Laser Feedback Control

User Manual

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Abstract

The project aims at developing control systems for generating a laser beam of required optical power using feedback from a photo-detector. The required power is input through Labview which then communicates it to Arduino UNO Micro controller via Serial Port. Arduino then utilizes feedback from photo-detector to bring the power to the setpoint. Simultaneously, Arduino is also capable of procuring power data from another detector and communicating it back to Labview. The system can also be run in the open-loop mode without utilizing feedback by selecting the mode in Labview.

1. Setup

This section describes the basic setup of the control module

1. Connect the +12V, -12V and Gnd from SMPS to the module.
2. Connect Laser and feedback detector.
3. Connect the seperate detector if required.
4. Connect Arduino to laptop.
5. Open Labview and select the Arduino COM Port.
6. Set the Meter Factor as the fraction of total power going into feedback detector.
7. Set the Detector Factor as the fraction of total power going into additional detector.
8. Toggle Open-loop button if feedback is not required.
9. Switch on the module and SMPS.
10. Run the Labview program.

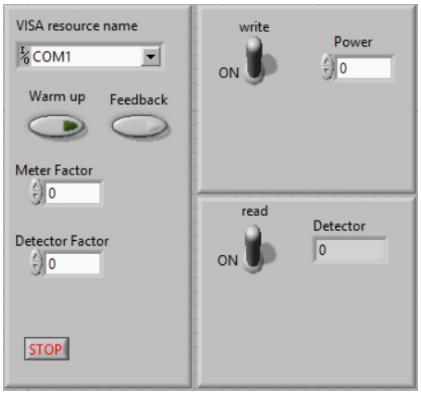

Figure 1: Labview Interface

1.1. Laser Warm up

NOTE: Keep the experiment out of the laser range during this step. Click the Warm up switch in Labview interface. It will Slowly bring the Laser to its peak intensity. Leave the system for about 5 minutes in this state to allow the laser to warm up. Click again to switch off the Warm up mode. The module is now ready for operation.

2. Operation

2.1. Feedback mode

Enter the required power value in the experiment inside the 'Power' field. Click on the write switch beside it.(The switch will automatically toggle off again) Wait for about 20-30 seconds for laser to stabilize.

For setting to a new power, repeat above step.

NOTE: Max power value is $100mW * (1 - DetectorFactor)$

2.2. Open-Loop mode

This mode linearly interpolates the control value from the input power value, hence laser operation will start above about 15% of max and will saturate by 85%. Max power value is same as above.

2.3. Additional Detector

To read power from the attached additional detector, switch on the 'read' key in bottom right box. Power values will appear in the 'Detector' field.