

## Touch Projector

Wouldn't it be great if you could use any surface you were projecting onto as a touchscreen? This is the core idea behind our project: creating a Touch Projector. Previous work on this idea has been largely software based. The methodology consists of three stages: 1) acquiring a depth map from a Kinect, 2) detecting fingers from the depth map, and 3) optimizing and controlling the input device.

This system has high reliance on the speed of image processing. Software methods can be boosted with GPU multi-core processing. However, we plan to accelerate image processing using FPGAs. By creating a specific circuit implementation of image processing for this application, we hope to achieve a much faster rate of processing as composed to software.

Our Touch Projector device uses the FPGA as a coprocessor, and has the following structure. First, the Kinect reads a depth map image (max: 1920x1080 at 30fps). After using software drivers, we send this image to the FPGA. The next stage is FPGA image processing. We can create a 2D pipeline implementation of image processing operators to perform both noise removal and finger detection. With an output of the finger blob coordinates and properties, this output is sent back to the computer, where the corresponding mouse actions are applied.