Ethernet ILDA-compatible Laser Controller

Ivan Delgado, James Johnston, and Andrew Mayers

What is a laser projector?

- Laser projectors reflect a laser beam on 2 or more mirrors.
- Mirrors are attached to galvanometers, which are precise, accurate, and fast electric motors.
- The projected laser beam is moved by adjusting the mirrors.
- Rapid movement allows the single projected point to render an image.

Why are laser projectors useful?

- Projects farther then standard video projectors
- Excels at rendering of vector graphics
- Brighter projections achievable with a laser
- No bulb replacement necessary

X/Y axis scanners

Why use our laser controller?

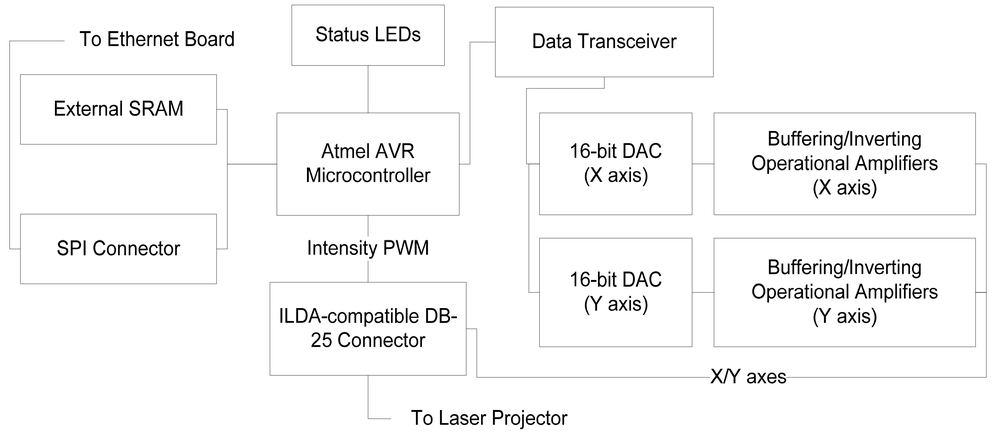
- Existing USB-/PCI-based products require close proximity to a PC
- We utilize Ethernet for easy addition of projectors over large distances
- Our controller only requires a networked PC to send a new image
- Increased stability as no PC is required after image download
- Commercial controllers cost > $2000 vs. $200 - $300 for our system

Our Design Requirements

- Output 30,000 points per second
- 12-bit accuracy achieved by analog components for X/Y axes
- Pulse Width Modulation (PWM) controls laser brightness
- Common ILDA-compatible DB-25 output for projector connection
- Use TCP over Ethernet to download new designs

Implementation

- Separate boards for Ethernet and laser controller
- Serial Peripheral Interface (SPI) for board-to-board communication
- Independent Atmel AVR processors ensure that Ethernet does not interfere with rendering

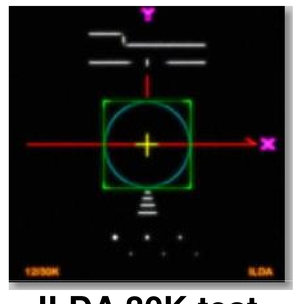


Laser Controller Block Diagram

Testing

Test setup

- Mirror setup causes distortion to be fixed in a future software version
- ILDA 30K test pattern used for calibration
- Single green laser projector used for testing



ILDA 30K test pattern