

## Data Acquisition Board for Testing the EIC DIRC Quartz Bars

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This note presents the features of the developed printed circuit board that reads the signals from four photodiodes, amplifies and converts the signals from analog to digital, and transmits the digital signals to an Arduino Duo R3 single-board computer of the EIC DIRC quartz bar laser testing data acquisition system.

Using Altium Designer, components were placed on a 6 in. × 5 in. board, which has four one-ounce copper layers. The top and bottom routing layers sandwich the power and ground planes. The minimum trace width is 18 mils, and the minimum routing clearance is 15 mils.

Figure 1 shows inputs for the photodiodes and power on board left and the Arduino sockets on board right; board bottom has a socket header to power a display screen for the ADCs' (U5 and U6) I<sup>2</sup>C signal outputs (green region), and a wake signal socket to turn on the digital display if it were to go into sleep mode. Four mounting holes (MH) sized for screws up to #8 facilitate connection to a copper pour that can be shorted to ground with a 0.100" header (MH to GND) located at board bottom. A 0.100" header (ADC-MH to GND) at board top enables grounding the mounting holes of the two ADCs U5 and U6.

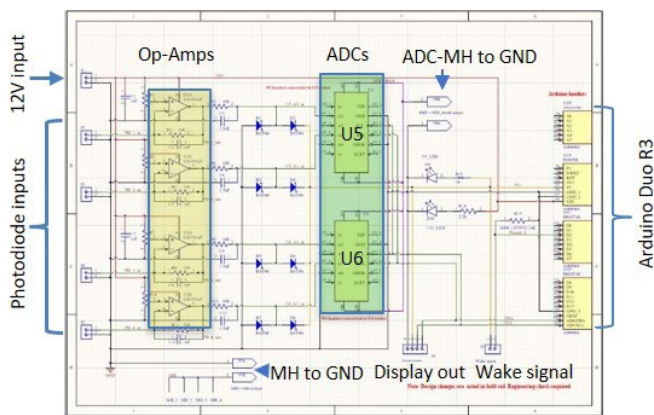


FIG. 1. Electrical schematic generated with Altium.

Figure 2 shows the component placement of the routed board done with Altium. The top layer traces are in orange, the power layer holes and split in the plane are shown in red, holes in the ground plane are green, and the bottom layer copper is in blue.

Figure 3, a rendered model, shows how the top and side views of the components and daughter boards would look after assembly.

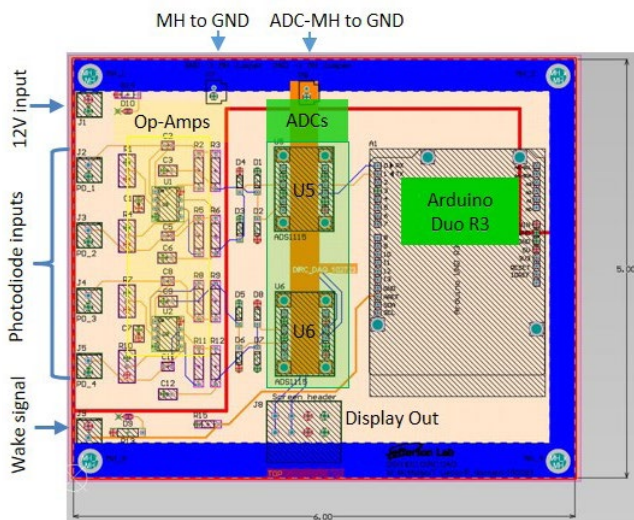


FIG. 2. Printed circuit board layout generated with Altium.

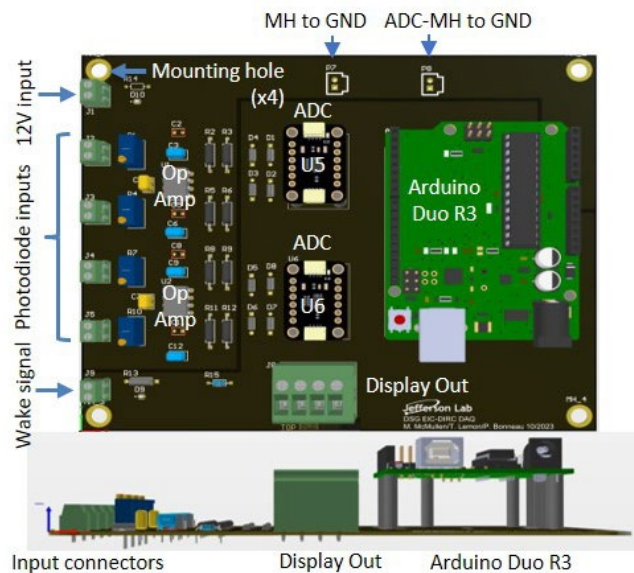


FIG. 3. Rendering of the routed board, top and side views.

Figure 4 shows a manufactured board. Initial circuit tests indicate that there are no issues with the boards.

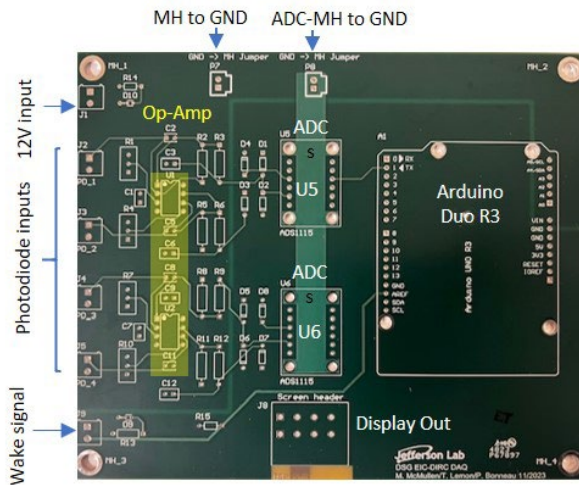


FIG. 4. Photo of the manufactured board.

To conclude, the designed printed circuit boards that read the signals from four photodiodes, amplify and convert the signals from analog to digital, and transmit them to an Arduino Uno R3 single-board computer for the data acquisition system of the EIC DIRC quartz bars laser testing project have been received. At present the boards are being populated and are to be tested thereafter.