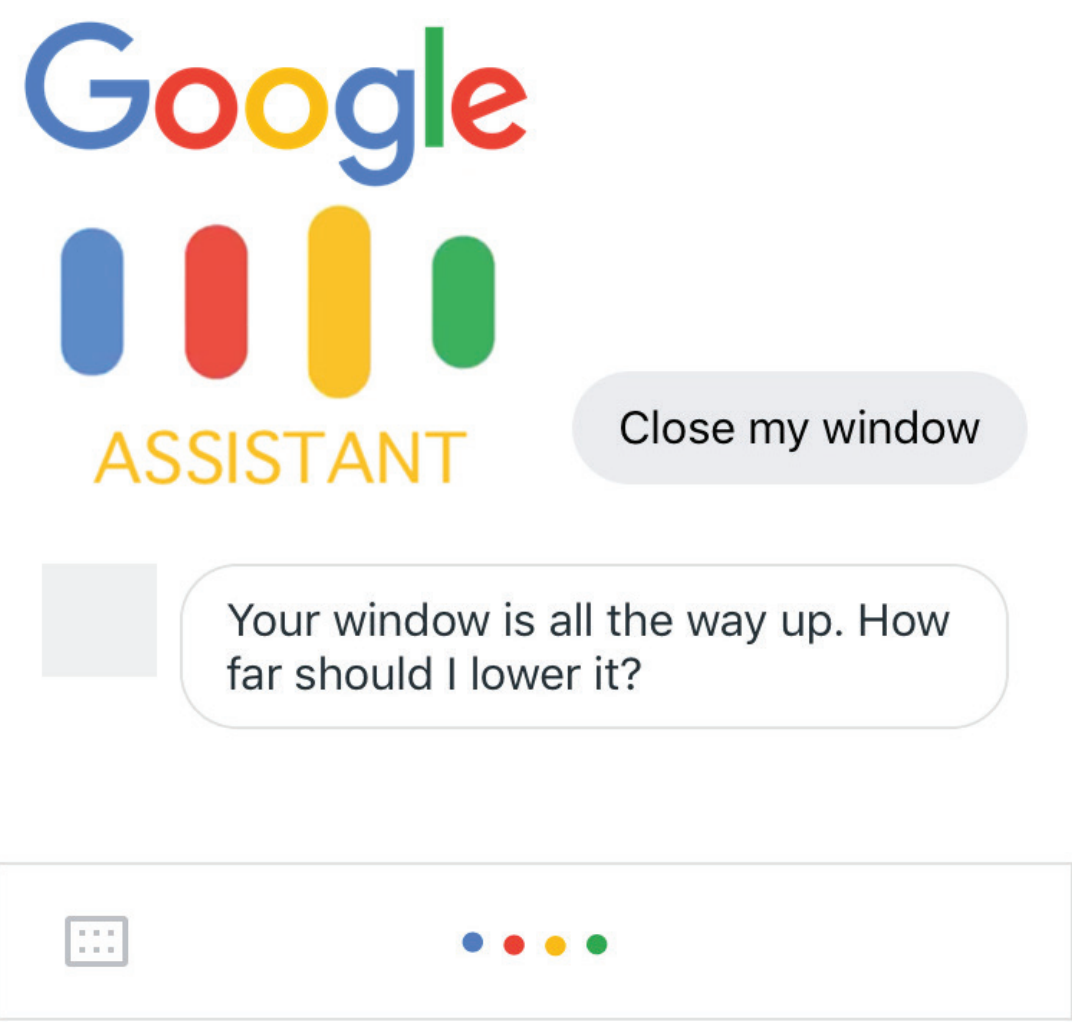
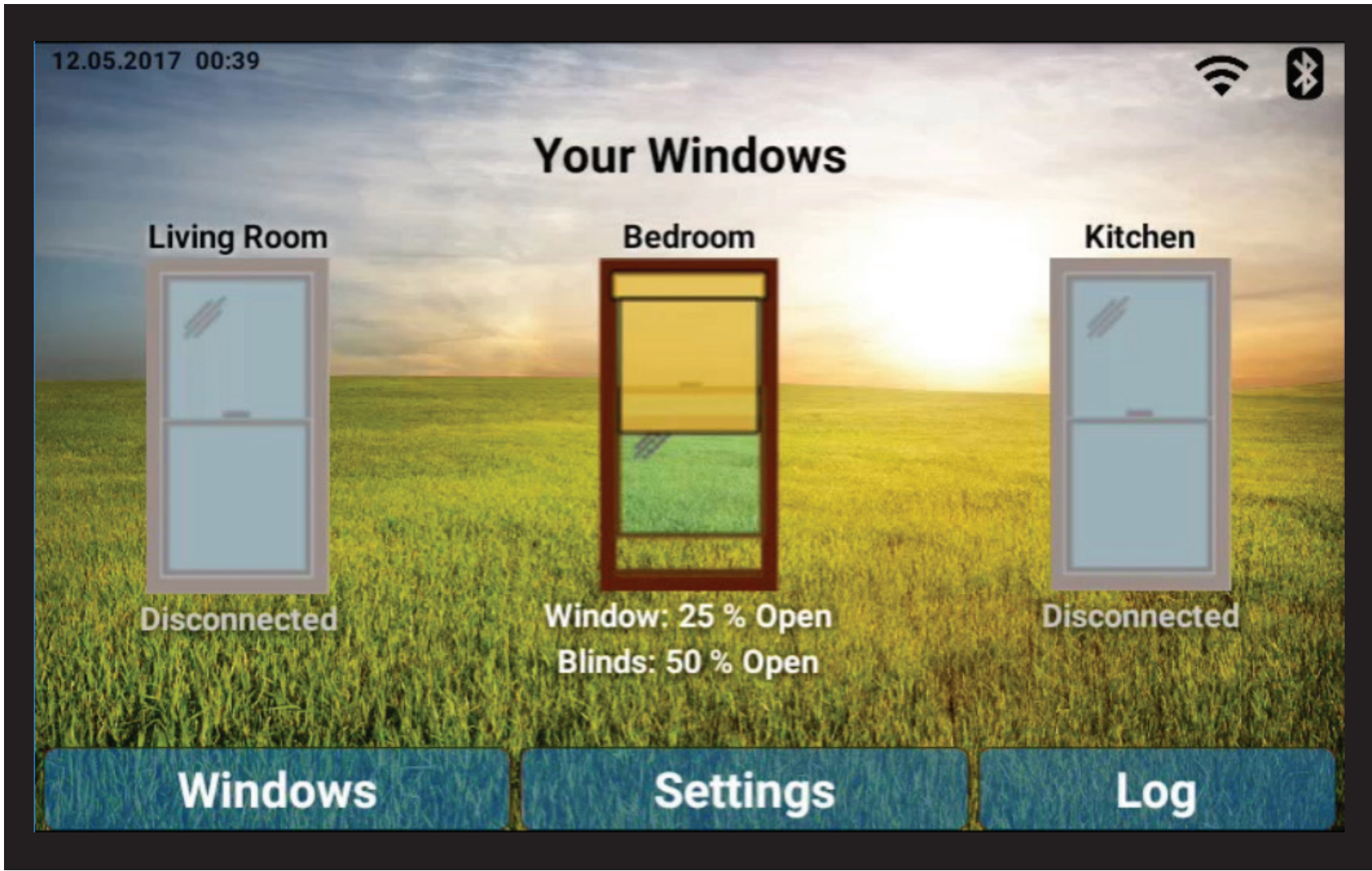


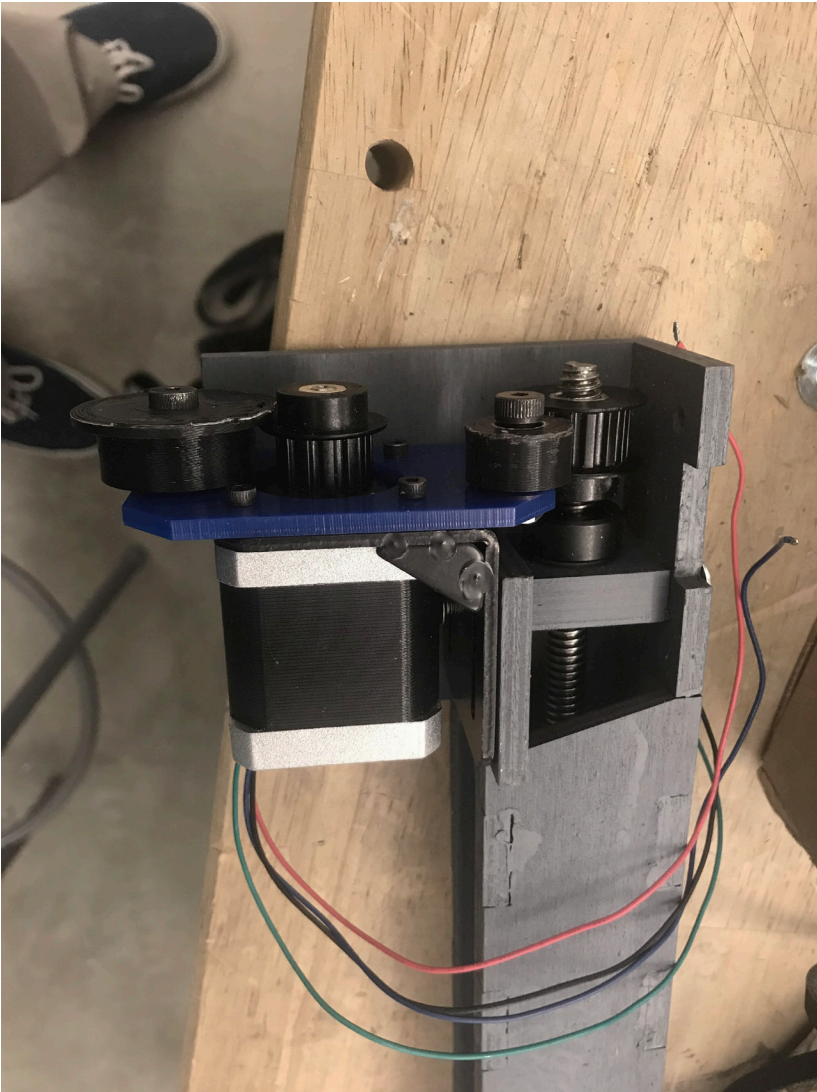


Problem

Millions of people face obstacles preventing them from controlling a basic element of most residences that allows us to regulate lighting, temperature, air quality, and noise - their window. While “smart windows” exist, current solutions may not be cost effective, retro-fit existing windows, or accomodate the most popular window in the US: the vertical single- or double-hung window.



The user can interact with the window through physical controls, a touchpanel, a mobile application, or voice UI (via Google Assistant)



Target User Group

Our target user group is those persons who, due to some physical disability, cannot open and close their windows and blinds. In the US alone, over 15 million people have some limited use of their hands while over 2 million people in wheelchairs may require assistance in order to open their home’s windows or blinds. (Source: U.S. Census).



The WinDo installed on a double-hung window.

Solution

The WinDo give those users with limited mobility the ability to control a window and blinds remotely through a diverse array of interactions such as a physical touch panel, controls on the device, a smartphone application, and voice recognition. We’ve learned, through our research, the importance in enabling a number of accessible interactions, not just to accommodate the various ways users would need to interact with their window, but to empower users to be independent in those less than perfect situations such as a smartphone dying or the internet going down. We tailored our solution towards a residential user by creating a consumer product that can be attached to an existing window.

Design Evolution

With various degrees of mobility, users showed that multiple ways of interacting with the device are key to designing for accessibility. A physical switch may be preferred during waking hours, especially if one does not want to depend on their phone, but voice activation or a smartphone application can be more useful when someone is in bed. Notably, how a person interacts with a smartphone application can vary as well; functions like click-and-dragging or swiping can drive users to various customizations for how they prefer to interact with their smartphone.

We experimented with multiple mechanical designs, opting for one that balances aesthetics (maintaining the outline of the window frame), reliability (two lead screws to prevent binding), and ease of retro-fit installation.

Final Prototype

In our final prototype, we provide a solution that demonstrates a practical way to retrofit a residential double hung window with a cost-effective “smart” device. The mechanism could match windows of all sizes (while staying unobtrusive) simply by customizing inexpensive materials for length and width.

Our next phase is to integrate automated blinds and to improve multiple window communication by allowing connections via Bluetooth.