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** PIC24EPXXXGP/MC20X PIC24EP32GP202	**PIC Option 2** **PIC16F18124**	**PIC Option 3** **PIC16F18855**
How many GPIO Pins?[1]	Needs at least 10 pins	**21**	28	**36**
Built-in Analog to Digital Converter? How many?	Needs at least 2 ADC pins, incase our team wants to switch	**6**	19	**29**
Built-in Hardware PWM? How many?	Needs at least one PWM	**3**	3	**4**
Built-in I2C? SPI? How many?	Needs at least 3 (two I2C, one SPI)	**2,2**	**(2,2)**	**2**
Built-in UART? How many?	Needs at least 2 pins UART (RX,TX)	**2**	**(2,2)**	**2**
Other Required Built-In		**-**	**-**	**-**

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

Features? *(optional)*				
Additional considerations specific to your project specifications *(optional)*	Since our project will be outside it must be able to operate from 0C-45C minimum	**-40℃ to 85℃**	**-40℃ to 85℃**	**-40℃ to 85℃**
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 2**	**PIC Option 3**
Part Number[2]	*Include the entire part number (leave off any letters at the end that specify the package type)*	**PIC24EP32GP202**	**PIC16F18124**	**PIC16F18855**
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		**LINK**	**LINK**	**LINK**

[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.

Sheets				
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.*	LINK, LINK	LINK, LINK, LINK LINK LINK LINK LINK LINK	LINK, LINK, LINK
Links (URL) to Code Examples		LINK, LINK, LINK	CLC examples	LINK, LINK
Links (URL) to External Resources	*Search on Google and YouTube for other resources for each specific microcontroller.*	LINK	programming PICs in 18F family playlist	LINK
Production Unit Cost	*Find in the Microchip online store, or Digikey*	**$1.55**	**$1.35**	**$1.97**
Supply Voltage Range	*Find in the microcontroller datasheet*	**3.0-3.6V**	**1.62-5.5V**	**2.3V - 5.5V**
Absolute Maximum Current for entire IC	*Find in the microcontroller datasheet*	**200mA**	**250mA**	**350mA**
Maximum GPIO Pin Current	*Find in the microcontroller datasheet*	**25mA**	**50mA**	**25mA**

(Source/Sink)				
8-bit or 16-bit Architecture	*Find in the microcontroller datasheet*	**16-bit**	**8-bit**	**8-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.*	**PIC24EPXXXGP/MC20X family contains both through-hole and surface mount footprints. Pages 5&6**	**PIC18F24Q24T-I/SS PIC18F24Q24-I/SO PIC18F24Q24-I/SS PIC18F24Q24-I/STX PIC18F24Q24-I/SP PIC18F24Q24T-I/ST X PIC18F24Q24-E/STX PIC18F24Q24T-I/SO PIC18F24Q24-E/SP**	**PIC16(L)F1885X/ 7X family contains both through-hole and surface mount footprints. LINK**
Supports External Interrupts?	*Find in the microcontroller datasheet*	**Yes**	**Yes**	**Yes**
In-System Programming Capability and Type	*Allows for programming the microcontroller without removing it from the PCB. Find in the microcontroller datasheet.*	**PGECx/PGEDx pins used for In-Circuit Serial Programming™ (ICSP™) and debugging purposes**	**In-Circuit Serial Programming™ (ICSP™) via Two Pins**	**In-Circuit Serial Programming via two pins (PGC & PGD)**

Programming Hardware, Cost, and URL	*Find on the microcontroller product page*	**MPLAB® X, Free, LINK**	**(MPLAB® ICD 5 In-Circuit Debugger/Programmer,$399.99, Link)**	**MPAB X, MPAB ICD, ICE. LINK**
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*	• **Plenty of Code examples provided.** • **Contains 3 PWM Channels to implement additional features**	**meets all requirements with redundancy on necessary features, cost-effective**	• **Has an ample amount of I/O pins** • **Enhanced core features with multiple PWM and EUSART modules for serial communication**
Overall Cons	*Write at least 2 for each microcontroller*	• **Lacking in safety features** • **Few/Limited I/O Pins**	**lacking on code examples, not many external resources**	• **Limited processing power** • **Limited program memory**
Ranking	*1 = first, 2 = second, 3 = third*	**2**	**1**	**3**

6. Final Microcontroller Choice: <PIC16F18124>

Rationale: Our main choices were between option 1 and option 2. They are pretty similar, especially in cost and meet all the requirements necessary for our project. The biggest difference was whether our team was going to go with 8-bit or 16-bit. 16-bit provides a lot more capacity for completing more complex tasks in exchange for somewhat slower speeds and less efficiency of computation. However, for our project, the level of complexity for our task is not that high. We are taking signals from a temp and humidity sensor, transmitting them via UART, and then activating a motor actuator subsystem (a fan or series of fans) based on the date we receive. This our group deemed did not require a higher capacity architecture, leading to our final selection of option 2.