MikuBox: Pseudoholographic projection box

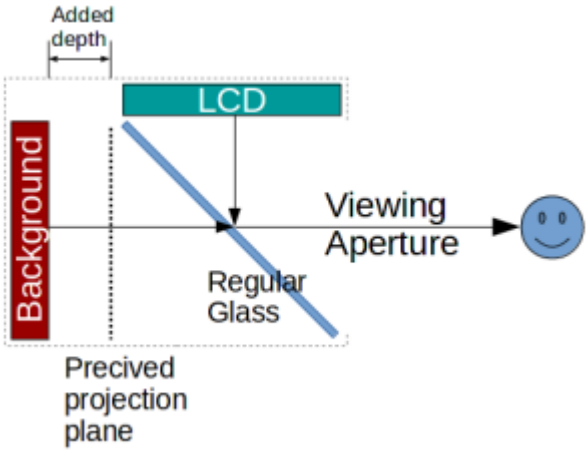
This project uses the Pepper's-Ghost effect in a medium-sized form factor to create the illusion of a projection standing in free space.

A black wooden box houses a LCD-Monitor and a RaspberryPi.

A glass plate is mounted at 45° angle to reflect the image of the monitor in the top of the box. Scrap PCBs serve as a backgound.

Principle of Operation

The „Pepper's Ghost“ effect, is based on mixing light from a hidden (here LCD) and a „normal“ (here Background) source. It has been used in stage plays since the 19th Century by temporarly illuminating a room not directly visible by the audience. This added partially transparent objects or actors „ghosts“ to the visible stage. In this setup an LCD provides an overlay animation added to a fixed background.



By choosing the box dimensions right, the light path from the background to the viewer is made longer than the path from the LCD. The projection is thus precived as freestanding in front of the background instead of on it. This causes two 2D layers to be precived as a 3D scene.

Because the mirror effect of the glass can only add light to the scene, but not remove it, the backgound may shine though dark parts of the animation.

Construction

The Mikubox is constructed around an off-the-shelf 21.5„ LCD and is made out of MDF. The Monitor of Choice uses a VA-LCD Panel to provide better Black Levels than standard TN Panels. It also does not suffer from IPS-Glow. Ideally an OLED Panel or other self illuminating pixel display should be used, but these were unobtainbale at time of writing.

The dimensions of the box are derived from the Monitor. It is important the some depth is added to

the box compared to the