Introduction

It is imperative to be able to visualize what you are working on especially in the 3D printing atmosphere. Seeing an object on a computer screen can be misleading since the image is not always 100 percent actual size, for this reason we have come up with the 3DPOV. With 3DPOV display you can accurately represent any object that is to be printed before you proceed with the print. Being able to see what the object looks like in real space before it is printed can save time and materials before printing something that may end up not being exactly what the user wanted. To be able to achieve a Persistence of Vision effect we build a system that rotates LEDs at 1800 rpm, during each rotation LEDs will light up at a preset position displaying an image. This build incorporated the use of brushless motor to drive the system, copper ring and carbon brush to transfer power to the rotating LEDs. Arduinos were built-in on each of the 8 layers which were used to control the LEDs through the use of LED drivers.

The concept of POV is that the human brain is capable of keeping an image in mind for 1/16th of a second. This allows for society to enjoy things like film, and television where (in the NTSC standard) a new frame is generated every 1/30th of a second, so it makes a sequence of images appear as a moving video. This allows us to take our system, spinning at 1800 RPM, to have an effective refresh rate equivalent to NTSC.

The Serial Peripheral Interface Bus, or more commonly SPI bus, is a communication protocol used to interface different systems together in a single master to one or many slave configuration mode. This allows for one to have a single master unit that may cost a lot of money, but is very good at processing data and have it interface with many, sometimes cheaper, slave units that are very good at doing a single task. In our system this is exemplified by the SRAM chips and the LED drivers that control our displays. In the SPI protocol every full duplex device has four wires going to it for just SPI purposes. These four wires are: Clock, Master Out Slave In (MOSI), Master In Slave Out (MISO), and Chip Select (/CS).

https://upload.wikimedia.org/wikipedia/commons/thumb/e/ed/SPI\_single\_slave.svg/381px-SPI\_single\_slave.svg.png

It should be noted that the standard has chip select as an active low line. The basic functionaltiy is as follows, when the /CS pin is pulled low by the master it then generates a clock signal and on every clock cycle it shifts out one byte of data at a time over MOSI, while the slave device shifts out one byte at a time on MISO. Once the transfer is completed the clock stops and the chip select line is pulled high.