

# Proposal: 3D Graphics Accelerator

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## Overview

We plan to make a graphics accelerator that renders 3D models on the screen. The user input will be vertices in 3D coordinates and other information. The FPGA will then render the user input in real time to the VGA framebuffer. Time permitting, we may add additional features such a texture.

## Design Outline

1. Software: We will write a kernel mode driver for Linux that provides a pseudo-file, which can be manipulated by mmap to provide MMIO communication. We will write a library that exposes a higher level interface to the programmer.
2. Hardware: The FPGA will monitor the bus and expose a vertex buffer and a projection matrix buffer to the CPU. A rendering module will render the scene to a framebuffer (either on chip or in the SDRAM). Then a VGA output module will put the rendered image on the screen.

## Goals

- Fallback goal: rendering wireframes.
- Intermediate goal: rendering filled polygons with interpolated color.
- Stretch goal: rendering polygons with a fixed parallel light source.