MSE2202B Prototype Specification Document

- Electronics, Sensors and Actuators
    - Main MCU
        - Nucleo-64, STM32 - F446RE
        - 180 MHz ARM Cortex-M4
        - 512 kb flash, 128 kb RAM
    - Sensors
        - Magnetic
            - ST LSM303
                - 1x Located on claw for cube detection
            - NXP MAG3110
                - 1x Located on rear chassis for cube detection for accurate pyramid placement
        - Distance
            - VEX Ultrasonic Rangefinder
                - 2x located on left side for parallel wall following
                - 1x located on front side for turning
        - IR
            - TSOP32338
                - 1x located on rear for Pyramid detection
                - 1x located on rear for Pyramid detection (with focusing shroud)
        - DC Motors, All controlled via VEX 29 Motor Controller
            - VEX DC motor
                - 1x located on claw linear slice
                - 3x located on pyramid lift
            - Chinese 12V DC motor with gearbox
                - 1x for left drive
                - 1x for right drive
        - Servo Motors
            - VEX Servo
                - 1x located on claw
        - Wireless Communications
            - ESP8266 WiFi Module
                - 1x for user to issue start and stop commands via a phone of computer
        - Misc.
            - Limit Switches
                - 2x located on claw linear slide
                    - Connected as interrupts to GPIO ports
                - 2x located on pyramid lift
                    - Connected as interrupts to GPIO ports

MCU Features:

- STM32F429ZIT6 in LQFP144 package
- ARM®32-bit Cortex®-M4 CPU with FPU
- 180 MHz max CPU frequency
- VDD from 1.8 V to 3.6 V
- 2048 KB Flash
- 256+4 KB SRAM, including 64 KB of CCM (core coupled memory) data RAM
- GPIOs (114) with external interrupt capability
- 16-stream DMA controller with FIFOs and burst support
- 12-bit ADCs with 24 channels (3)
- 12-bit DAC channels (2)
- USART/UART (4)
- I2C (3)
- SPI (6)
- Advanced-control Timer (2)
- General Purpose Timers (10)
- Watchdog Timers (2)
- CAN 2.0B active (2)
- SAI
- SDIO
- Random Generator (TRNG for HW entropy)
- USB 2.0 OTG HS
- USB 2.0 OTG FS
- Camera interface
- Ethernet
- LCD-TFT