From Rotary Telephones to Universal Number Entry Systems: Can the Past Re-shape the Future?

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Overview
Although number entry appears to be a trivial task, user errors are still common and could be the result of poorly engineered interaction with devices. We are challenging the design of universal number entry systems by looking at cases where user errors are frequently made.

We will consider the number being entered as a name because inputting a single wrong digit does not get us close to what we intended, it is instead entirely wrong. In the same sense, using the wrong letter in a name is incorrect; a wrong digit in a telephone number will result in speaking to a different person all together.

The telephone is used as a platform to compare input devices for number entry where we can look for speed and accuracy trade-offs between direct and indirect inputs. We will focus on the knob, button, and touchscreen and hope to find guidelines for when each is appropriate to use in a number entry system.

Method
Our user study will test the three traditional telephone interfaces. To create consistency across the three interfaces, users will not be able to see the numbers they are entering except for the tactile feedback provided by the device. Similarly, we have not given users the ability to correct their mistakes by deleting the last digit entered because this was not possible on older phones.

The system creates the necessary feedback loops of an interactive system [3] between the interface and the user directly instead of using a display by placing a finger in a hole of the knob, feeling the button press, or seeing the button light up on the touchscreen. The tactile feedback will serve as a critical indicator [5] of the user’s actions. Our interfaces are displayed below.

The traditional rotary dial layout. This interface is from an original 1960s phone. The interface is connected to an Arduino Uno board to convert the number of mechanical pulses into digital output.

The traditional 3x4 pushbutton keypad layout. This interface is created using a .NET Gadgeteer Spider kit.

The traditional 3x4 keypad layout on a touchscreen. This interface is created on the LCD resistive touchscreen display of a .NET Gadgeteer Spider kit.

The Telephone
The phone that we interact with began as a knob and then moved on to buttons, both of which are indirect input methods whose input must be translated into the resulting action of the device. Current technology involves using the direct input of a touchscreen where the user’s input directly effects the resulting action. It appears that technology is moving in the direction of direct interaction with our devices but without touch at all, reminiscent of early phones. Consider Siri [4] on iPhones or Voice Actions for Android [6] where users can speak a question and have an answer almost instantly. Early designs may now be reshaping future ones, but before technology can advance, we need to know that the current state has improved the past versions.

References