E2.04 – NXP Peripheral Integration

TEXAS STATE UNIVERSITY
Ingram School of Engineering

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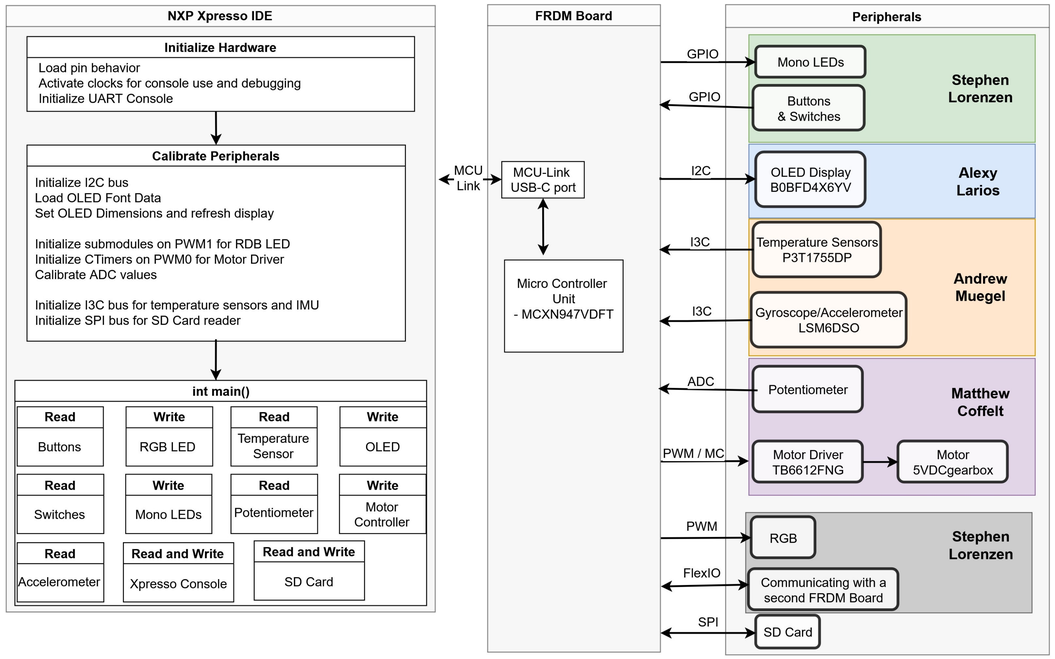
Project Sponsor and Faculty Advisor: **Mr. Welker**



Objective

Program a low-cost replacement for the EE3420 Microprocessors course's lab equipment using NXP's FRDM board and development environment.

What is MCUXpresso?

NXP's free, Eclipse-based IDE used to write, build, and flash firmware directly to the FRDM board. Features integrated clock and pin configuration tools, auto-generated initialization code, and onboard USB debugging.

The Team

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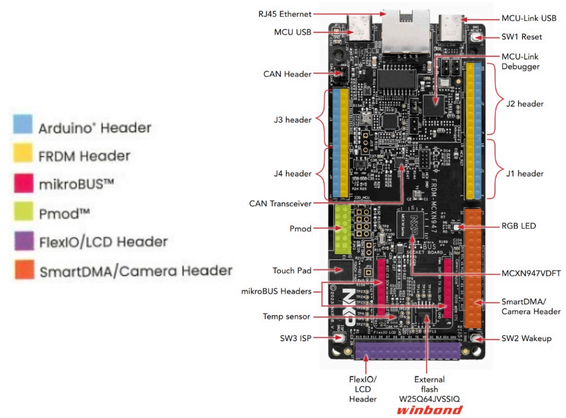
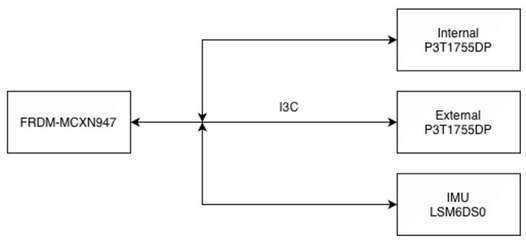
FRDM Layout



IMU and Temp Sensors

LSM6DS0 and P3T1755DP Sensors:

- Run at 3.3V
- Uses I3C for communication
- Various registers can be probed for information

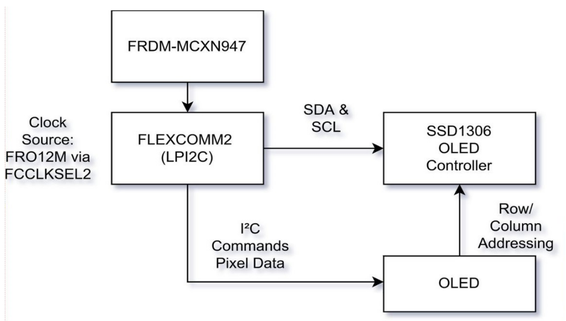



```
--- Performing DAA ---
DAA successful
Found 1 device(s):
 [0] dynAddr=0x6A vendor=0x CD0 part=0x5028140A
Using I3C dynamic address 0x6A

--- Reading WHO_AM_I ---

  SUCCESS: WHO_AM_I = 0x6C
```

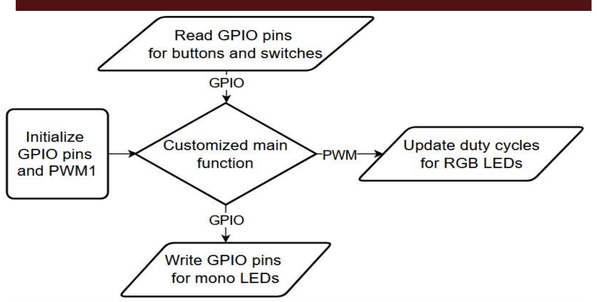
OLED Display



Requirements:

- I²C communication via FLEXCOMM2 (LPI2C)
- Maintain proper timing and synchronization
- Develop display buffer for output

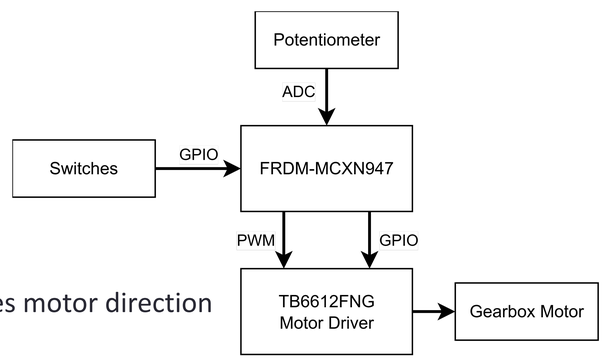
Switches and LED's



Motor Driver

FRDM-MCXN947:

- Clock source Frequency = 150 MHz
- PWM frequency = 20 kHz
- Converts ADC value into percentage
- Read switch action for gpio logic combo



TB6612FNG:

- Dual H-Bridge IC
- Two direction pins' input logic combo determines motor direction
- Standby pin enables/disables the driver

Labs

Lab 1: LED's and Switches
Lab 2: OLED Display Stopwatch
Lab 3: UART "Console" Communication
Lab 4: PMOD GPIO
Lab 5: SPI, I2C, I3C
Lab 6: ADC and Servo

Acknowledgements

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E2.03: Diamond Dogs