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]	Need at least 10 GPIO Pins	**23**	**14**	**28**
Built-in Analog to Digital Converter? How many?	Least 2 Analog to Digital Converter JUST INCASE	**14**	**11**	**24**
Built-in Hardware PWM? How many?	1 Built in PWM for the motor	**8**	**2**	**2**
Built-in I2C? SPI? How many?	1 built in I2C for the temperature sensor and the pressure sensors	**2 SPI and 2 I2C**	**2 SPI and 2 I2C**	**2 SPI and 2 I2C**
Built-in UART? How many?	None	**3**	**1**	**1**
Other Required Built-In Features? *(optional)*	None	**-**	**-**	**-**
Additional considerations specific to your project specifications *(optional)*	**Needs to be easy to solder and not super small**	**-**	**-**	**-**
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	**Instructions**	**PIC Option 1**	**PIC Option**	**PIC Option 3**

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

			2	
Part Number[2]	*Include the entire part number (leave off any letters at the end that specify the package type)*	**AVR32DA32-I/PT**	**PIC16F18425-E/SL**	**PIC18F27Q10**
Link (URL) to product page	*Do not paste links directly into the table. Instead, link them like this.*	Link	Link	Link
Links (URL) to Data Sheets		Data Sheet	Data Sheet	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.*	Touchpad CCL Bootloader	Layout 5 bit ADC C-Code	HLVD 5 Bit ADC ADCC CCP Getstarted
Links (URL) to Code Examples		Code Example	Curiosity Demo Git	Curiosity Demo HPC
Links (URL) to External Resources	*Search on Google and YouTube for other resources for each specific microcontroller.*	UPDI Program Number Maze	Embedded Lab Dev Kit Uart Example	Help forum Arduino Uni
Production Unit Cost	*Find in the Microchip online store, or*	**$1.65**	**$1.58**	**$1.76**

[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.

	Digikey			
Supply Voltage Range	*Find in the microcontroller datasheet*	**1.8-5.5V**	**1.8v - 5.5v**	**1.8v - 5.5v**
Absolute Maximum Current for entire IC	*Find in the microcontroller datasheet*	**350 mA**	**250 mA**	**250 mA**
Maximum GPIO Pin Current (Source/Sink)	*Find in the microcontroller datasheet*	**±50 mA**	**±50 mA**	**±50 mA**
8-bit or 16-bit Architecture	*Find in the microcontroller datasheet*	**32**	**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.*	**6LX = VQFN48 RXB = VQFN32 PT = TQFP SS = SSOP SO = SOIC SP = SPDIP**	**14 - PDIP 14 - SOIC (3.9 mm) 14 - TSSOP 16 - UQFN (4x4)**	**28-pin SPDIP 28-pin SOIC 28-pin SSOP 28-pin VQFN 28-pin QFN**
Supports External Interrupts?	*Find in the microcontroller datasheet*	**Yes**	**Yes**	**Yes up to 3**
In-System Programming Capability and Type	*Allows for programming the microcontroller without removing it from the PCB. Find in the microcontroller datasheet.*	**Yes In-System Programmable**	**Yes In-System Programmable**	**In Circuit Serial Programming**
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**

5. Write overall pros, cons, and rankings for the chosen microcontrollers				
Overall Pros	*Write at least 2 for each microcontroller*	**Features a 32-bit architecture, offering higher computational power and efficiency for complex applications.** **Wide supply voltage range (1.8-5.5V), providing flexibility in power supply design.**	**Lower cost compared to the other options, making it a budget-friendly choice for cost-sensitive projects.** **Available in a DIP package, facilitating easy soldering and prototyping for beginners or projects with manual assembly needs.**	**Highest number of GPIO pins (28) and ADC inputs (24), ensuring ample connectivity for sensors and actuators.** **Supports a wide range of communication protocols including 2 SPI and 2 I2C, offering versatile peripheral connectivity.**
Overall Cons	*Write at least 2 for each microcontroller*	**Limited number of ADC inputs (14) compared to project requirements, potentially restricting the number of analog sensors that can be**	**Fewer GPIO pins (14) than required for projects needing extensive external**	**Higher cost relative to other options, which may affect budget considerations for the project.**

		directly connected. **Lacks a DIP package option, making it less ideal for projects requiring manual soldering or prototyping on breadboards.**	**connections.** **Limited ADC inputs (11), restricting the direct interfacing with multiple analog sensors.**	**While it offers a broad feature set, the complexity and capabilities might necessitate a steeper learning curve.**
Ranking	*1 = first, 2 = second, 3 = third*	**2**	**3**	**1**

6. Final Microcontroller Choice: PIC18F27Q10

Rationale: The PIC18F27Q10 is selected as the optimal microcontroller for this project. Its extensive GPIO and ADC offerings align perfectly with the project's need for multiple sensor and actuator interfaces, while its support for essential communication protocols accommodates complex system designs. Despite its slightly higher cost, the PIC18F27Q10's adaptability and the availability of development tools justify its selection, promising a smoother development process and a robust final product.