Motivation

- Spatially Augmented Reality (SAR) uses objects in the real world as digital canvases to provide new user experiences
- Advances in computing technology allow for projection-based systems with low power and mobility

Hardware System

- NVIDIA Jetson TX1
- Intel RealSense SR300
- TI DLP3000

Demos and Results

Jetson SAR
- Rectangle Disparity: 2-3 pixels
- Max theoretical FPS: 20
- Achieved: ~5.5 fps
- Form Factor: 120mm x 117mm x 40mm

Other Work
- Projector Disparity: .3-2 pixels [4]
- Scan time: 30 minutes [2]
- Real-time update [3]
- Form Factor: 177mm x 127mm x 38.1mm + computer [4]

Scene Geometry

Project object layout onto scene using captured and processed depth map

“Privacy” Zone

Define region in the scene in which objects are not “allowed” (colored red)

Capture and Projection Pipeline

Capture Image with Calibration Rectangle

Find Projector FOV in Camera Coordinates

Compute Perspective Transform

Image Processing

Project Augmented Scene

Perspective Transform Computation

\[ \text{dst}(x, y) = \sigma \left( \frac{M_{11}x + M_{12}y + M_{13}}{M_{31}x + M_{32}y + M_{33}} \right) \]

References