

**Project Team**

***Alexander Julian***

*Major: Electrical Engineering*

*Minor: Mathematics*

Alex has experience in systems design, hardware design, project management, and microcontroller coding/processing. These experiences helped him craft and mold the project and has given him a strong sense of the engineering design process.

***Philip D. Geramian***

*Major: Computer Engineering*

Philip has worked with a variety of different systems in the past, from 8-bit microcontrollers up to 32-bit SoC systems. In addition, he has prior experience with different EDA tools that has allowed him to help contribute to the design of the hardware in our system.

***Roman Olesh***

*Major: Electrical Engineering*

Roman is very creative and an outside the box thinker. He also has a good knowledge of electrical systems and basic programming. Previous exposure to wood working and metal fabrication allowed him to heavily contribute to the project and in the process add more skills to his already impressive portfolio.

***Lyle Moffitt***

*Major: Computer Engineering*

Lyle is passionate about all things related to software-defined hardware. His expertise in the design of: software, data-paths, and concurrent / asynchronous systems; as well as his deep knowledge of compile-time and control-flow optimization techniques were instrumental to the success of this project.

System Description

The 3DPOV display is a three dimensional display that enhances 3D printing workflows by providing an organic representation of any 3D model. The system exploits the *persistence of vision effect* to form a perceived static image from layered motion (similar to how a spinning fan blade appears as a flat disc).

Layered segments of pulsing LEDs spin around a central shaft at 1800 rpm. The LEDs’ illumination is synchronized with specific points of the blades’ rotation to create the appearance of a 3D image.

**System Architecture**

The 3DPOV display system consist of hardware and software. The following key components of the system are contained within the display box:

* Gears, bearings, DC brushless motors
* Control instrumentation and a touchscreen interface
* Beagle Bone master front-end
* Copper ring based power transfer system
* Custom printed circuit boards
  + 32x White 3mm LEDs
  + 2x 16 output constant current LED drivers
  + 4x 1Mbit SRAM chips
  + ATmega 328p with Arduino bootloader
* Hand-crafted oak platform
* Hand-crafted 1/8” thick Plexiglas safety shield
* Hand-crafted control board
* Custom 270W power supply

Project Objectives

The 3DPOV display enhances 3D printing workflows by providing an organic representation of any 3D model. By giving an immediate physical representation of 3D printable objects, it drastically cuts down excess print times and material costs. Additionally, the 3DPOV display provides a new dimension to visual displays for the home and office.

Engineering Challenges

The 3DPOV display needs to have precise controls and data-paths. Fine-tuning the system architecture to meet these needs proved to be a challenge. A fast data management interface was made possible through careful selection of components, such as Maxim’s 6971 led driver and Microchip’s SRAM blocks. Additionally, achieving a smooth balanced rotation proved difficult. We chose a double-helix formation and used robust fabrication techniques to ensure optimal and consistent performance.

3DPOV Display