing between apps, MIDI support for musical instruments and a lot more.
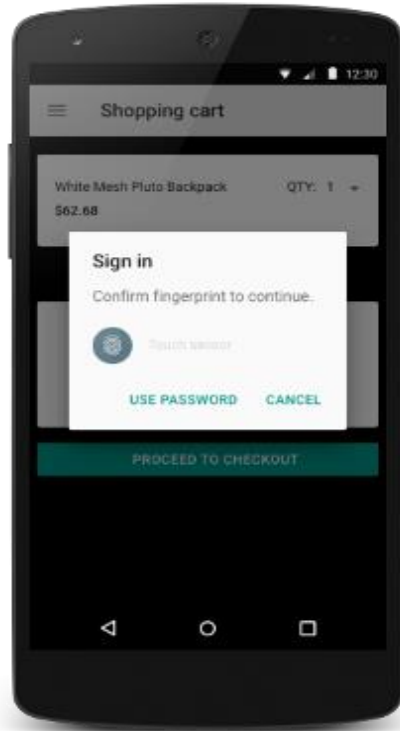
Figure [18]: Fingerprint reader [18]

2016

Android 7.1Nougat

 In October 2016, Android 7.1Nougat were released. Majorly brought changes are Circular app icon support, App shortcuts, Image keyboard support, New Professional Emoji, Storage Manager Intent and many more.

Figure 19: Incorporation of Emojis [19]

2017

Android 8.0 Oreo

 In August 2017, Android 8.0 Oreo is released. Android Oreo served up picture-in-picture apps for even more multitasking. There was also a better copy-and-paste experience, improved security and better battery management, Notification dots, Autofill framework, Adaptive icons, Downloadable fonts, Neural Networks API, Multi-display support and many more.

Figure [19]: Picture-in-picture mode [19]

2018

Android 9 Pie

 In August 2018 Android 9 Pie was released. It focused on behind-the-scenes improvements that made Android phones work faster and save battery life. That included AI tools that suggested apps and shortcuts you might want to use, and it loaded slices of an online page that gave precise information, without the need to download an app search through a webpage apart from these it supported for Indoor positioning with Wi-Fi RTT,

Enhanced messaging experience, multi-camera support and camera updates, Image Decoder for drawable and bitmaps and Animation etc.
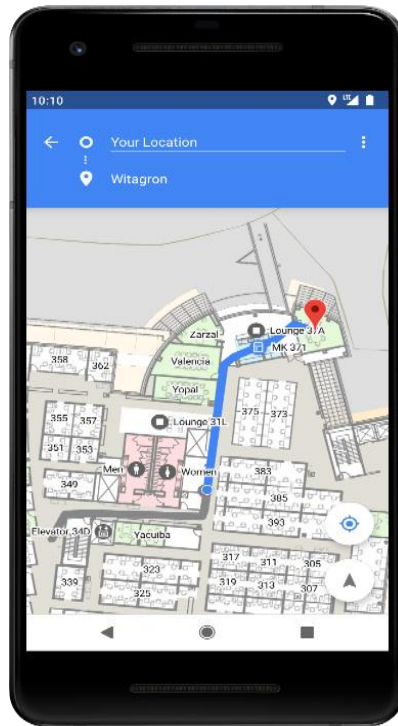

Figure 20: Wi-fi real trip time benefit [20]

2019

Android 10 Q

In Sept 2019, Android 10 Q was released. It introduces Dark Theme, a new pop-up notifications style called Bubbles and live captioning on videos that are being played for more accessibility.

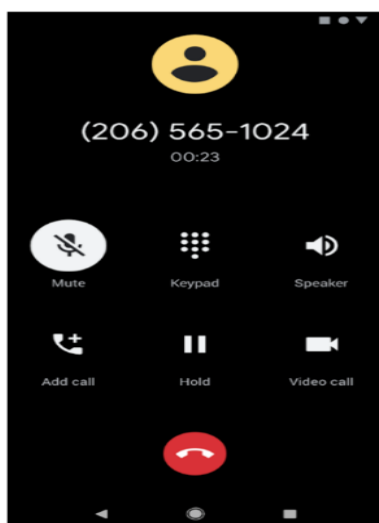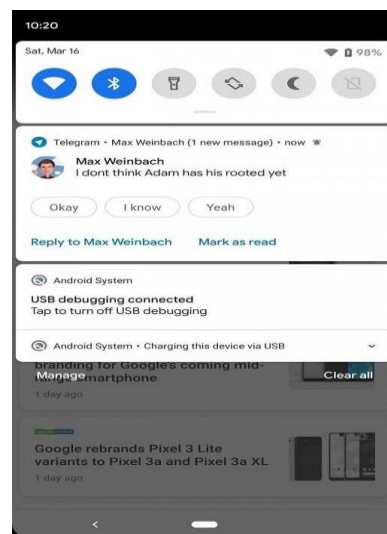Figure 21: Dark theme enabled feature [21]   Figure 22: Pop-up Notification feature [22]

2020

Android 11 R

In 8th of September 2020 Android 11"R" was released ,its internal codename is Red Velvet Cake. Significant features are powerful usage of power button menu, dynamic media control, built-in screen recorder, Notification history, pin favorite apps etc.
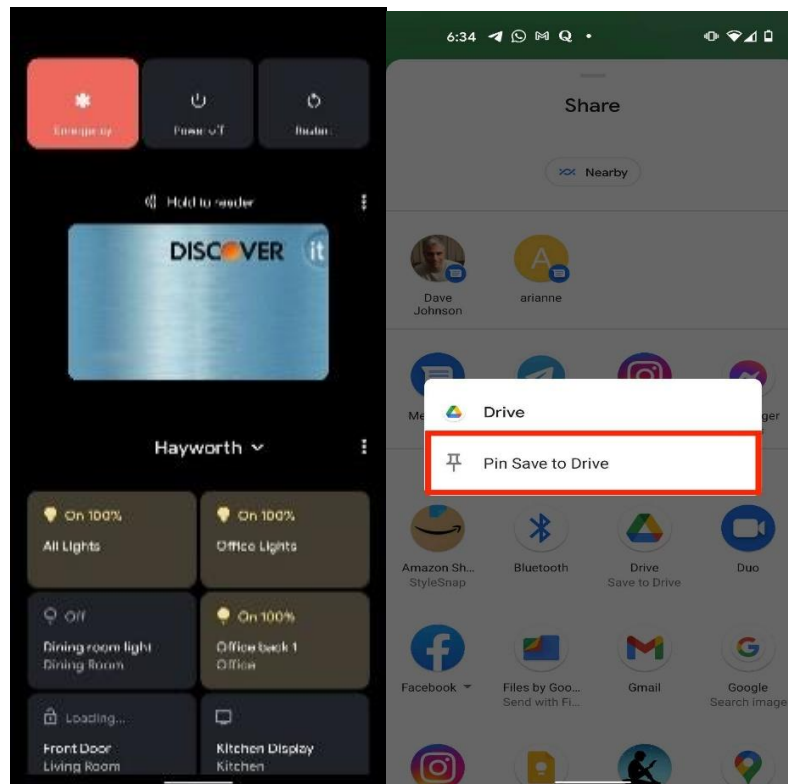

Figure 23: Useful power button menu and Pin apps in share page [23]

2021

Android 12

On October 4, 2021, Android 12 released its internal code name is Snow Cone, which includes Dynamic color, Responsive motion, Conversation widgets, Accessibility improvements, Mic & camera indicators, and toggles, easily switch phones, Enhanced gaming, scrolling screenshot and many other min blowing features are incorporated which eventually become the symbol of modern society.

Figure 24: Android 12 Beta features [24]

REFERENCES

[1] Aayushitated2000 (10-Nov-2020). *History of Android into a roadmap like structure[photograph]*, Retrieved from https://www.geeksforgeeks.org/history-of-android/.

[2] Vishal Soni. *Founders and Developers of Android Operating System – Andy Rubin, Rich Miner, Nick Sears, and Chris White[photograph]*, Retrieved from https://www.engineersgarage.com/android-versions-and-their-features/.

[3] Sarthak Dogra. (20- August-2021). *Google secretly paid smartphone makers extra to prevent third-party app stores on Android[Article][Image:Reuters]*. Retrieved from https://www.indiatoday.in/technology/news/story/google-secretly-paid-smartphone-makers-extra-to-prevent-third-party-app-stores-on-android-1843366-2021-08-20.

[4] Vishal Soni. *Logo of Android 1.0 and 1.1 and their Look and Feel on a QWERT Smartphone[photograph]*,Retrievedfromhttps://www.engineersgarage.com/android-versions-and-their-features/.

[5] James Martin (2009). *All the different Android versions through the years [Article][photography]*, Retrieved from https://www.cnet.com/pictures/google-android-versions-history/3/.

[6] Vishal Soni. *Logo of Android 1.5 and its Look and Feel on a Smartphone[photography]*, Retrieved from https://www.engineersgarage.com/android-versions-and-their-features/.

[7] Lynn La James Martin (May 8th 2019), *All the different Android versions through the years [Article][photography]*, Retrieved from https://www.cnet.com/pictures/google-android-versions-history/3/.

[8] Vishal Soni .*Logo of Android 2.0 and its Look and Feel on a Smartphone [photography]*, Retrieved from https://www.engineersgarage.com/android-versions-and-their-features/.

[9] Vishal Soni. *Logo of Android 2.2 and its Look and Feel on a Smartphone [photography]*, Retrieved from https://www.engineersgarage.com/android-versions-and-their-features/.

[10] Vishal Soni, *Logo of Android 2.3 and its Look and Feel on a Smartphone [photography]*, Retrieved from https://www.engineersgarage.com/android-versions-and-their-features/.

[11] Vishal Soni , *Logo of Android 3.0 and its Look and Feel on a tablet [photography]*, Retrieved from https://www.engineersgarage.com/android-versions-and-their-features/.

[12] James Martin, (May 8 2019), *All the different Android versions through the years [Article][photography]*, Retrieved from https://www.cnet.com/pictures/google-android-versions-history/3/.

[13] Ice Cream Sandwich[Article], *Face recognition lets you unlock your phone with your face[photography]*, Retrieved from https://developer.android.com/about/versions/android-4.0-highlights .

[14] Jelly Bean[Article], More parts of Android 4.3 are optimized for RTL languages [photography], Retrieved from https://developer.android.com/about/versions/android-4.0-highlights .

[15] Josh Miller, (May 8 2019), *All the different Android versions through the years [Article][photography]*, Retrieved from https://www.cnet.com/pictures/google-android-versions-history/3/.

[16] Vishal Soni, *Logo of Android 4.4 and its Look and Feel on a Smartphone [photography]* Retrieved from https://www.engineersgarage.com/android-versions-and-their-features/.

[17] Chris Chavez (Oct 18th, 2014), *Hands-on : Android 5.0 Lollipop new apps and features [Article]* Retrieved from https://phandroid.com/2014/10/18/hands-on-android-5-0-lollipop-new-apps-and-features-video/ .

[18] Android 6.0 APIs [Article] [photography] , Retrieved from https://developer.android.com/about/versions/marshmallow/android-6.0 .

[19] Kyle Wiggers, (September 13th, 2017), *How to use Picture-in-Picture Mode in Android 8.0 Oreo*, Retrieved from https://www.digitaltrends.com/mobile/how-to-use-picture-in-picture-mode-in-android-8-oreo/ .

[20] Kamal Kishore,(March 13th, 2018), *Android P- Is it the New Definition to Android App Development,* Retrieved from https://www.octalsoftware.com/blog/android-p-application-development/.

[21]ANDROID DARK MODE [Blog],(January21st,2021),Retrieved from https://msapps.mobi/android-dark-mode/.

[22] Mishaal Rahman (May 8th, 2019), *XDA[website]*, Retrieved from https://www.xda-developers.com/android-q-notification-assistant/.

[23] DAVE JOHNSON (MAR 26 th, 2021), *The 11 best new features of Android 11 that make your phone more dynamic and easier to use [Article],* Retrieved from https://www.businessinsider.in/tech/how-to/the-11-best-new-features-of-android-11-that-make-your-phone-more-dynamic-and-easier-to-use/articleshow/81712016.cms .

[24] Sameer Samat, (May 18, 2021), *Android 12 Beta: Designed for you [Blog]* Retrieved from https://blog.google/products/android/android-12-beta/ .