ShodanVR:
Immersive Visualization of Text Records from the Shodan Database

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Figure 1: An immersive, head mounted display visualization for viewing text records from the Shodan database of Internet connected devices. The user is provided with a two handed interface for navigating and manipulating text.

ShodanVR is an immersive visualization for querying and displaying text records from the Shodan database of Internet connected devices. Shodan provides port connection data retrieved from servers, routers, and other networked devices [2]. Cybersecurity professionals can glean this data for device populations, software versions, and potential security vulnerabilities [1].

The design goal was to create an immersive interface that allows both browsing and close examination of large text record collections while also supporting manipulation and composition of new text queries. Traditionally, immersive environments have been poor places for working with text. The limited resolution of HMDs can make small typefaces illegible and the inability to see one's own hands makes keyboard use difficult.

ShodanVR utilizes an Oculus Rift DK2, a two-handed 6DOF Razer Hydra input device, and the Unity game engine. A thumbstick on the Hydra allows panning across and zooming into text records on a display "ribbon", using a microfiche metaphor. Users can select from a wide range of zoom levels, allowing reading of text as well as overviews. Below this, a scrub bar presents thumbnails of the text records. Raycasting allows text selection. Text can be highlighted across all records and the scrub bar, providing text frequency information. A thumbstick operated pie menu allows selection of additional functions, such as adding selected text to a query. A graphical history of previous queries is shown above the record display ribbon.

With these UI features, and a live connection to Shodan, this prototype demonstrates useful searching, browsing, and query refinement, surpassing limitations of the paginated Shodan web interface. ShodanVR was developed to demonstrate UI concepts for DARPA's PlanX cyberwarfare program.

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References

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