

M.Sc. Thesis Defense
TZee: A Tangible Device for
3D Interactions on Tabletop
Computers
by
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Abstract

The manipulation of 3D objects on a tabletop computer is inherently problematic. The flat surface of tabletop computers enable natural 2D interaction, but lack the additional dimension needed to intuitively facilitate 3D object manipulation. In this thesis I present TZee, a passive tangible widget that enables natural interactions with 3D objects by exploiting the lighting properties of diffuse illumination (DI) multi-touch tabletops. TZee is constructed from several pieces of stacked acrylic glass. The stacked glass enables TZee to channel the light emitted from the tabletop slightly higher above the surface without major light loss. This technique allows TZee to transmit touches on the device to the tabletop without any supplementary power. TZee enables simple translation, rotation and scaling along the x, y, or z axes. TZee's transparent construction allows these interactions to be enhanced with visual feedback or other additional information under the device. TZee is compact and is easily assembled from affordable and accessible materials. These factors allow multiple TZees to be fabricated and to interact on one surface. This thesis discusses several important design considerations of TZee, demonstrated TZee's value through several applications and a gesture design study. The thesis also presents several solutions to enhance the performance of TZee..