

Virtual reality platform developed for context-dependent cognitive research in rodents

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In a study published online in *Neuroscience Bulletin*, the researchers from Dr. Xu Chun's Lab and Dr. Wen Yunqing at the Institute of Neuroscience, Center for Excellence in Brain Science and Intelligence Technology of the Chinese Academy of Sciences, and their collaborators, developed a high-performance virtual reality (VR) platform which is assembled from modular hardware and custom-written software with upgradability, providing a more economical and flexible tool for context-dependent cognitive research in rodents.

In [daily activities](#), animals need to respond to various environmental contexts appropriately. It is important to study context [cognitive process](#) as it's closely linked to aspects of behaviors. The environmental context consists of various individual elements and is enriched with multisensory information. Thus, it imposes great challenges to quantitatively control the context elements and quickly switch between distinct

contexts.

VR technology is instrumental in studying neural mechanisms underlying environmental-context-modulated behaviors by simulating the [real world](#) with maximized controls of context elements while being compatible with head-fixed neural recordings.

The researchers designed a high-performed VR platform and its main hardware structure included six curved screens, a styrofoam cylinder, a motion detector, the neural activity recording device, and peripheral functional modules which could be assembled according to the experimental needs. Rapid display switching and interactive immersive VR experience were achieved through multi-thread processing of position detection, real-time screen update, peripheral device triggering and mouse behavioral parameters by custom-written software.

Using this VR platform, researchers trained mice to perform context-dependent cognitive tasks with rules ranging from discrimination to delayed-sample-to-match while recording thousands of hippocampus place cells.

Compared with previous experimental VR devices, the VR platform developed in this study is flexible, widely applicable, cost-effective, and easy to use. Its lightweight software and upgradeable hardware modules can be assembled according to the needs of different experimental tasks.

This study preliminarily explores the role of elements in the context recognition process and establishes a more convenient VR platform to investigate context-dependent cognition with large-scale neural recording.

More information: Xue-Tong Qu et al, A Virtual Reality Platform for Context-Dependent Cognitive

Research in Rodents, *Neuroscience Bulletin* (2022).

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