

P19345 Feasibility Questions:

1. Can a user with a technical background equal to a Mechanical Engineer replicate our modular control panel circuit design?
 - Open Source Project
 - Include additional instructions and simplified bill of materials for external users to create, implement and benefit from our system design
 - Confirm users will not be required to code, only interact with the provided interface

2. Does our design communicate effectively with the existing RIT Model Railroad NCE system?
 - Include in Test Plan
 - Can we send and receive information without issues?
 - Can our new system provide visible output onto RIT MRC current system? ie./ LED illuminated
 - Required to interface with NCE command station

3. Is the clock rate of the microcontroller / board being used for the new layout brain / control panel fast enough to send signals between two systems?
 - Benchmarking data included research in clock rate of different microcontrollers
 - Amount of data / information being sent to and received from the board while in the MRC current system was considered

New Layout Brain Microcontroller						
Model	ATMEGA328PB-AUR	ATMEGA2560-16AUR	PIC32MX250F128D-I/P T	STM32F030C8T6TR	PIC16F1716T	MSP430F5310
Manufacturer	Microchip	Microchip	Microchip	STMicroelectronics	Microchip	Texas Instruments
Clock Rate	20 MHz	16 MHz	40 MHz	48 MHz	32 MHz	8 MHz
I/O	23 General Purpose I/O	86	33	39	25	31
Memory	27 KB	256 KB	128 KB	64 KB	14 KB	32 KB
Bits	8	8	32	32	8	16
Price	\$1.46	\$12.35	\$3.97	\$1.98	\$1.41	\$3.48
Package	32-TQFP	100-TQFP	44-TQFP	48-LQFP	28-SSOP	48-LQFP
Connectivity	PC, SPI, UART/USART	EBI/EMI, I ² C, SPI, UART/USART	I ² C, IrDA, LINbus, PMP, SPI, UART/USART, USB OTG	I ² C, SPI, UART/USART	I ² C, LINbus, SPI, UART/USART	I ² C, IrDA, LINbus, SCI, SPI, UART/USART

4. What is the cost per unit?
 - Unit refers to parts we are working on relative to the prototype design

Component	Quantity	Price per Unit (\$)	Total Price (\$)
RS232 to USB Port (TL377-ND)	1	18.45	18.45

Raspberry pi 3 Model B+	1	35.00	35.00
Raspberry pi 3 Model B	1	29.44	29.44
Raspberry pi Zero	1	10.00	10.00
Screw-in phoenix-type connector (10 pins)	2	1.94	3.88
40-pin header	1	0.95	0.95
Total:			97.72

5. Is the cost appropriate for the boards' expected functionality?
 - Refers to the customer stating the board should not cost \$50 dollars just to control one on the MRC current system
 - Yes

6. What input to output ratio for the board is appropriate for the function of the board?
 - (refers to customer preferably wanting more pins for ...)
 - 8 or more pinouts - customer is currently using 8 pinouts for the control board and would prefer to have more if possible

7. What are expected expenses for the project? Are the expenses within the budget?
 - Microcontroller (2)
 - Buttons
 - LEDs
 - Breadboard

8. Will the system be able to respond correctly if there is a loss of block detection information?
 - Include test plan
 - Remove block detection sensor and run system
 - Tamper or adjust block detection sensor while system is running
 - Monitor that correct response is implemented