

# Despite Decades of Research, why have Intelligent user Interfaces not Gained Wide Usage?

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## Introduction

While great strides have been made in Human User Interface development and also in Artificial Intelligence (AI) research, the computer science industry has very few examples of the successful use of these two technologies together. A notable exception is Apple's Siri program. Siri is a digital assistant which incorporates years of DARPA funded research on Natural Language Processing (NLP), a big part of AI and Human User Interface research. I would like to address the apparent lack of widespread adaptation of Intelligent User Interfaces. But, what is an Intelligent User Interface?

## Intelligent User Interfaces

In [1], Annika Waerndescribes an IntelligentUser Interface as one that is adaptable, does not necessarily mimic human behavior and probably not one that strictly uses a knowledge base to adapt to a user. Indeed, she lists some techniques commonly used in 1997 in IntelligentUser Interfaces which include user adaptability, user modeling and natural language technology. She adds dialogue modeling and explanation generation, but to me those could be loosely coupled in the language technology group. For the purpose of this article I define an Intelligent User Interface as an interface coupled with an artificial intelligence agent able to learn how to best present information and control options to a human to either maximize his or her performance, or make the interaction as easy or pleasant as possible.

## History

Intelligent User Interfaces as a research field has been around since the mid 1980s [2]. There has been a large proliferation of research efforts in this area. There have been books [3], workshops [4], and conferences<sup>1</sup>, with the academic focus on Intelligent User Interfaces that indicates clearly a strong push in this direction. But, where are the fruits of all this research?

Using artificial intelligence in user interfaces probably began with the use of speech recognition. Dragon Naturally Speaking is a widely used speech recognition tool which has a long history and seen some measure of success. Currently we see this type of speech recognition technology integrated into office applications (MS Office) and operating systems (iOS, OSX, Android, MS Windows, etc.). Indeed, speech recognition is one area we believed for a long time would lead to a golden future; a future where we simply tell our computers what to do and they do it. Many science fiction works depict such a future; the ship's computer in Star Trek and 2001: A Space Odyssey (HAL) are probably the most popular of the group. But, despite the availability of the voice recognition technology in these applications, most people simply do not use it and when it is used it is for voice dictation and not user control. Until the advent of Siri. What is it about Siri that has finally captured the attention of the mass public?

## Trends

Aside from Siri there are other small-scale uses of AI in interface technology which are often over-looked. Pen based tablet PCs often incorporate the use of character and handwriting technologies when can be viewed as AI. Today's GPS systems

typically incorporate Artificial Intelligence to improve the performance of the localization process but do not aid in the interaction with the user.

In 1998, Wahlster and Maybury [5] wrote a paper which articulated the current state of the field at the time, and described the need for this type of technology. By and large this call to action was left unanswered, but there are a few examples of the contrary.

Ideally, implementing machine intelligence into any kind of system requires us to incorporate some kind of sensor device to provide the learning agent data to base decisions on. More and more we see the use of cameras on our computers, tablets and various other hand held computational devices. Additionally our mobile devices are equipped with accelerometers (they can sense how fast they are accelerating and in what direction), GPS sensors, multi-touch capacitive screens and other advanced sensor technology.

## So, why haven't we seen more intelligent user interfaces?

I would argue that there is a list of reasons why this is the case. First, while Artificial intelligence as a discipline has been around for a long time, it is still a far from perfected science but is gaining ground in usage throughout a wide spectrum of applications. AI systems are typically not guaranteed to work with any kind of reliability. If you spend any time at all trying to tell your vehicle navigation device where you want to go you will soon see this is the case. Second, software developers are typically not trained in artificial intelligence. The normal paradigm for software development is to hire an interface expert for the graphic user interface, an AI expert for AI components, and various other people to develop the other modules in the system. An Intelligent User Interface requires someone that is versatile in AI as well as user interface development. Finally, while there is a large proliferation of published research on the topic, much of it is still only available to subscribers who are required to pay annual subscription fees. While time will help with the first items, we believe wider usage of open access will help with the later.

## Conclusion

Today's computer systems are more aware of their environment than ever before and perhaps now in the critical point in our history when the technology to learn from that sensor input and adapt to

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it begins to take root. If we cultivate a culture of open access this becomes more likely. Open access provides unrestricted access to published journals by means of the Internet through a forum like the OMICS Publishing Group. Today's wide proliferation of open access is producing a large breadth of data and research from scientists. By publishing to open access media outlets, professionals performing research in both artificial intelligence and user interfaces have easy access to each other's work and we can expect an ever-increasing amount of collaboration between the two fields of study.

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