

Computer brain that can learn, poised to bring robots 'alive'

A new artificially intelligent computer system called 'Amelia' – that can read and understand text, follow processes, solve problems and learn from experience – could replace humans in a wide range of low-level jobs



Amelia aims to answer the question, can machines think? Photo: IPsoft



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In February 2011 an artificially intelligent computer system called IBM Watson astonished audiences worldwide by beating the two all-time greatest Jeopardy champions at their own game.

Thanks to its ability to apply advanced natural language processing, information retrieval, knowledge representation, automated reasoning, and machine learning technologies, Watson consistently **outperformed its human opponents** on the American quiz show Jeopardy.

Watson represented an important milestone in the development of artificial intelligence, but the field has been progressing rapidly – particularly with regard to natural language processing and machine learning.

In 2012, Google used 16,000 computer processors to build a simulated brain that could correctly **identify cats in YouTube videos**; the Kinect, which

provides a 3D body-motion interface for Microsoft's Xbox, uses algorithms that emerged from artificial intelligence research, as does the iPhone's Siri virtual personal assistant.

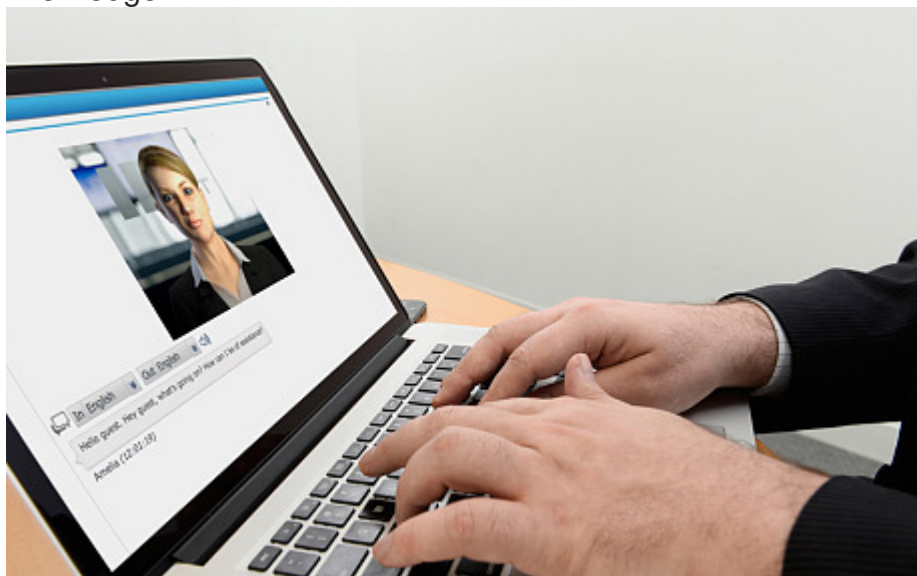
Today a new artificial intelligence computing system has been unveiled, which promises to transform the global workforce. Named 'Amelia' after American aviator and pioneer Amelia Earhart, the system is able to shoulder the burden of often tedious and laborious tasks, allowing human co-workers to take on more creative roles.

"Watson is perhaps the best data analytics engine that exists on the planet; it is the best search engine that exists on the planet; but IBM did not set out to create a cognitive agent. It wanted to build a program that would win Jeopardy, and it did that," said Chetan Dube, chief executive Officer of IPsoft, the company behind Amelia.

"Amelia, on the other hand, started out not with the intention of winning Jeopardy, but with the pure intention of answering the question posed by Alan Turing in 1950 – can machines think?"

Amelia learns by following the same written instructions as her human colleagues, but is able to absorb information in a matter of seconds. She understands the full meaning of what she reads rather than simply recognising individual words. This involves understanding context, applying logic and inferring implications.

When exposed to the same information as any new employee in a company, Amelia can quickly apply her knowledge to solve queries in a wide range of business processes. Just like any smart worker she learns from her colleagues and, by observing their work, she continually builds her knowledge.



While most 'smart machines' require humans to adapt their behaviour in order to interact with them, Amelia is intelligent enough to interact like a human herself. She speaks more than 20 languages, and her core knowledge of a process needs only to be learned once for her to be able to communicate with customers in their language.

Independently, rather than through time-intensive programming, Amelia creates her own 'process map' of the information she is given so that she can work out for herself what actions to take depending on the problem she is solving.

"Intelligence is the ability to acquire and apply knowledge. If a system claims to be intelligent, it must be able to read and understand documents, and answer questions on the basis of that. It must be able to understand processes that it observes. It must be able to solve problems based on the knowledge it has acquired. And when it cannot solve a problem, it must be capable of learning the solution through noticing how a human did it," said Dube.

IPsoft has been working on this technology for 15 years with the aim of developing a platform that does not simply mimic human thought processes but can comprehend the underlying meaning of what is communicated – just like a human.

Just as machines transformed agriculture and manufacturing, IPsoft believes that cognitive technologies will drive the next evolution of the global workforce, so that in the future companies will have digital workforces that comprise a mixture of human and virtual employees.

Amelia has already been trialled within a number of Fortune 1000 companies, in areas such as manning technology help desks, procurement processing, financial trading operations support and providing expert advice for field engineers.

In each of these environments, she has learnt not only from reading existing manuals and situational context but also by observing and working with her human colleagues and discerning for herself a map of the business processes being followed.

In a help desk situation, for example, Amelia can understand what a caller is looking for, ask questions to clarify the issue, find and access the required information and determine which steps to follow in order to solve the problem. As a knowledge management advisor, she can help engineers working in remote locations who are unable to carry detailed manuals, by diagnosing the cause of failed machinery and guiding them towards the best steps to rectifying the problem.

During these trials, Amelia was able to go from solving very few queries independently to 42 per cent of the most common queries within one month. By the second month she could answer 64 per cent of those queries independently.

"That's a true learning cognitive agent. Learning is the key to the kingdom, because humans learn from experience. A child may need to be told five times before they learn something, but Amelia needs to be told only once," said Dube.

"Amelia is that Mensa kid, who personifies a major breakthrough in cognitive technologies."



Analysts at Gartner predict that, by 2017, managed services offerings that make use of autonomies and cognitive platforms like Amelia will drive a 60 per cent reduction in the cost of services, enabling organisations to apply human talent to higher level tasks requiring creativity, curiosity and innovation.

IPsoft even has plans to start embedding Amelia into humanoid robots such as **Softbank's Pepper**, **Honda's Asimo** or Rethink Robotics' Baxter, allowing her to take advantage of their mechanical functions.

"The robots have got a fair degree of sophistication in all the mechanical functions – the ability to climb up stairs, the ability to run, the ability to play ping pong. What they don't have is the brain, and we'll be supplementing that brain part with Amelia," said Dube.

"I am convinced that in the next decade you'll pass someone in the corridor and not be able to discern if it's a human or an android."

Given the premise of IPsoft's artificial intelligence system, it seems logical that the ultimate measure of Amelia's success would be passing the Turing Test – which sets out to see whether humans can discern whether they are interacting with a human or a machine.

Earlier this year, a chatbot named Eugene Goostman became the first machine to **pass the Turing Test** by convincingly imitating a 13-year-old boy. In a five-minute keyboard conversation with a panel of human judges, Eugene managed to convince 33 per cent that it was human.

Interestingly, however, IPsoft believes that the Turing Test needs reframing, to redefine what it means to 'think'. While Eugene was able to immitate natural language, he was only mimicking understanding. He did not learn from the interaction, nor did he demonstrate problem solving skills.

"Natural language understanding is a big step up from parsing. Parsing is syntactic, understanding is semantic, and there's a big cavern between the two," said Dube.

"The aim of Amelia is not just to get an accolade for managing to fool one in three people on a panel. The assertion is to create something that can answer to the fundamental need of human beings – particularly after a certain age – of companionship. That is our intent."