Virtual Reality Telemedicine Platform

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Vegetable Rice

InTouch Health

Hi, developers. We are *frustrated* with displays not showing all the information we need.
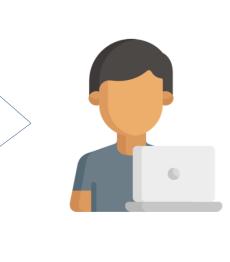
Why not use more monitors?

They are *too small*. It is cumbersome to switch back and forth between screens.

Let's use **virtual reality!** It will give you more space to display your charts and graphs and to work with your applications.

The *data* we deal with is also *very complicated*. It is difficult to interact with different scan images with a mouse on a flat screen.

Virtual reality can provide *simple and intuitive* interaction with hand gestures, allowing you to be more **productive**.

> By applying
> **VIRTUAL REALITY**
> We can provide doctors with a more **productive & accessible** interaction with their apps.
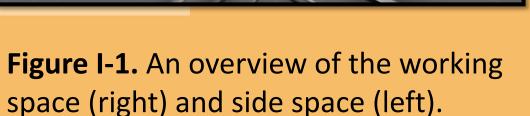
Tools, Libraries, and Platforms

WebRTC   VRTK   Chromium   Firebase   Oculus

Design Principle I – Spaces

We have developed three spaces for different purposes.
- In the main **working space,** you interact with all your applications.
- In the *side space,* you have access to widgets.
- In the fixed *eye space* you can monitor important information.

Figure I-1. An overview of the working space (right) and side space (left).

Figure I-2. Applications running in the working space.

Figure I-3. Video streaming (bottom left) and vitals monitor (bottom right) are fixed in the eye space.

Design Principle II – Interaction

Good interaction experience boosts productivity.
- *Intuitive and simple hand gestures*: Push to minimize, pull to reopen.
- *Controllers and physical buttons:* More options and allows precise actions. Bring up the menu by pressing a button.

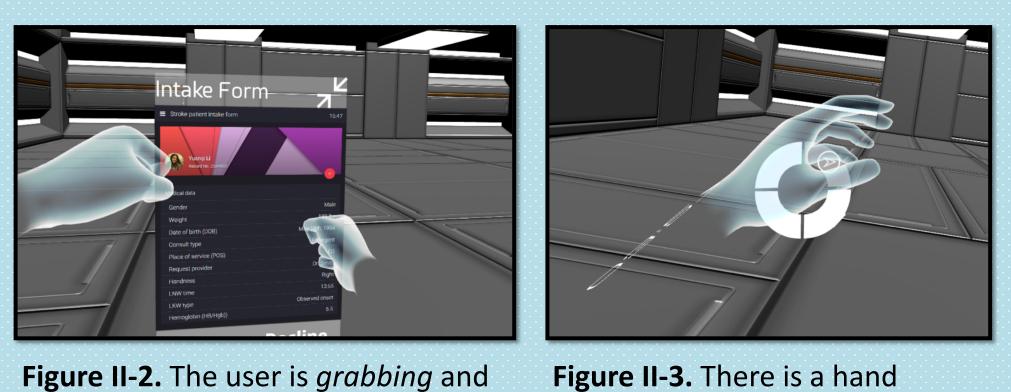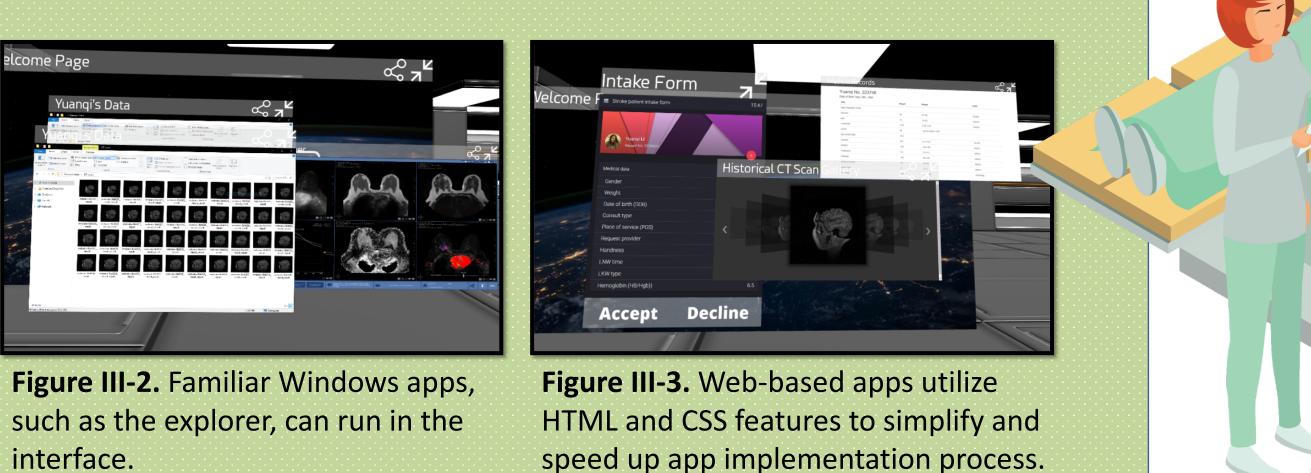**Figure II-1.** The user is using a *pull gesture* to reopen all minimized apps in working space.

Figure II-2. The user is *grabbing* and *resizing* the Intake Form app.

Figure II-3. There is a hand *menu to* open apps.

Design Principle III – Extensibility

Our project is a platform for incorporating *VR native applications*, *Windows-* or *web-based applications* in one VR setting. With our API, traditional apps can also be extended to support more VR features. e.g., creating a 3D model from a traditional Windows app.

Figure III-1. Some apps are implemented in Unity to maximize their performance and fully utilize VR features.

Figure III-2. Familiar Windows apps, such as the explorer, can run in the interface.

Figure III-3. Web-based apps utilize HTML and CSS features to simplify and speed up app implementation process.

Innovations

- *Three spaces* make use of VR to provide more space for users.
- *Gestures* allow users to efficiently interact with different kinds of data.
- *Very portable and extensible*. More apps can be easily migrated. It can also be used for non-medical purposes.

Future developments

- Graphics can be improved for a better user experience.
- More medical-specific native applications can be implemented.
- Rendering 3D models for MRI/CT scans can be added.

Selective VR Native Apps

- Real time video streaming
- Medical encounter notes
- MRI scan image viewer
- Electronic medical record visualization
- Vitals monitor
- Widgets

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