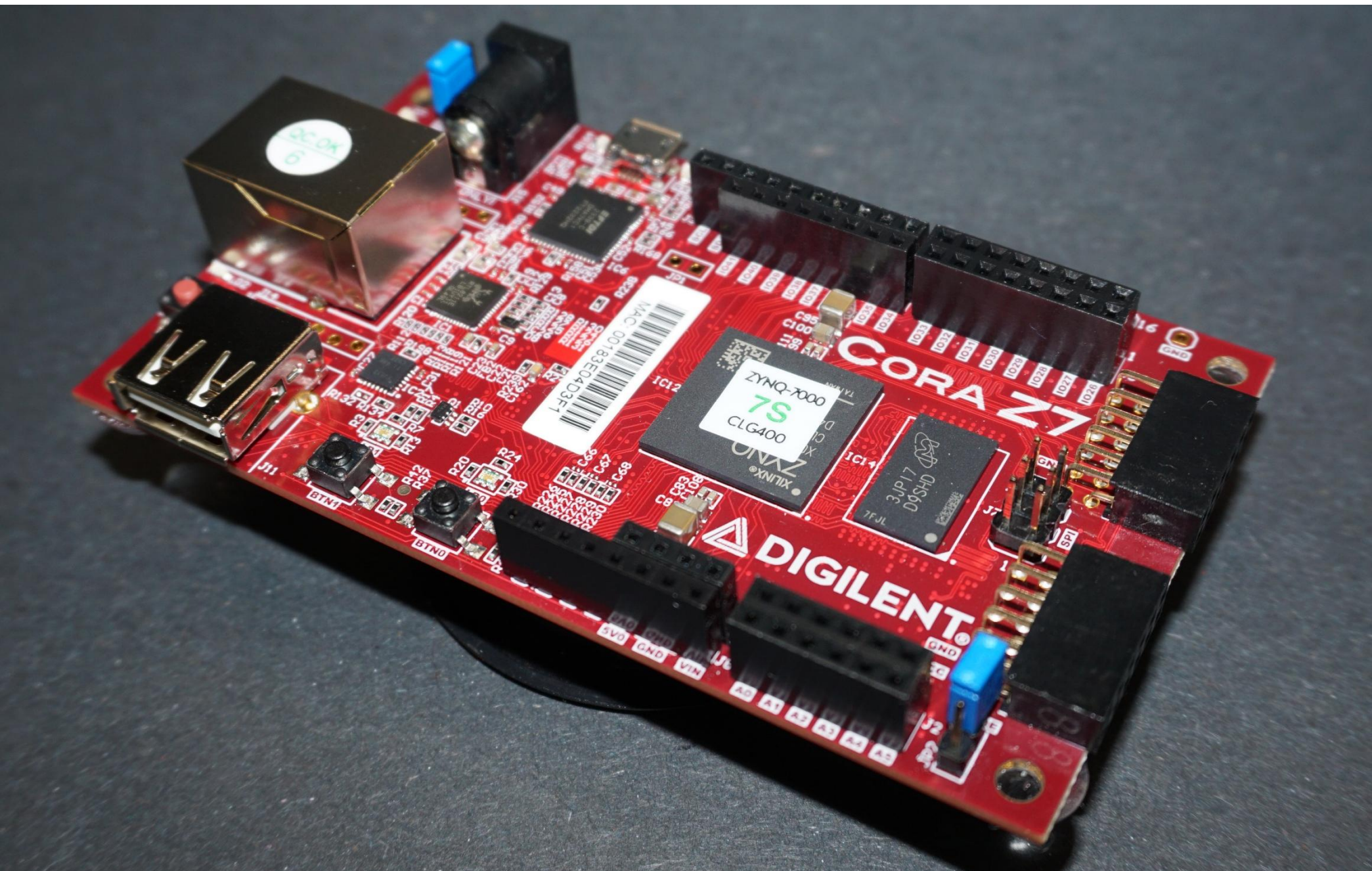
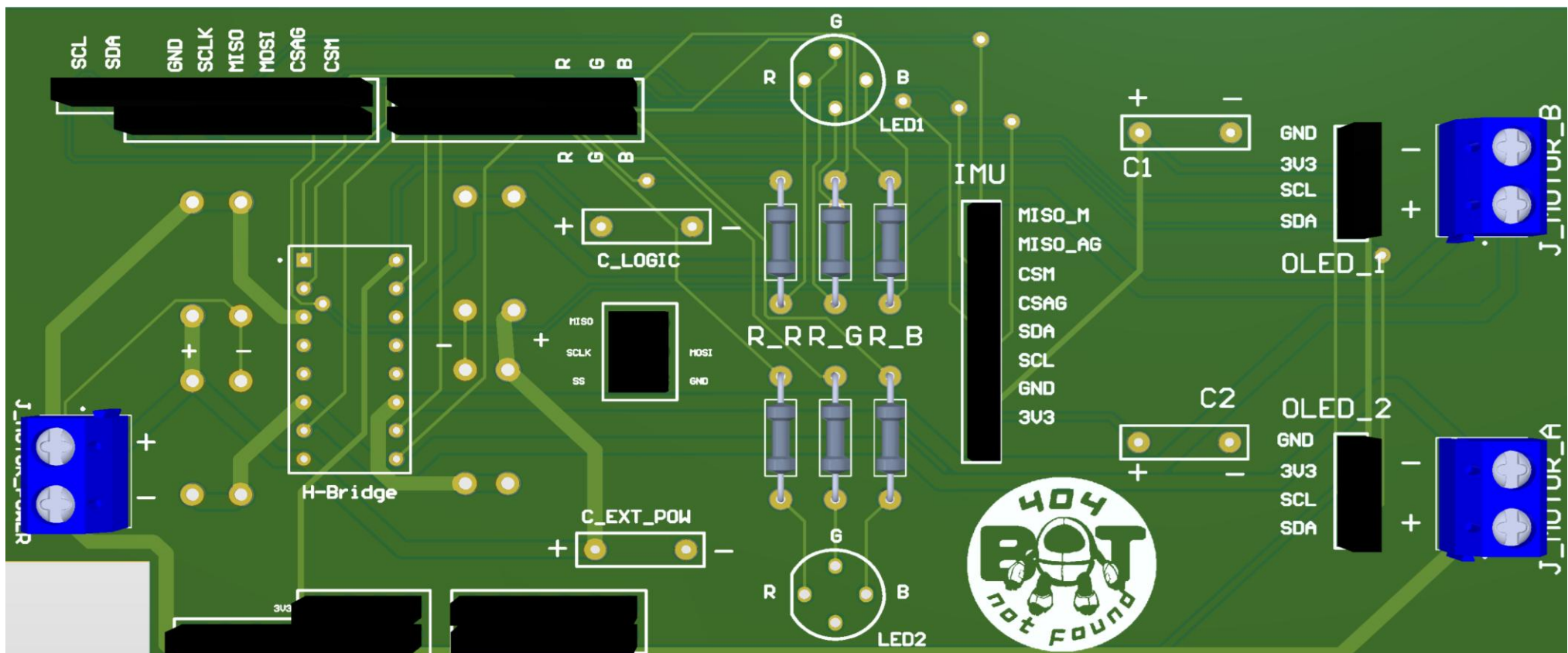
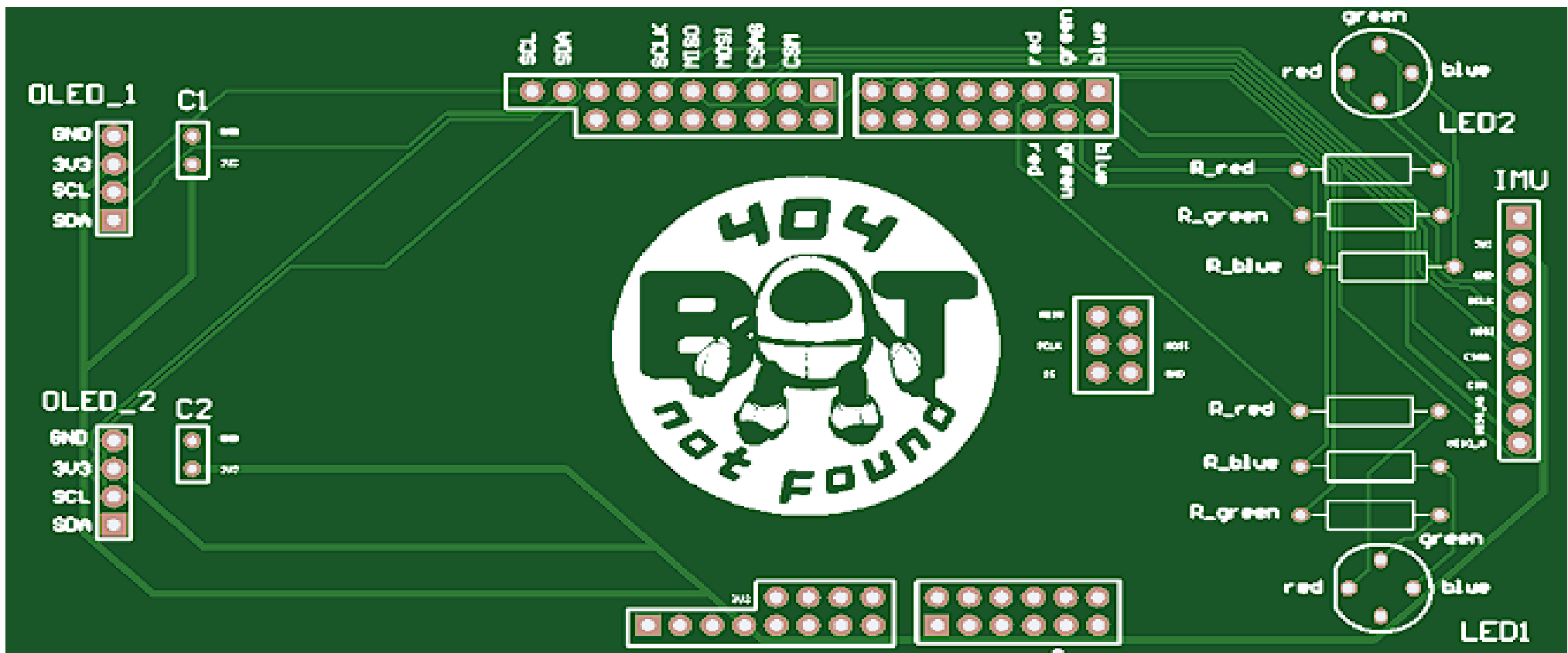


Overview



The Cora Z7 Development Platform enables hands-on learning by combining FPGA hardware with ARM-based software control. Through integrated SPI, I2C, GPIO, and PWM peripherals, the system supports real-time sensor reading, display output, and motor control providing a practical foundation for understanding embedded systems.

PCB



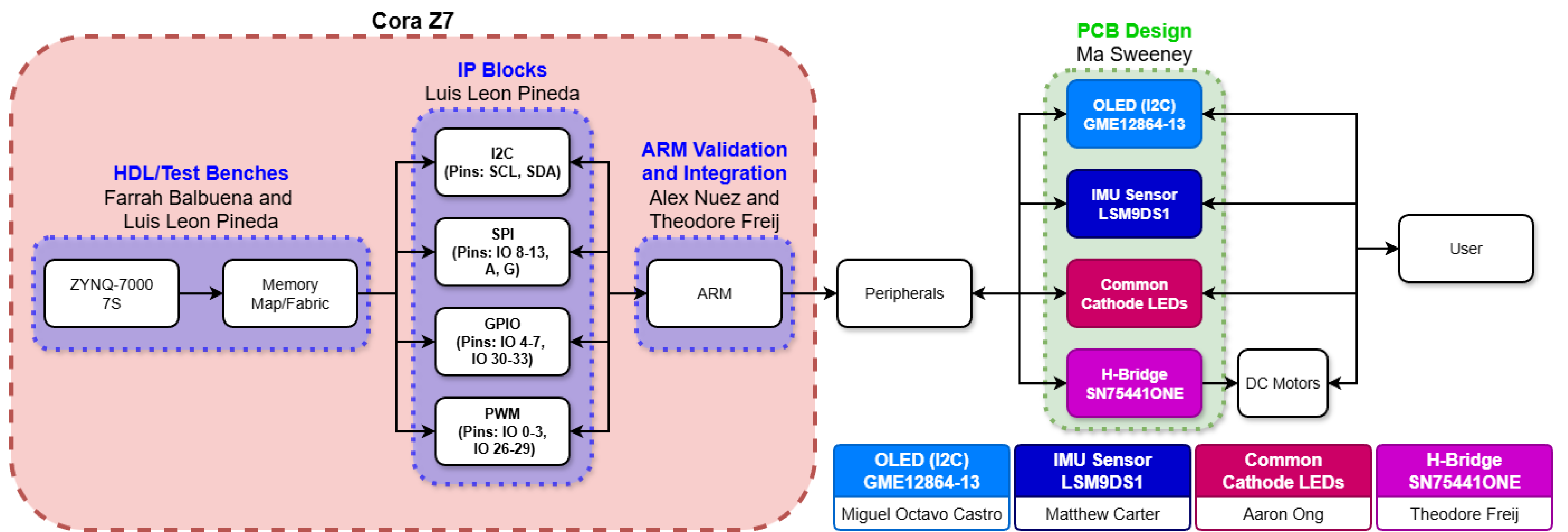
Design 1 Deliverables

- Completed top-level FPGA block design and generated a functional XSA
- Built HDL testbenches for SPI, I2C, PWM
- Validated SPI communication by reading IMU, validated I2C communication by initializing and writing to OLED
- Verified GPIO and PWM operation through buttons, LEDs, and RGB dimming
- Finished initial PCB design routing all peripheral interfaces

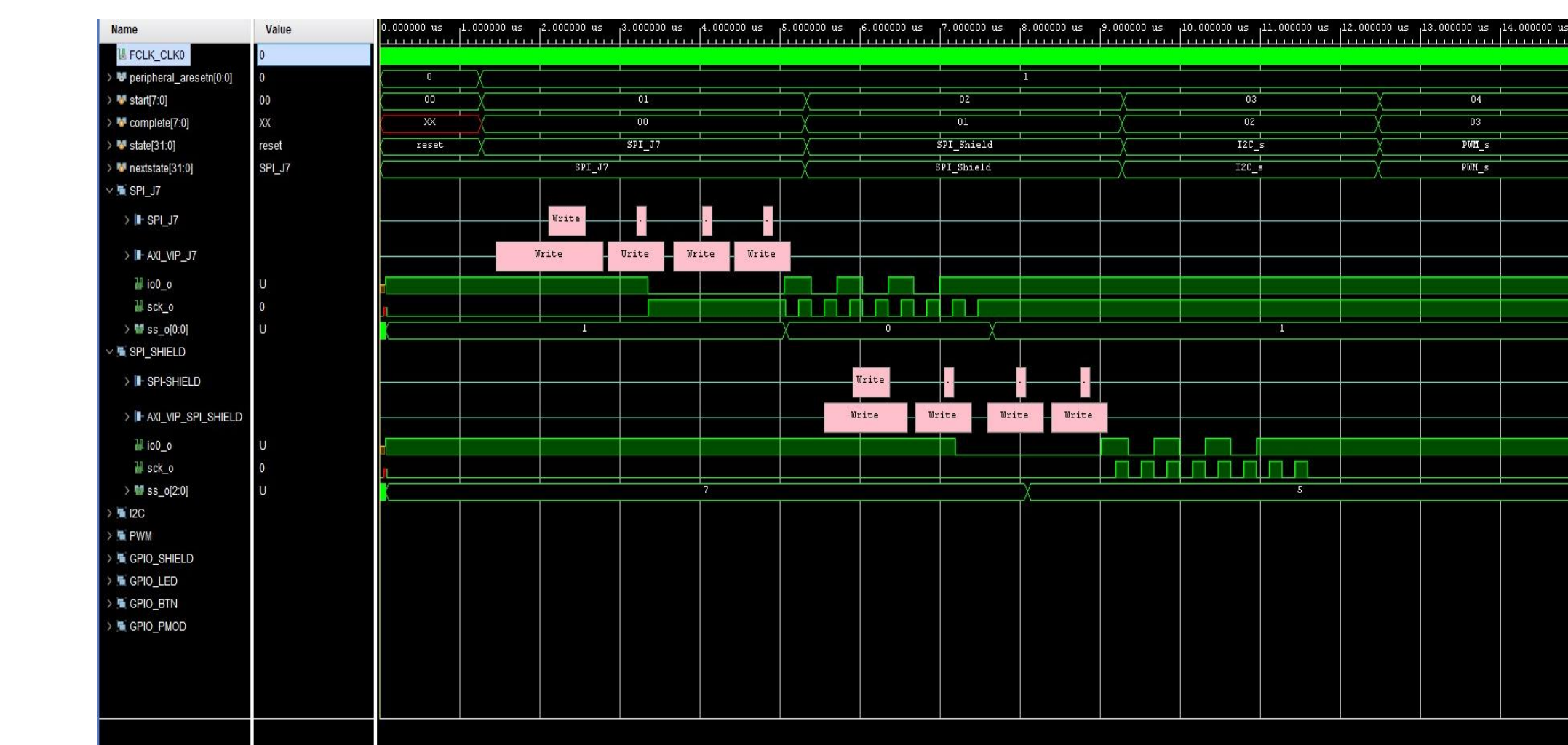
E1.07 – 404 Bot Not Found

Luis Leon Pineda (PM), Farrah Maezie Balbuena,
Marie-Albert Sweeney, Alexandra Nuez, Aaron Ong, Matthew Carter,
Theodore Freij, Miguel Octavo Castro
[Mark Welker](#)

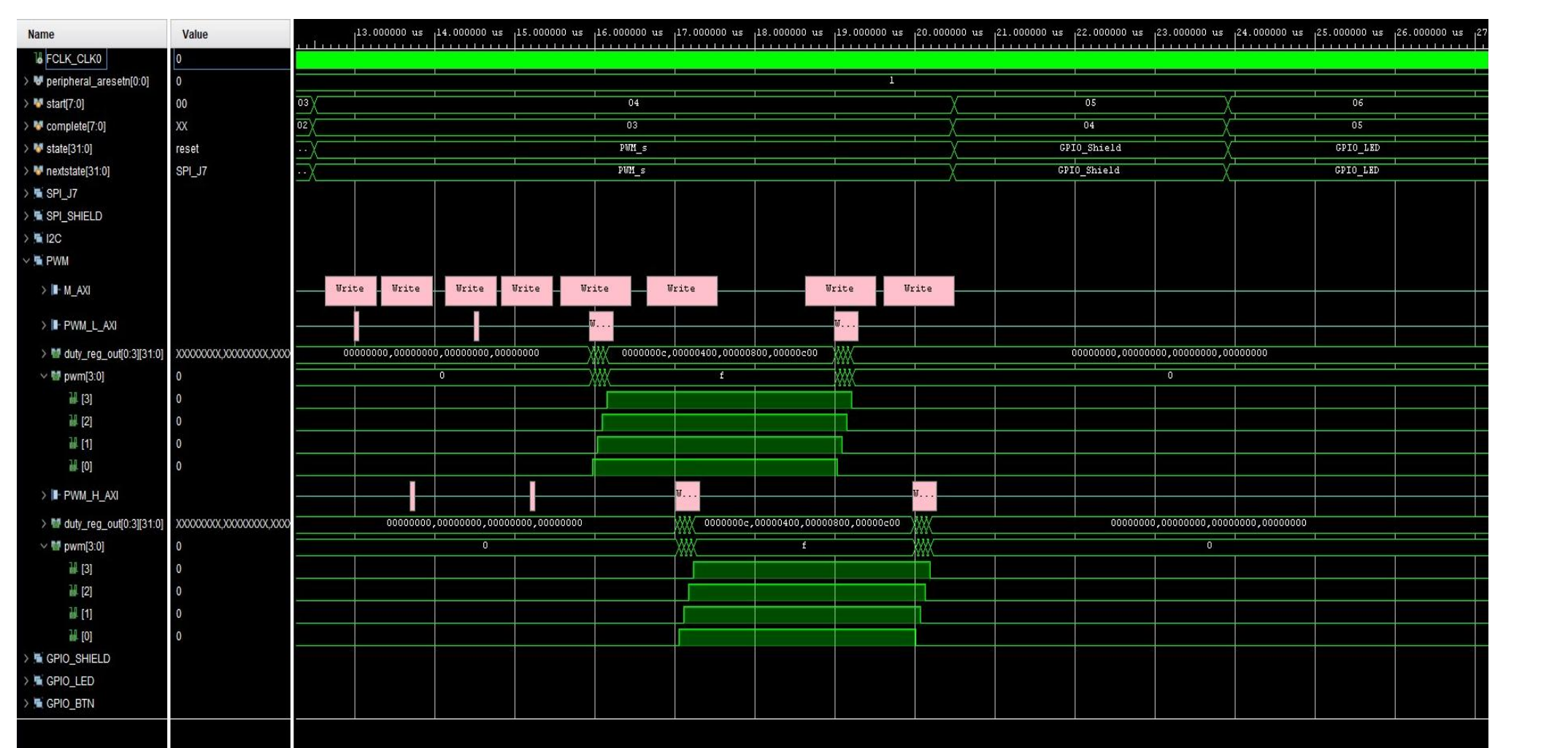
Overall Block Diagram



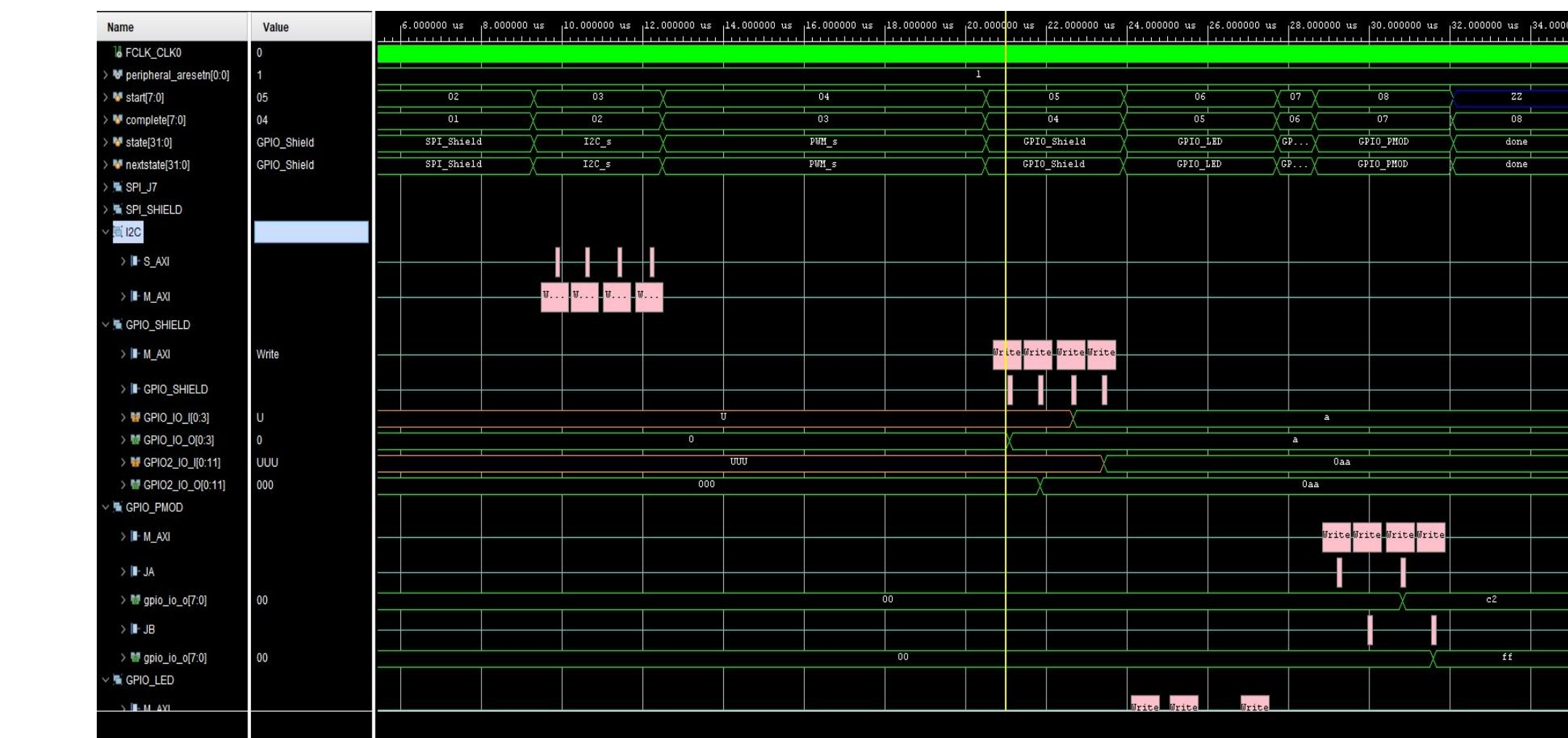
Testbenches



SPI Testbench



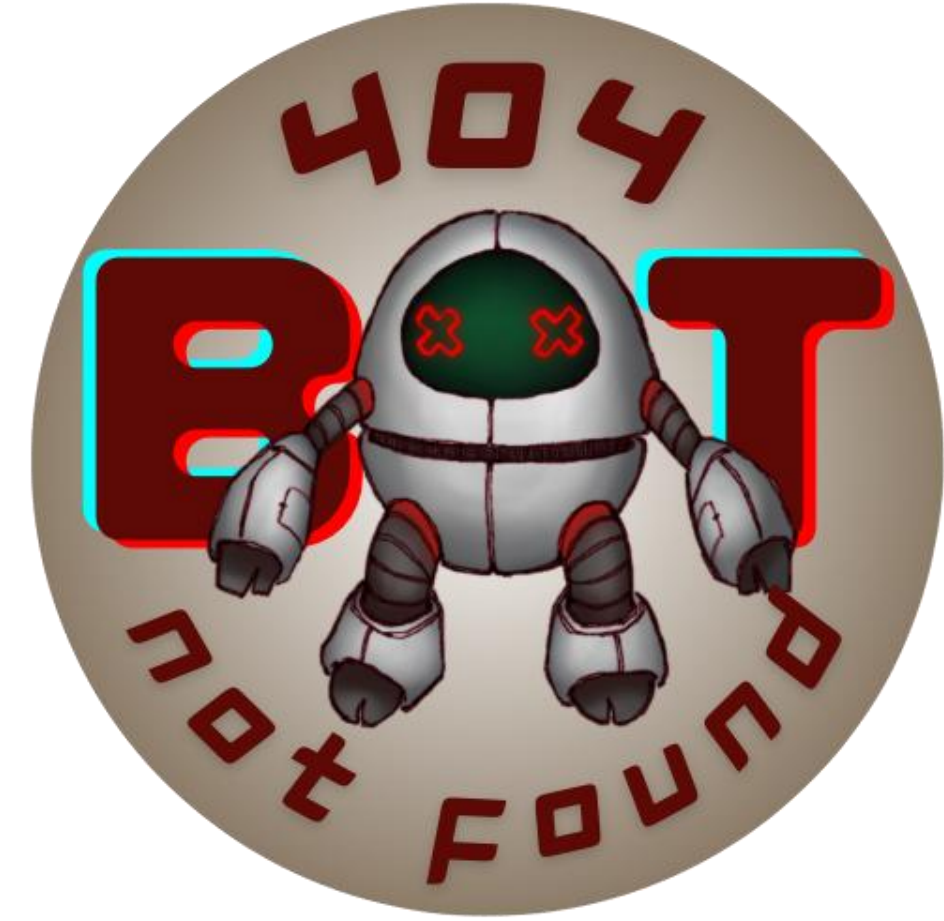
PWM Testbench



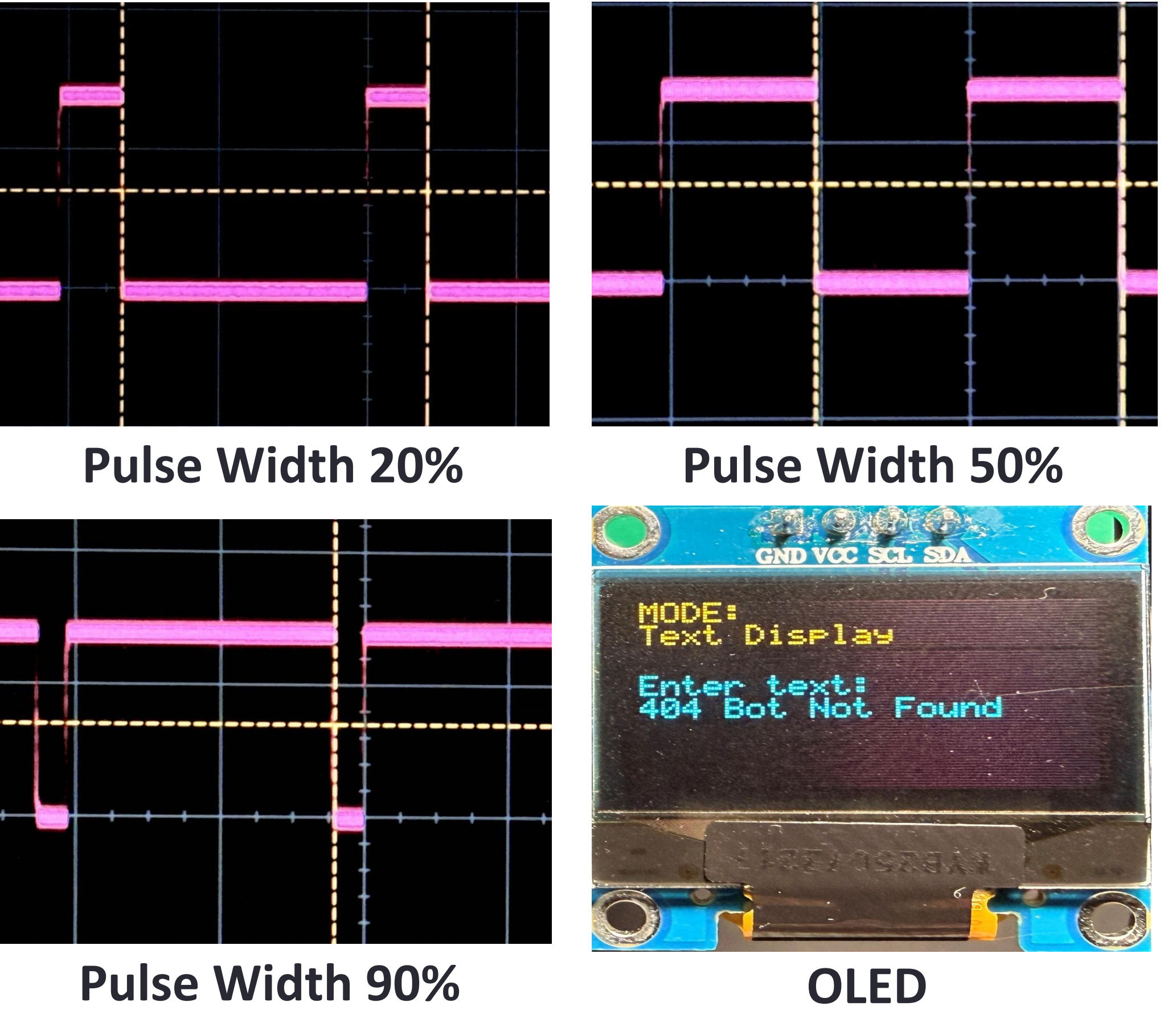
I2C/ GPIO Testbench

- SPI Testbench:** AXI VIP drives write transactions to both SPI buses verifying correct chip-select behavior, clock generation, and MOSI data output
- I2C Testbench:** Confirms proper START, address, data, and ACK sequences generated by the AXI IIC IP, validating register and bus communication
- PWM Testbench:** Verifies duty-cycle and period register updates through AXI writes, with the waveform showing correct PWM pulse generation across test states

The 404 Bot Not Found Team

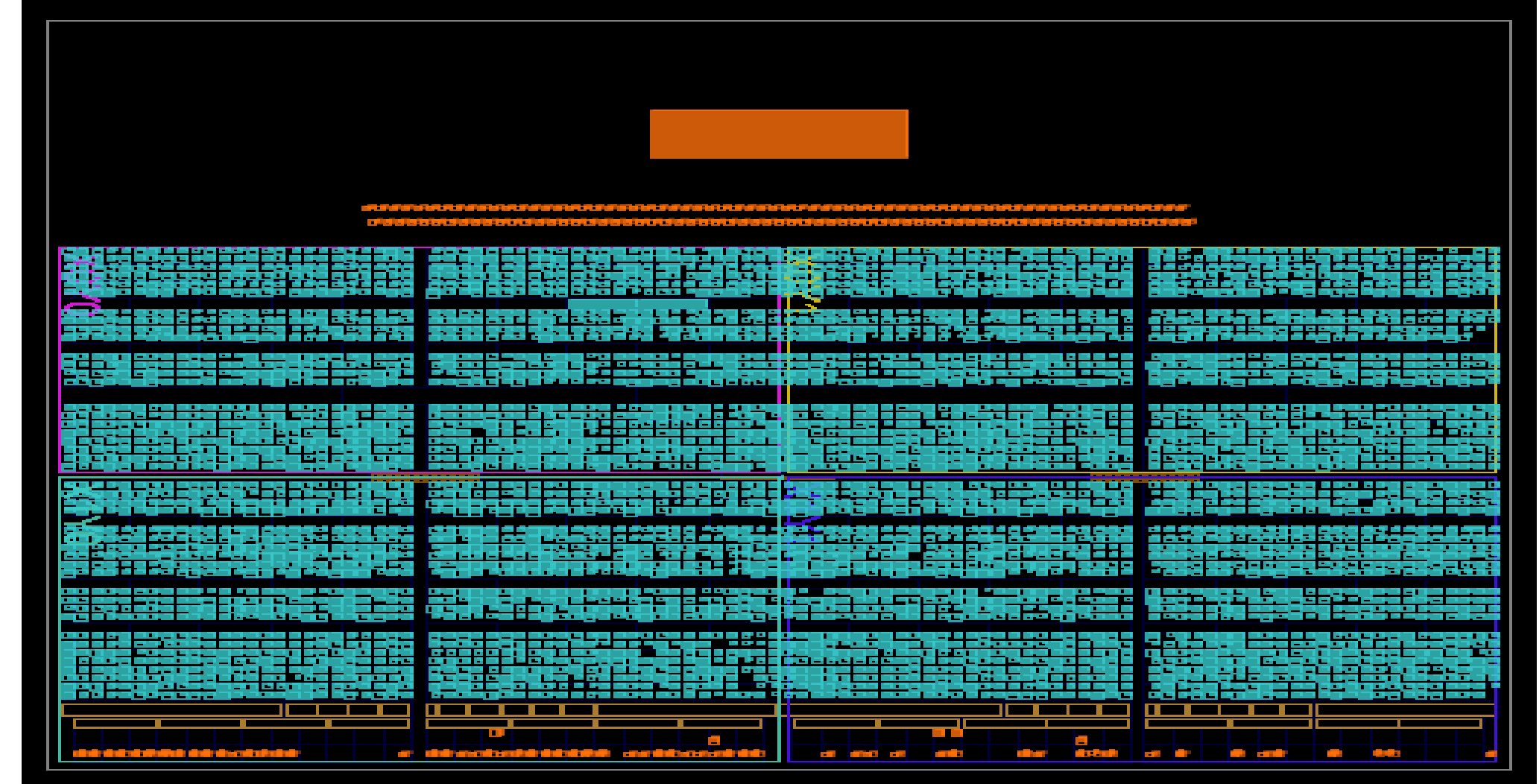


Peripherals



Accelerometer and Gyroscope

FPGA Fabric Layout



RTL is synthesized to show the layout of FPGA fabric.

Design 2 Goals

- Finalize ARM software package for the HDL curriculum
- Create a clear HDL workflow guide from IP integration to XSA generation
- Provide reusable HDL testbenches for all peripherals
- Produce three completed PCBs with full peripheral support
- Explore other applications for the Cora Z7 for senior design projects