

# VoodooIO

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## Abstract

VoodooIO is a new physical interface that can be easily constructed out of atomic interaction elements. Its components are a collection of basic controls (Voodoo Pins) that can be dynamically pinned into and manipulated on an active material. The net effect is a system which allows the user to easily define and adapt their physical interaction space to suit their personal preferences and interaction requirements.

## Introduction

VoodooIO consists of a kit of small interactive elements - such as buttons, sliders, dials and joysticks - and a flexible substrate material on which they can be freely arranged (c.f. Figure 1). Any number and combination of elements can be brought together on a substrate to compose bespoke physical interfaces on the fly. The substrate is connected to a desktop computer, allowing the coupling of the physical controls with applications parameters. The net effect is that the user is given the ability to quickly compose a physical interface of their own design, and to dynamically adjust it to the task at hand, according to their personal preference.

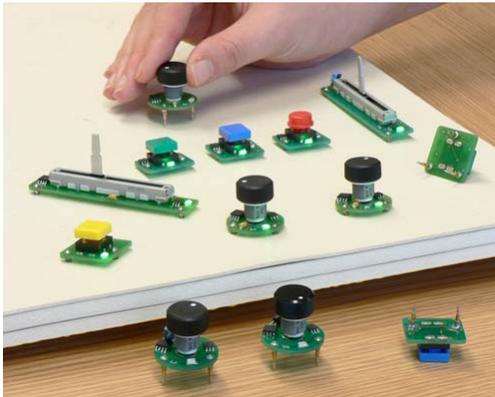


Figure 1. VoodooIO control 'Pins' can be freely arranged and manipulated on the interface substrate.

The basic interface building blocks are the 'Voodoo Pins': small interaction devices equipped with transducers and controls which the user can physically perceive and manipulate. The 'Pins' take their name from the way they can be pinned into the substrate material via the small sharp connectors that each is equipped with.

## Implementation

Voodoo Pins are realized as embedded devices that can communicate with a desktop PC via a planar networking substrate, using Pin&Play technology (c.f. Figure 2). The Pin&Play infrastructure involves a flexible substrate material with embedded conductive layers and custom-designed coaxial connectors that allow the pin computers to affix to the substrate, providing both physical attachment and digital connectivity. Ad hoc networking techniques allow any combination of 'Pins' to be dynamically brought in and out of play from the substrate

network. A communications protocol provides automatic discovery of network pins, as well as bi-directional communication between pins and the computer. A high-level programming API, allows rapid development of VoodooIO-based applications. Alternatively, configuration tools and application hooks allow VoodooIO to interface with existing applications.

'Pins' can be placed anywhere on the substrate, in any orientation, and can be repeatedly inserted and removed without damaging the substrate. As soon as a Pin is attached it becomes connected, detected, and identified by the system, becoming ready for interaction in a fraction of a second. All user interaction with the Pins is communicated through the substrate network to a PC running the VoodooIO software, which translates these into application effects.

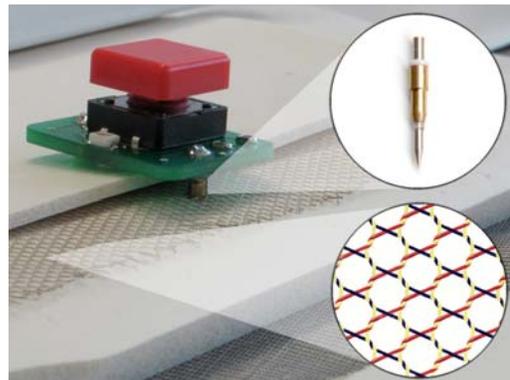


Figure 2. VoodooIO uses Pin&Play technology to supply network and power to interaction elements.

## Project Vision

VoodooIO takes the approach of making the interface malleable by decomposing interactive hardware into atomic interaction units that can be combined and arranged ad hoc into functional interfaces for computing applications.

Physical interfaces are popular for their tangibility. But a physical form comes at the price of flexibility. The graphical interface on a computer is constantly changing, adapting and being adapted to the task at hand, while the input devices that are used to interact with it remain rigid. Few physical interfaces support customization beyond the ability to re-map physical controls to functions, and almost none support the active modification of its physical shape during use. The result is generic hardware that works for a wide range of applications and users, but is not necessarily the best suited for any single one.

We see VoodooIO as a new type of human-computer interface. A flexible fabric that allows spontaneous provision of physical control to the digital functionality of applications, allowing its physical composition and functionality to be dynamically adapted as an interface that supports the changing requirements and preferences of its users.