

KiCAD PCB Design Spring 2025

First A. Author, Second B. Author, Jr., and Third C. Author

Goal:

The goal of this DA will be to design an Arduino Shield for your Xplained Mini Atmega328p/pb. The shield should have the following components listed below. Students are required to submit the schematic, and PCB Layout, of this project. The entire project folder along with the libraries used and created should be uploaded to the github page under the folder KiCAD.

Deliverables:

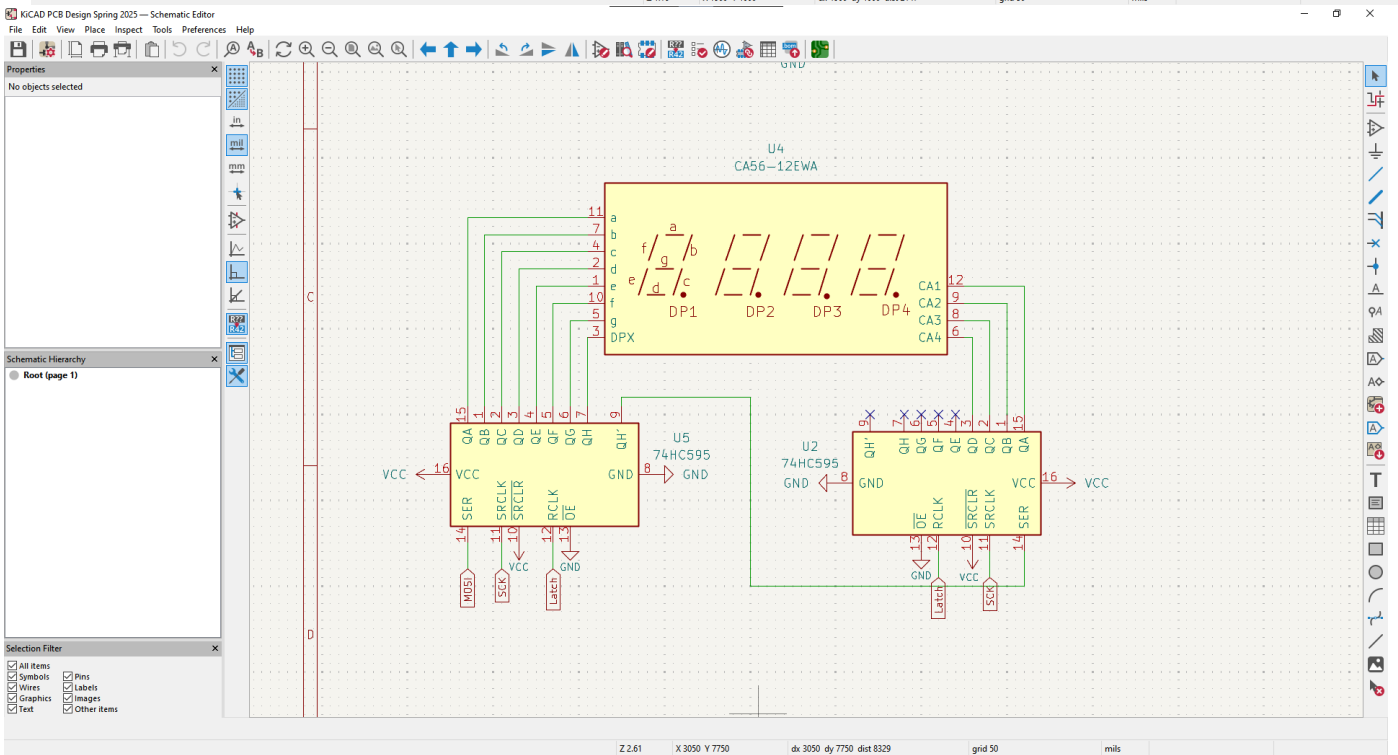
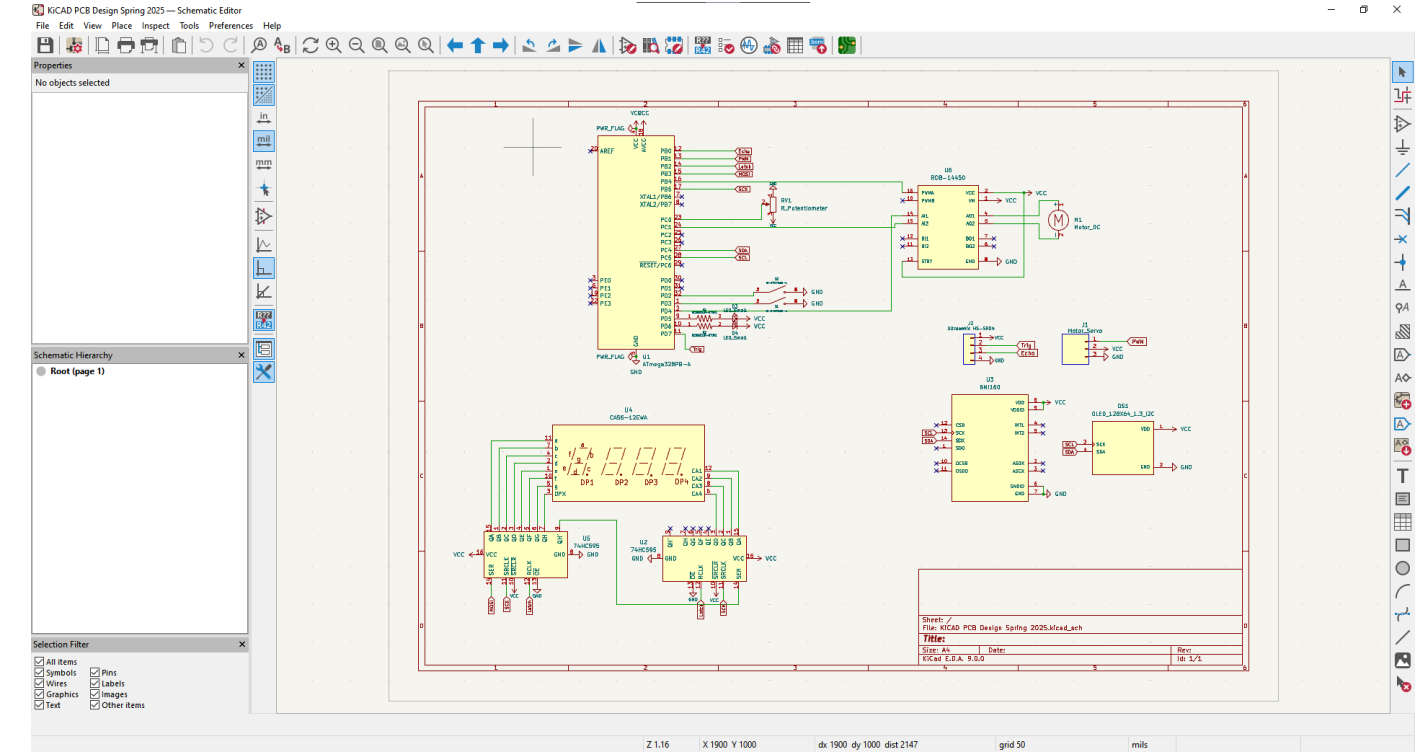
Design considered Complete:

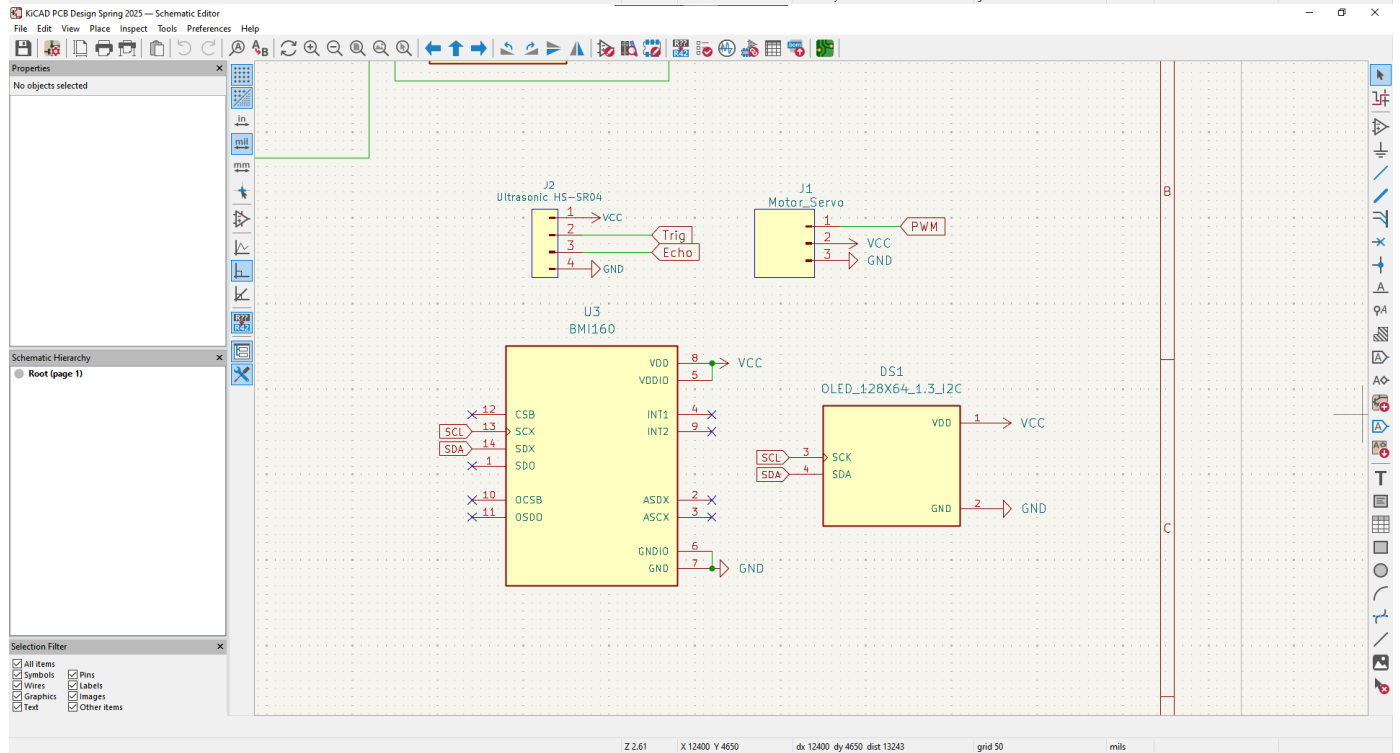
1. Completed schematics with all components - with ERC pass; complete layout of the routed components in PCB with DRC pass; 3D view.

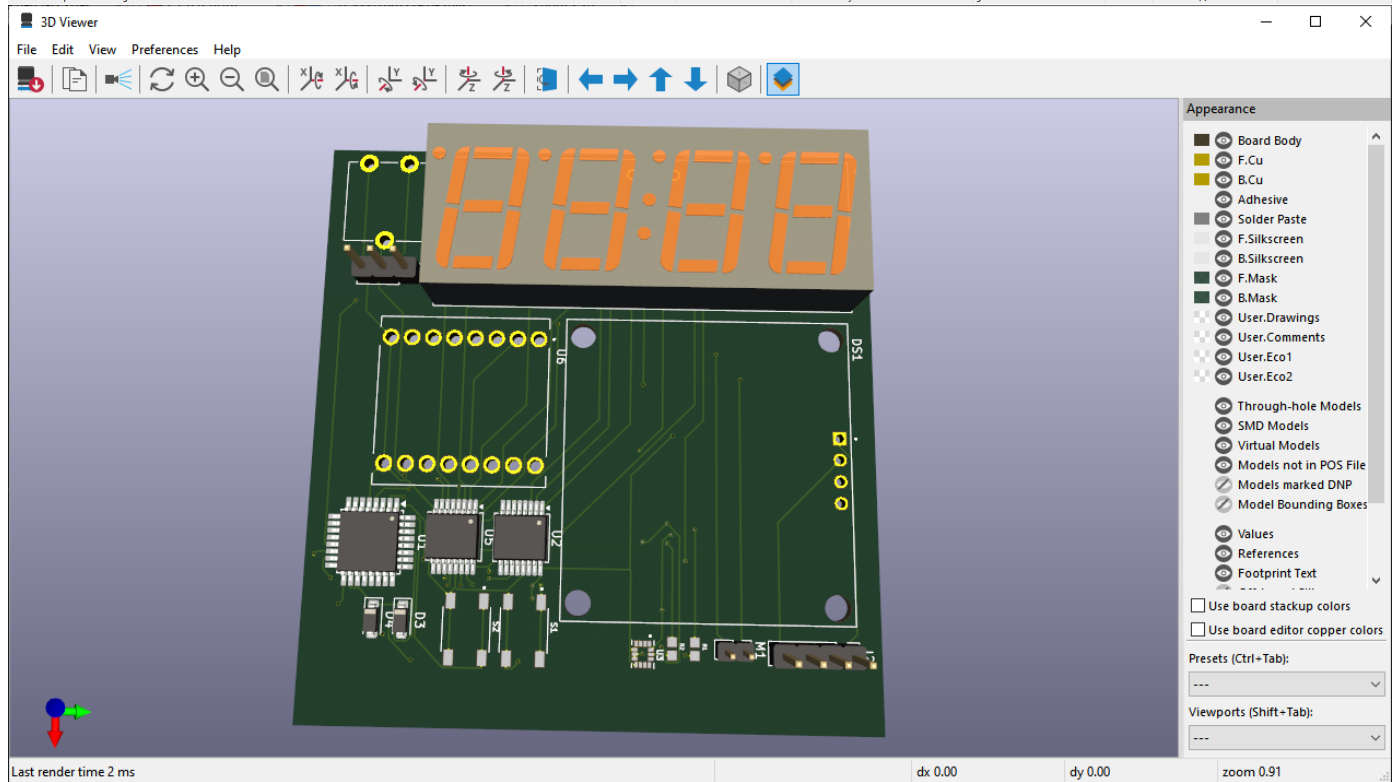
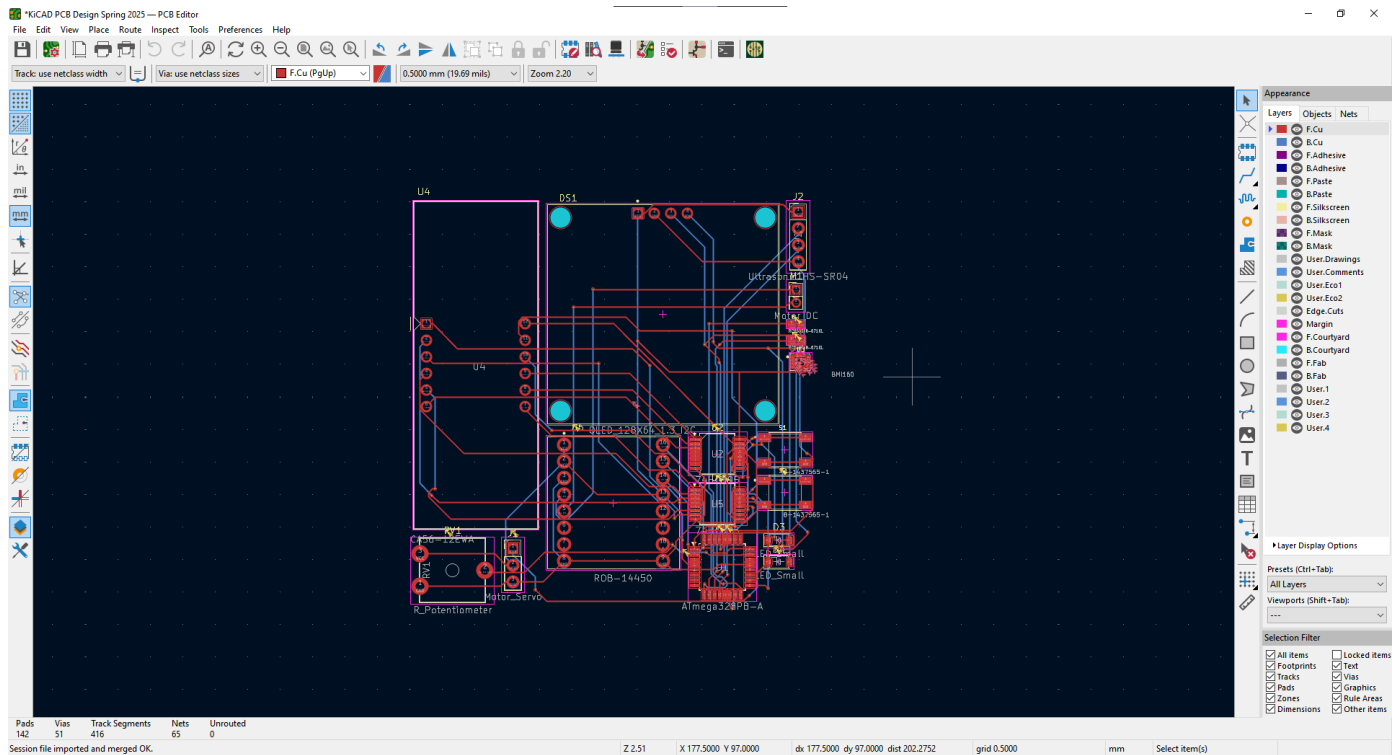
I. COMPONENTS

1. Two LEDs ([Spec](#)) with appropriate resistors ([Spec](#)) connected to PORTD pins 5&6 in reverse logic.
2. Two push buttons ([spec](#)) working in internal pullup mode connected to PORTD pins 2&3.
3. A 10K Potentiometer ([spec](#)) with a filter connected to PORTC pin 0.
4. A Quad 7-SEG display ([KiCAD libLinks to an external site.](#)) with shift registers with connections as shown in the multi-functional shield that will operate in HW SPI mode.
5. Connectors ([KiCAD LibLinks to an external site.](#)) to interface the ultrasonic sensor to the T1 capture pin.
6. DC motor driver (TB6612FNG dual motor driver module (ROB-14450) - [KiCAD libLinks to an external site.](#)) interface with external motor power terminals, chip and connectors (sch reference).
7. Interface to the servo motor (connectors only -([KiCAD LibLinks to an external site.](#)))
8. Interface to the US sensor (HS_SR04) (connectors only -([KiCAD LibLinks to an external site.](#)))
9. Create a custom symbol and footprint for the BMI160 sensor module with I2C interface. Include the BMI160 module in your schematic and PCB layout.
10. Include a 128x64 I2C Display module with your I2C interface.

II. SCHEMATICS







III. CONCLUSION

This project gave me a solid understanding of designing custom hardware using KiCad. From building the schematic to laying out the PCB, I was able to integrate multiple components like LEDs, buttons, a potentiometer, 7-segment display, sensors, and motor drivers into a functional Arduino Shield for the ATmega328PB Xplained Mini. It helped me connect theory to practice and appreciate the full process of creating a real, working circuit from the ground up.