Intella-Bell: a Cloud-Controlled Doorbell

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The Intella-Bell prototype was developed through a collaboration between Stephen Barbour, MA, OTR/L and Lori Kenuk, PT, DPT at our product design company, Evolve Design Solutions Inc. Our diverse clinical and educational training has informed our design process to incorporate Universal Design principles within the product.

Overview of The Design Process

The Intella-Bell prototype was developed to augment the user’s experience and ability to respond when a guest arrives at their door. Traditional doorbells must be hard-wired, and take special adaptions to be used by people with disabilities. Intella-Bell allows users the flexibility to receive notifications through standard cellphones, computers, tablets etc. It therefore can easily integrate with existing technologies users may currently utilize.

We aimed to create a product that is intuitive, powerful, and also familiar to use. After setup, just press to activate Intella-Bell, like a standard doorbell, and you'll be notified.

Features

Put The Power of the Internet to Work for You

Gardening in the backyard and can't hear the doorbell? No problem, Intella-Bell's got you covered!

Intella-Bell is Wifi enabled, allowing it to communicate with other smart connected devices. It achieves this level of communication through utilization of a free cloud service (IFTTT). This powerful flexibility in customization allows users to choose exactly how they prefer to be notified, augmenting their ability respond to guests.

Flexible Actions Through IFTTT

IF This Then That (IFTTT) is a free online service that allows users to create “recipes” or simple logic commands to coordinate online services. For example, when Intella-Bell has been pressed, it sends a signal to IFTTT which turns on-and-off lights to notify a guest has arrived.
Future Improvements

As a prototype, Intella-Bell has limitations, and there are areas for improvement:

- Replace the pressure sensor with a capacitive touch sensor for greater sensitivity while operating
- Create an external one-touch button for Wifi setup
- Create a custom integrated component board to significantly reduce production costs
- Create a dedicated Intella-Bell app for easy setup and control.
- Integrate a more powerful Wifi antenna
- Custom 3D printed cases designed from compostable PLA plastics.
- Weatherproofed Design

Design Challenges

During the design and prototyping process we ran into a number of design challenges:

- Form Factor: It was important to find a form factor that was familiar as a doorbell, yet large enough to fit the modular prototyping components inside. We chose on a repurposed retail packaging for an iPod for the prototype.

- Force Adjustment/Sensitivity: Providing consistent low-effort activation of the device was a challenge. If adjusted too sensitive, the device would send false-signals. Conversely, with too much required effort it would not meet Universal Design Principle 6: Low Physical Effort.

- Limitation in Wifi reception: the modular prototyping components had moderate to weak Wifi reception. During testing we had some signal dropping.

- Service Provider Limitations: While many online services can be configured through IFTTT, may popular outlets are not available.

Equitable Use: The device provides users with identical experiences when activating the device via the faceplate.

Flexibility in Use: Provides users many choices for methods of receiving notifications via the IFTTT service. Additionally, the device can be activated by any body part or external object pressing against it.

Simple & Intuitive Use: The user experience is consistent with their expectation of how a doorbell operates. The device does not require language to operate, as it utilizes LED lighting and sound to provide user feedback.

Perceptible Information: When pressed, the device provides redundant audio, visual, and tactile feedback to the user. The device uses bright LED lighting to provide contrast between itself and the environment.

Tolerance for Error: Electronic components are shielded inside hard plastic casing which can be weatherproofed. An LED status light allows the owner to easily identify connectivity issues.

Low Physical Effort: If mounted at a recommended height, the device can comfortably be activated by users seated or standing. The device does not require grip strength to use, and can be activated by other objects.

Size & Space for Approach and Use: Users may mount the device wherever they desire, however it is recommended to be mounted at a height which is comfortable for both seated and standing users. The compact design allows the device to be easily accessed in most front landing areas and moved if desired.

Integrated Universal Design Principles

Weatherproofed Design
Provides Blue LED for Visual Feedback

Device "ON"

Buzzer Provides Tactile Feedback