Challenge
The decreasing size of computers and memory, with the corresponding decrease in cost creates an opportunity for computers to be embedded throughout our lives. Any device that requires settings of any kind can have an embedded interactive computer through which users can control the device. However, the peripherals for human-computer interaction are too large and too expensive and consume too much power. No matter how small and how cheap processors and memory becomes, our fingers will not get smaller and our eyes will not get sharper.

Most of the interactive problems with very small computers can be addressed using spoken language interaction. The interactive devices for speech interaction are very small, very cheap and very low power. They can scale down in size and cost to match the size and cost of future processors. Such interfaces, however, engender their own interactive problems. If we use speech to empower the creation of large numbers of interactive devices, this will create large numbers of unique user interfaces. Each new interface must be learned which constitutes a serious user load. Natural language may eliminate learning of syntax but does not solve the problems of "what can this device do and how?" The wide range of natural language makes recognition more difficult. Robust natural language systems are difficult and expensive to develop.

A Vision
Spoken language interfaces are retracing the history of graphical user interfaces with about a 10 year lag. Rather than using rich flexible dialogs tuned to each application (similar to natural language) the GUI community adopted a standard look and feel with standard toolkits to support development. This standardization allows users to transfer experience with one application to the next. The standard look and feel produced greater usability benefits than task-specific interactions. The standard look and feel also allowed for more powerful development tools with vastly reduced development times and cost.

We propose the creation of Speech Widgets, which is a standard language for speech interaction with computing devices. It will use standard syntax for users to explore the capabilities of an interface, invoke its actions, extract information, change settings and get help. These standard forms will be parameterized by the objects, actions and fields that make up a particular interface. A user approaching a new Speech Widgets device will have the same usability advantages as users approaching a new Mac or Windows application. Such advantages are particularly important in spoken language interfaces where there are no visual queues as to what is possible. Such a standardized language will not only reduce user learning problems but will increase the confidence of users in interacting with new devices.

Research Problems
The primary research problem is the design of the Speech Widgets language. The language must be general enough to support a broad class of applications. In particular the interaction using Speech Widgets must not become cumbersome or ineffective. This can be addressed by collecting a large set of potential applications and doing paper designs on the language structures required. A second problem is language learnability. Since this is not a natural language its design must be iteratively evaluated with users to determine if ordinary people can learn Speech Widgets in a small amount of time. The most critical test of the Speech Widgets concept is learning transference. The project will be a success if users who have learned on Speech Widgets interface can learn the next interface an order of magnitude faster.

The second major goal is to create an interface toolkit for Speech Widgets. This toolkit will support rapid development of highly useable speech interfaces. This would become the Visual Basic of spoken language interfaces and make possible a much broader class of applications. The usability work of designing the widgets will be encapsulated in reusable components.