AI PERSONAL ASSISTANTS: ARE THEY READY TO HELP US?

- Most of the tech giants, such as Apple, Facebook, Google and Microsoft, are racing to develop or improve their own artificial intelligence (AI) personal assistants. Many startups are offering competing products as well.

- The market size of digital assistance systems is forecasted to grow to $2.2 billion in 2019 and to $8.1 billion in 2024.

- Advances in AI personal assistant technology may completely change how businesses reach and interact with their customers.
EXECUTIVE SUMMARY

Since the first iPhone was introduced in 2007, smartphones have revolutionized the way we communicate with each other. They have also changed the way businesses operate. Today, consumer-facing applications that use AI are gaining traction, and they may become game-changers in the near future. Most of the tech giants, as well as numerous startups, are racing to develop or improve AI-powered personal assistants. According to a study by BCC Research, the market size of digital assistant systems stood at $585 million in 2014, and is expected to grow to $2.2 billion in 2019 and to $8.1 billion in 2024.

Tech giants have spent a fortune developing AI-powered personal assistants. For example, Google paid $400 million to acquire DeepMind, a company that focuses on machine learning and systems neuroscience, while Apple spent over $50 million to acquire VocalIQ, a speech technology startup. And in 2014, investors funded AI startups to the tune of $309 million across more than 40 deals.

In this report, we cover the AI personal assistants developed by tech giants such as Apple, Facebook, Google and Microsoft. We also look at the work of several startups that have designed competing products.

WHAT ARE AI PERSONAL ASSISTANTS?

AI personal assistants are basically software that has been developed to perform tasks for the user. Today, most of these assistants can perform tasks such as answering queries, scheduling meetings and providing travel routes. More advanced personal assistants can provide information more proactively and make suggestions. They can tell a user how much extra commute time she might need due to inclement weather, for instance, or remind her what time her favorite TV show will air.

These products are powered by two core AI technology components: language recognition software and predictive learning capability. Language recognition includes speech recognition and natural language processing, which enable the software to understand human languages and interact with a user. Predictive learning technology enables the software to proactively provide information to the user and make suggestions based on user input and data, such as frequent search queries, emails, past meetings and locations that the user commonly checks into.
DEVELOPMENT IN AI PERSONAL ASSISTANTS
At Apple’s product announcement event in June 2015, the company revealed that its AI personal assistant, Siri, received 1 billion requests a week, an impressive number. However, this technology is still in its very early growth stages. A survey conducted in 2013 revealed that only 15% of iOS 7 users had ever used Siri, likely because they did not need to rely on it in order to operate their devices and because it had limited capabilities.

This might change in the next few years as technology advances and the Internet of Things (IoT)—which includes smartwatches, smart TVs and in-vehicle infotainment systems—grows. Since entering text is impractical on these smart devices, an AI personal assistant could help users by acting as a proactive go-between. And, as mentioned above, tech companies are investing heavily in AI technology. In January 2014, Google paid $400 million to acquire DeepMind, a company that focuses on machine learning and systems neuroscience to build powerful general purpose learning algorithms. In October 2015, Apple acquired VocalIQ, a speech technology startup, for over $50 million. In 2014, backers invested a total of $309 million in AI startups across more than 40 deals.

AI PERSONAL ASSISTANTS ON THE MARKET
Apart from common capabilities such as performing search queries, scheduling meetings and planning travel routes, each of the major AI personal assistants on the market has some key, unique features:

<table>
<thead>
<tr>
<th>Software</th>
<th>First Launched</th>
<th>Key Features</th>
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<tbody>
<tr>
<td>Apple Siri</td>
<td>Oct. 2011</td>
<td>Integrated into multiple devices, including the iPhone, iPad, iPod Touch, Apple Watch and Apple TV</td>
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<tr>
<td>Google Now</td>
<td>Jul. 2012</td>
<td>Relies on predictive technology to anticipate the user’s information needs</td>
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<tr>
<td>Microsoft Cortana</td>
<td>Apr. 2014</td>
<td>Employs progressive intelligence; the system asks permission before accessing a user’s information on a device, instead of automatically recording information</td>
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<td>Facebook M</td>
<td>Aug. 2015</td>
<td>Uses human intelligence to train and improve AI</td>
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<td></td>
<td>(in trial)</td>
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<td>Hound by SoundHound</td>
<td>In development</td>
<td>Comprehends natural language; is capable of handling sophisticated commands</td>
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<tr>
<td>Mobvoi</td>
<td>Aug. 2014</td>
<td>Chinese AI personal assistant that is available on iOS, Android and its own smartwatch</td>
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Source: Company official websites/Financial Times
Apple Siri: Integrated into All Apple Smart Devices

Siri was originally a third-party iOS app developed by the startup Siri Inc. The startup was acquired by Apple in April 2010, and was integrated into the iOS 5 system together with the iPhone 4s in October 2011. It was the first AI personal assistant integrated into a smartphone operating system.

In the latest version, iOS 9, Siri has become smarter and more proactive; it can provide more relevant information based on the owner’s usage patterns. It also provides suggestions regarding commands and features available, which helps the owner use it more effectively. Siri has become an integral part of many Apple devices, apart from just the iPhone, and is now available on the iPad, iPod Touch, Apple Watch and Apple TV.

Apple has been upgrading Siri, and recently acquired speech technology startup VocalIQ, whose software uses an AI technique called deep learning to help it interact with humans more naturally: it could help Siri better interpret conversations, understand context and deliver more natural responses, improving Siri’s ability to converse with users.

Google Now: Anticipating Usersstand co

Google Now is Google’s response to Siri. The app was launched in July 2012 together with Android 4.1. It is now available on both the Android and iOS platforms.

Google Now relies on advanced predictive technology; it can anticipate a user’s information needs and provide more relevant information. These suggestions are based on the actions the user has previously performed on the smart device, such as checking in at specific locations, making calendar appointments and searching queries. For example, if a user has searched for a specific TV show on Google Now, it will remind the user about upcoming episodes and what time they will air.

Users can also train Google Now to provide better suggestions. For instance, users can add addresses in appointment entries to make sure Google Now suggests the best route to take to get to each location, or they can hide information they are not interested in, so the personal assistant will know not to offer suggestions about it in the future.
Microsoft Cortana: Progressive Intelligence

Under threats of new operating systems in the mobile era, such as Android and iOS, Microsoft is making over its own AI personal assistant, Cortana. First launched in April 2014, the software is now available on a wide range of devices, including the Microsoft Band, Xbox One gaming console, Windows 10 PC and smartphone, and it will be available on iOS and Android devices as well.

Cortana has similar features to the other major AI personal assistants on the market—the difference lies in its transparency. Similar to other apps, Cortana is able to read a user’s information, such as email, in order to inform the suggestions it makes. However, it will ask for the user’s permission before doing so. This helps to confirm if the software is anticipating the user’s needs correctly, and provides better privacy for the user.

Cortana takes advantage of Microsoft’s domination in the PC market, where users can have a fully optimized experience across different devices, including PCs, smartphones and tablets that run Windows 10.

Facebook M: AI Supercharged by Human Intelligence

Facebook debuted its personal assistant, M, in August 2015. Unlike other AI personal assistants currently available, Facebook’s version is supervised by humans. When a user asks M a question, the assistant will formulate a response, but send it first to a human trainer, who will decide what else needs to be done before delivering the response to the user. In the long run, this can drive a more advanced system based on deep learning.

The app also has promising potential in business applications. For example, Facebook is planning to include a new type of ad in the app, called “click to message,” through which a user could send a business a message.
Hound: Understands Both Context and Details

Currently in development, with an Android preview version having already been released to beta program users, Hound has gained attention among those in the industry. The app aims to enable humans to interact with the things around them in the same way that we interact with each other.

Apart from providing fast and deep results, Hound also combines speech recognition and language understanding. After an interview with re/code reporter, SoundHound’s CEO Keyvan Mohajer demonstrated the product by ordering it to “Show me hotels in Seattle for Friday, staying one night.” Within a few seconds, 10 results appeared on a Google Map. He then asked a much more complicated and in-depth question by adding more parameters: “Show only the ones that have three or four or five stars that are pet friendly, that have a gym and a pool, within 4.5 miles of the Space Needle.” The refined results where shown right away. A similar demonstration is also available on the company’s official website.

Chumen Wenwen is a leading Chinese AI personal assistant. Key features include Chinese speech recognition, vertical search and hot word triggering.

Mobvoi: The Chinese Startup founded by a former Google employee

Founded in 2012, the company’s Chumen Wenwen is a leading Chinese AI personal assistant. Recently Google has invested in the company and taken a significant minority stake. Key features include Chinese speech recognition, vertical search (which helps deliver precise search results) and hot word triggering (which wakes up the device for query upon hearing a key phrase from the user, such as “Hi Watch”).

The app is available on iOS and Android and for wearables such as Google Glass and Android Wear. The company also developed its own smartwatch, the Ticwatch, which works with both Apple and Android smartphones.
IBM Watson

IBM demonstrated its AI prowess with the Watson supercomputer, and the company’s approach could be even more sophisticated than that of the other tech juggernauts. Instead of launching its own AI human interface that interacts with consumers, IBM launched the IBM Watson Developer Cloud, which allows enterprises and startups to develop apps that have the AI capability to interact with humans. The Pepper robot and CogniToys are two examples of products that rely on Watson technology.

- **Pepper** is a humanoid robot developed by Aldebaran Robotics and SoftBank using IBM Watson technology on the back end. It can interact with humans, and has the potential to become a robotic assistant to individuals and to serve businesses, too.

- **CogniToys** is a smart toy dinosaur that can speak to and interact with kids, teaching them about different subjects. It is also powered by IBM Watson, although indirectly, for privacy reasons. For example, kids can ask questions such as “How far is it from the Earth to the Moon?” and the dinosaur can answer them.

**IMPLICATIONS**

Since the launch of Apple’s Siri in 2011, there has been rapid development in the AI personal assistant market. Now, it is possible for the software to perform more advanced tasks, such as making recommendations based on predictive technology. AI personal assistants are also becoming an integral part of the IoT, which has seen explosive growth in the past few years.

With billions of dollars invested in this area, and with numerous startups as well as the tech giants actively developing technologies and products, we may see breakthroughs in the next few years, with AI personal assistants advancing from “nice to have” features on our smartphones to an essential part of every smart device we use.

This would revolutionize the way we use smart devices, as well as our decision-making processes. It would have great implications for retail, and other sectors, too. For example, instead of having to search for information by manually inputting a query into a smartphone and then filtering the returns, we could rely on our AI personal assistant to decide which services to call on in order to fulfill our requests. So, when we request “a four-star hotel downtown with a swimming pool,” our assistant could recommend some based on our own previous usage and preferences, along with review websites and business websites. This would ultimately change the way businesses operate, especially the way they reach and interact with their customers.
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