| **1. Determine your project-specific requirements** | **3. Look up specifications in the PIC datasheet** | | |
| --- | --- | --- | --- |
| **Design Considerations** | **PIC Option 1** | **PIC Option 2** | **PIC Option 3** |
| How many GPIO Pins?[[1]](#footnote-0) | **12/8** | **53/8** | **33/8** |
| Built-in Analog to Digital Converter? How many? | **11/2** | **35/2** | **12/2** |
| Built-in Hardware PWM? How many? | **2/2** | **2/2** | **/2** |
| Built-in I2C? SPI? How many? | **spi** | **2 I2C/spi** | **spi** |
| Built-in UART? How many? | **1/2** | **2/2** | **/2** |
| Other Required Built-In Features? *(optional)* |  | **4 16 bit Timers** |  |
| Additional considerations specific to your project specifications *(optional)* |  |  |  |
| **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** | | |
| **Microcontroller Considerations** | **PIC Option 1** | **PIC Option 2** | **PIC Option 3** |
| Part Number[[2]](#footnote-1) | **PIC16F18325T-I/SL** | **PIC18F47Q10-I/PT** | **ATMEGA808-AUR** |
| Link (URL) to product page | [**Link**](https://www.digikey.com/en/products/detail/microchip-technology/PIC16F18325T-I-SL/5286788) | [**Link**](https://www.digikey.com/en/products/detail/microchip-technology/PIC18F47Q10-I-PT/10187786) | [**LINK**](https://www.digikey.com/en/products/detail/microchip-technology/ATMEGA808-AUR/10444937) |
| Links (URL) to Data Sheets | [**Link**](http://ww1.microchip.com/downloads/en/DeviceDoc/40001744C.pdf) | [**Link**](https://ww1.microchip.com/downloads/en/DeviceDoc/PIC18F27-47Q10-Data-Sheet-40002043E.pdf) | [**LINK**](https://ww1.microchip.com/downloads/aemDocuments/documents/MCU08/ProductDocuments/DataSheets/ATmega808-09-1608-09-DataSheet-DS40002172C.pdf) |
| Links (URL) to Application Notes |  | [**Link**](http://www.microchip.com/en-us/application-notes) |  |
| Links (URL) to Code Examples |  | [**Link**](https://mplabxpress.microchip.com/mplabcloud/example?device=q10) |  |
| Links (URL) to External Resources |  | [**Link**](https://ww1.microchip.com/downloads/en/DeviceDoc/PIC18F2X_4XQ10-Memory-Programming-Spec-40001874H.pdf) |  |
| Production Unit Cost | **$1.27** | **$1.94** | **$1.24** |
| Supply Voltage Range | **2.3V to 5.5V** | **1.7V to 5.5V** | **-0.5V to 5V** |
| Absolute Maximum Current for entire IC |  | **5.7 mA** | **200mA** |
| Maximum GPIO Pin Current (Source/Sink) |  | **200 μA** | **40mA** |
| 8-bit or 16-bit Architecture | **16 bit** | **8-bit** | **8-bit** |
| Available IC Packages / Footprints | **Surface Mount** | **Surface Mount** | **Surface Mount** |
| Supports External Interrupts? | **Yes** | **Yes** | **Yes** |
| In-System Programming Capability and Type | **C** | **Yes, C** | **C** |
| Programming Hardware, Cost, and URL |  | **MPLAB® PICkit™ 5 in-circuit debugger/programme**  **$94.99**  [**Link**](https://www.microchip.com/en-us/development-tool/PG164150) |  |
| Works with [MPLAB® X Integrated Development Environment](https://www.microchip.com/mplab/mplab-x-ide) (IDE)? | **Yes** | **Yes** | **Yes** |
| Works with [Microchip Code Configurator](https://www.microchip.com/mplab/mplab-code-configurator)? |  | **Yes** |  |

| **5. Write overall pros, cons, and rankings for the chosen microcontrollers** | | | | |
| --- | --- | --- | --- | --- |
| **Overall Pros** | *Write at least 2 for each microcontroller* | * **Smaller/ easy to solder** * **Less application tools** | * **Familiarity** * **Plenty of GPIO Pins** | * **Functionality** * **Similar to class** |
| **Overall Cons** | *Write at least 2 for each microcontroller* | * **Less GPIO pins to work with** * **Minimal datasheet** | * **Low Operating Voltage Range** * **Difficult Assembly** | * **Could be hard to find information** * **Lower in stock** |
| **Ranking** | *1 = first, 2 = second, 3 = third* | **2** | **1** | **3** |

**6. Final Microcontroller Choice**: **PIC18F47Q10-I/PT**

**Rationale**: Because it's familiar to the class, we can work it in more seamlessly into our design without a lot of modification to our subsystem designs.

1. No PIC16F887, PIC16F917, PIC18F47Q10, or dsPICs allowed [↑](#footnote-ref-0)
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. [↑](#footnote-ref-1)