egr 3X4

Ira A. Fulton Schools of Engineering
Arizona State University

EGR-314 Team-208 (Abner Oaxaca, Enyinnaya Onyenso, Joaquin Jimenez, Panagiotis Levendis)

1. Determine your project-specific requirements		3. Look up specifications in the PIC datasheet		
Design Considerations	**Team Project-Specific Requirements** from Problem Definition and Block Diagram	**PIC Option 1**	**PIC Option 2**	**PIC Option 3**
How many GPIO Pins?[1]	30	**36**	**34**	**12**
Built-in Analog to Digital Converter? How many?	1	**1**	**1**	**1**
Built-in Hardware PWM? How many?	4	**4**	**6**	**2**
Built-in I2C? SPI? How many?	2/1	**2/1**	**2/3**	**2/2**
Built-in UART? How many?	2	**2**	**4**	**1**
Other Required Built-In Features? *(optional)*				
Additional considerations specific to your project specifications *(optional)*	**Operation Voltage Min.(V)**	**1.8V**	**2.0V**	**2.2-5V**
2. Find 3 microcontrollers that meet your team project-specific requirements and find information on each		**4. Look up part details in the PIC datasheet**		

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[1] No PIC16F887, PIC16F917, PIC18F47Q10, or dsPICs allowed

Microcontroller Considerations	Instructions	PIC Option 1	PIC Option 2	PIC Option 3
Part Number[2]	*Include the entire part number (leave off any letters at the end that specify the package type)*	**PIC18F46K42**	**PIC24FJ128GB204**	**PIC16F18325**
Link (URL) to product page	*Do not paste links directly into the table. Instead, link them like this.*	[Product page](#)	[Product page](#)	[Product page](#)
Links (URL) to Data Sheets		[DataSheet](#)	[DataSheet](#)	[DataSheet](#)
Links (URL) to Application Notes	*Often provided by manufacturers to give you specific examples of how to use their products. Search for them in the search bar on the Microchip's website.*	[Application Note Writing code for PIC16 and PIC18](#)		[Application Note Writing code for PIC16 and PIC18](#)
Links (URL) to Code Examples				
Links (URL) to External Resources	*Search on Google and YouTube for other resources for each specific microcontroller.*			
Production Unit Cost	*Find in the Microchip online store, or Digikey*	**$2.54**	**$5.38**	**$1.60**
Supply Voltage Range	*Find in the microcontroller datasheet*	**2.3V-5.5**	**2V-3.6V**	**2.3V-5.5**

[2] General Purpose Input/Output Pins - calculate based on your block diagram and include at least 20% more than you need. Avoid using In-System Programming (ISP) pins for GPIO.

		V		V
Absolute Maximum Current for entire IC	*Find in the microcontroller datasheet*	**350mA**	**300mA**	**250mA**
Maximum GPIO Pin Current (Source/Sink)	*Find in the microcontroller datasheet*	**+/-50mA**	**200mA**	**+/-20mA**
8-bit or 16-bit Architecture	*Find in the microcontroller datasheet*	**8-bit**	**16-bit**	**16-bit**
Available IC Packages / Footprints	*Find in the microcontroller datasheet. Choose a microcontroller with both surface mount and DIP/through-hole packages available. See Most Common Mistakes below for requirements to improve manufacturing reliability.*	**Surface Mount, Through hole**		**Surface Mount, Through hole**
Supports External Interrupts?	*Find in the microcontroller datasheet*	**Yes**	**Yes (5)**	**Yes**
In-System Programming Capability and Type	*Allows for programming the microcontroller without removing it from the PCB. Find in the microcontroller datasheet.*	**Yes, C**		**Yes, C**
Programming Hardware, Cost, and URL	*Find on the microcontroller product page*			
Works with [MPLAB® X Integrated Development Environment](#) (IDE)?	*Required. See [Microchip Development Tools](#)*	**Yes**	**Yes**	**Yes**
Works with [Microchip Code Configurator](#)?	*Required. Go to the [MCC website](#), click the "Manual Downloads" tab, scroll to the device library that goes with the PIC you chose (likely "MCC 8-bit PIC") and read the release notes to make sure your microcontroller is in the list of supported devices.*	**Yes**	**Yes**	**Yes**

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5. Write overall pros, cons, and rankings for the chosen microcontrollers

Overall Pros	*Write at least 2 for each microcontroller*	multiple 8-bit and 16-bit timers multiple UARTS	-16-bit capability - Many UART, SPI, I2C capability	Smaller Inexpensive
Overall Cons	*Write at least 2 for each microcontroller*	limited memory capacity 8-bit instead of 16-bits	0 DAC Outputs Only 1 PWM Time Base	Less GPIO pins Less application tools
Ranking	*1 = first, 2 = second, 3 = third*	1	2	3

6. Final Microcontroller Choice: <PIC18F46K42 choice #1 >

Rationale: <We decided to go with option #1 because of the limitations the other two microcontrollers faced while option #1 passed all the tests. It also offered multiple UARTS as well as analog-to-digital. It was somewhat limited when it came to memory capacity as well as clock speed but those factors won't affect our final product. . >

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